

REVIEW OF THE PRACTICES AND OUTCOMES OF THE NATURAL DISASTER RISK MANAGEMENT STUDY PROGRAMME: QUEENSLAND DEPARTMENT OF EMERGENCY SERVICES

Draft Final Report

**Centre for Disaster Studies
James Cook University**

This copy has been consolidated and edited
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Contact Officer:
Alan White

awhite@emergency.qld.gov.au

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Executive Summary and Summary of Recommendations

Purpose

The purpose of the report is to identify best practice methodologies for Natural Disaster Risk Management through the review of a selection of case studies. The report also undertakes a review of current methodologies both nationally and internationally as outlined in the objectives and deliverables below.

Objectives

Review methodology/content of selected Natural Disaster Risk Management Studies conducted by local governments and/or consultants, The "Red Books", and international literature to:

- Identify "Best Practice Studies" to be used as case studies,
- Identify improved risk assessment and planning practices that recognise the differing capacities of councils, and
- Identify practical ways of linking risk assessments from local to national level.

Deliverables

The key deliverables of the report project are to:

- Identify "best practice" tools and methodologies
- Report on content and practices employed to undertake Queensland's risk assessment projects with recommendations for the development of "Best Practice Manuals"

Terms of Reference

[Terms of Reference from original project documentation to be inserted – the ToR below are not original]

The Centre for Disaster Studies undertook to carry out a review of the methodology, content and findings of Queensland's Natural Disaster Risk Management Studies Program. The primary consultant of this project was the director of the centre. The review was to identify examples and case studies of best practice in order to contribute to improved risk assessment and planning at the local government and national levels. The review was to contribute towards a best practice manual for use in future projects, aiming to make recommendations to assist local government and indigenous communities in improving their hazard mitigation strategies. Such recommendations were to identify mitigation and risk reduction strategies, risk assessment and associated planning activities, identify areas where CDRS may improve service delivery, and contribute to comparative data capture.

The consultant understood the multi hazard approach of emergency management and was to pay close attention to the diversity and commonality of a wide range of natural hazards, as well as the contrast between shires and regions of very different size, population, accessibility and remoteness.

Summary of Findings

The report considers a wide range of case studies. The following summary is only an outline of the key points discussed in the report.

Outcomes of Studies

Safe evacuation as a mitigation treatment. Risk of loss of life or injury is reduced by evacuating out of the hazard zone. In reducing and managing risk the role of local government is to facilitate safe evacuation, although local government will not necessarily play any part in giving the order to evacuate. Specific strategies that have been identified relate to education and awareness, management of evacuation routes and shelters for evacuees.

Safe evacuation shelters for events such as cyclones and storm surge. Councils perceive that there is an expectation among members of the community that safe shelters already exist or that the council is or should be responsible for providing shelters.

The risk inventory and the mitigation treatments are outcomes of the NDRMSP. The NDRM studies have identified, described and prioritised natural hazard risks. The second primary outcome is the list of treatments. Furthermore, the risk inventory informs a whole series of internal plans: social, planning scheme, land-use, corporate, operational etc. In influencing and informing these other plans the risk evaluation is an active outcome.

The NDRMS process was oriented to Local Government Authorities. LGAs have the primary responsibility to mitigate and plan for natural hazards. Thus most hazard emergency managers are identified from emergency management agencies or council positions. The treatment lists are dominated by council business.

The mitigation treatments are mostly conservative. Most of the treatments identified in the studies are council core business. In a sense the councils have done a good and sensible job. They have identified treatments that were within their capacity and have succeeded in achieving most of them. They worked through consensus consultation and avoided radical, expensive or unattainable goals.

Best Practice Identified

Communication as a mitigation treatment is still in its infancy. A hierarchy of communication activities exists in mitigation treatments. Operational and response communication is identified in most council treatment forms and is ongoing and involved those officers and organisations closest to the council response. Communications with NGOs and private enterprise are scantily referred to, both at response and recovery level, and in terms of awareness and preparedness at the mitigation stage.

Involvement in the risk management process informs and empowers the actors. Active involvement of council employees and those business and community members who were involved in the whole process enhanced ownership of knowledge and hazard mitigation that will ultimately strengthen the community.

Reliance on outside consultants potentially disempowers the community. An in-house study is best practice. While this may not be feasible for smaller shires, the preferred solution is the use of consultants with a long and personal experience of the community.

Community engagement was a missed opportunity. The manual and guidelines clearly recommend interactive community involvement in the NDRMS process. Mostly what occurred was tokenism.

The NDRMSP guidelines lack a mechanism for developing treatments from the risk priority inventory. Furthermore risk evaluations are not repeated or identified in the risk treatments, thus providing no direct link from risk assessment to treatment.

Council satisfaction with the NDRMSP process and evaluation of reports. Each study was evaluated on a simple three point scale that ranks the report in relation to its ease of accessibility, its adherence to the Zamecka & Buchanan NDRM Guidelines and Manual and its adherence to its own aims and objectives.

Other Issues of the Studies

Lack of council (and NDRMS) influence over other organisations. Best practice mitigation is multi-hazard and whole of community. Councils made an effort to involve other government sectors and departments, NGOs, private enterprise and the resident community to varying extents.

There is an issue of problems of census data in Indigenous communities that may lead to flaws in vulnerability assessments. Census data must be assessed against population figures that are known to the community, because of the high levels of mobility of the population, both seasonally as well as on a regular basis, and the detailed personal knowledge within communities of who is where.

Under Acknowledgement of the Bushfire Hazard. All shires and councils identified bushfire as a hazard and included some treatments. A commonly stated treatment was to ground truth bushfire maps. If climate change brings more extremes of wet and dry it is conceivable that this hazard will increase as a threat. This issue is reiterated in research from the Bushfire CRC (Cottrell 2005).

Other Characteristics of the Studies

Many studies were extremely dense, long winded and difficult to access information. The main review section of this review of NDRMS has summarised each study under main headings that are, or should be, common to all studies. These summaries are the core information that is needed in order to drive mitigation treatments.

Summary of Recommendations

This summary contains all recommendation of the final report. All recommendations should be referenced to the context of the report in which they appear.

- Much greater levels of community education and provision of space in safe shelters for households without local support.
- The shelter issue is not going away. All levels of government and private enterprise need to investigate how safe shelters might be made available. In small communities this need may be met by the construction of strengthening of community facilities. In larger towns an assessment of cyclone or flood safe structures will identify many public and private enterprise buildings. The issues that then need to be addressed are the areas of liability, insurance and security.
- All studies should list treatments under relevant organisations and stakeholders as identified in the Cairns City Council study.
- Private enterprise operations need to be educated and made hazard aware with the same priority as the general public. Companies, peak body representatives and leading

industries (such as the tourist industry) should be involved in local counter disaster committees and hazard management planning.

- Significant funding from state or commonwealth levels will have some impact on counteracting this tendency to work within local constraints.
- Leadership from a level such as COAG needs to be ongoing in pushing all stakeholders towards a community wide recognition of responsibility for hazard management and mitigation.
- The Zamecka & Buchanan NDRM Guidelines and Manual clearly spell out community involvement both as part of the process and an opportunity for education. Councils avoided or minimised community involvement, most probably through lack of time and funding. Much greater funding may be the only solution to raising awareness.
- Much greater emphasis on local government responsibility to educate the community in hazard awareness and preparedness. The fear of political repercussions may ultimately have to be countered through an enforced legislative responsibility.
- A workshop with local government emergency managers, or a research project to investigate a workable method for directly linking risk to treatment that will also identify bolder treatments and solutions.
- There is a need for further legislation to extend mitigation responsibility to private enterprise and the business community.
- Vulnerability assessments of indigenous communities must be community based, dependant on information supplied by the council and community members. Unfortunately this is not likely to be a quick process, but where carried out in house, or by a consultant with a long association with the community the process will be both quicker and supply accurate information.
- The bushfire threat is underplayed in most local government community hazard awareness campaigns, and in the mitigation treatments and needs to be given greater emphasis, particularly at the level of community awareness and knowledge.

Section 1 – The emergency management context, COAG, IDNDR, DoTARS and Background to the Study

The context of the Natural Disaster Risk Management studies lies in the Council of Australian Governments (COAG) review and preceding initiatives from Department of Transport and Regional Services (DoTARS) and other stakeholder organisations, and the international context of the International Decade for Natural Disaster Reduction.

In Queensland in particular, risk is also enhanced by the rapid population growth rate that is being driven by sea change lifestyle migration, alongside migration into the booming Queensland economy. Much of the growth is in the coastal fringe in newly developing beach communities and in the peri urban areas around cities. People are moving into locations in which they have not experienced seasonal hazards and in which many families are losing ties of family and community. These factors that increase hazard vulnerability exacerbate overall risk. Alongside the movement of people into hazard prone locations is the proliferation of residential dwellings, economic activities and critical infrastructure within those same zones.

In any specific location climatic cycles and probable extreme events are greater than any impact that may eventuate in the short to medium term from climate change, although some beaches, semi rural bush settings and particularly hazardous flood plains may be recipients of adverse vegetation change and inundation that is directly attributable to climate change. However, for the state as a whole, impacts of climate change will be measurable and identifiable in numbers and intensity of hazard events. In this sense state government will more directly experience increased risk from climate change, although the responsibility for mitigation must be borne by local governments.

This study proceeds to a review of practices nationally and internationally. At international conferences and meetings Australia's emergency management procedures, experience and knowledge are held in high regard and are generally acknowledged as best practice. An example of this high regard was recently stated by the Director of the Inter Agency Secretariat of UN ISDR, Salvano Briceno (Briceno 2004). Within Australia different states have demonstrated innovative approaches and exchange of knowledge is an important process. At this level Queensland is seen as a leader in many aspects of emergency management best practice. It is important to acknowledge this perception in the following context of critiquing an attempt at best practice mitigation.

Tasks, Deliverables and Work Plan of the Review

Terms of reference and selection criteria

The Centre for Disaster Studies undertook to carry out a review of the methodology, content and findings of Queensland's Natural Disaster Risk Management Studies Program. The primary consultant of this project was the director of the centre. The review was to identify examples and case studies of best practice in order to contribute to improved risk assessment and planning at the local government and national levels. The review was to contribute towards a best practice manual for use in future projects, aiming to make recommendations to assist local government and indigenous communities in improving their hazard mitigation strategies. Such recommendations were to identify mitigation and risk reduction strategies, risk assessment and associated planning activities, identify areas where CDRS may improve service delivery, and contribute to comparative data capture. The consultant understood the multi hazard approach of emergency management and was to pay close attention to the diversity and commonality of a wide range of natural hazards, as well as the contrast between shires and regions of very different size, population, accessibility and remoteness.

Objectives and deliverables

The consultant was to review the methodology, content and outcomes of a selection of natural disaster risk management studies conducted both by local government and consultants. The consultant was also required to draw on contributions from the red books and the broader literature. The aim was to identify best practice case studies, to suggest improved risk assessment and planning practices within the capabilities of councils of very differing sizes and resources and to identify practical ways in which risk assessments can be linked from the local to the national level. Within these aims the review will also identify tools and methodologies for best practice, use and development databases and recommendations for a best practice manual.

Tasks

The consultant was to carry out tasks as outlined in the terms of reference.

1. Attend briefing meetings and gather documentation.
2. Liaise with Geoscience Australia to identify national and international trends and risk management documentation.
3. Review the methodology and contents of a selection of Natural Disaster Risk Management Studies.
4. Review a selection of local government studies provided by CDRS.
5. Review compliance with Queensland's Natural Disaster Risk Mitigation Studies Program.
6. Develop database submissions and produce an interim report on best practice which identifies appropriate case studies.
7. Consult with local governments and undertake a variety of interviews and meetings in order to assess the risk assessment process methodology.
8. Present a final report and presentation.

Section 2 – Summary of Issues, Characteristics of Studies, Outcomes and Best Practice

Outcomes are positive, real consequences of the NDRMSP process. These are presented as factual measures of the process.

Best practice statements concern those practices which were the best at achieving desired outcomes at the time these studies were conducted and recommendations are actions that follow directly from the experience of this process that may enhance the effectiveness of future risk management and mitigation programs.

Issues are observations of phenomena, practices and potential problems that are identified as areas that may need to be addressed.

Characteristics of studies are observations of details and style in the studies and the reports that require an organisational modification.

Outcomes

- The risk inventory and the mitigation treatments are outcomes of the NDRMSP.
- Evacuation is a mitigation treatment that requires more education and awareness if it is to be safe and effective.
 - Recommendation: much greater levels of community education and provision of space in safe shelters for households without local support.
 - Recommendation: the shelter issue is not going away. All levels of government and private enterprise need to investigate how safe shelters might be made available.
- The NDRMS process was oriented to Local Government Authorities and emphasised their core business and assets. Recommendation: that future programs will engage more effectively with other government bodies and private enterprise as outlined in the COAG Review.
 - Recommendation: all studies should list treatments broken down by agency responsibility, as illustrated in the Cairns .study.
- The mitigation treatments are mostly conservative.
 - Recommendation: that future programs must challenge local government in its relationship with stakeholders, private enterprise and the community.
 - Recommendation: only significant funding from state or commonwealth levels will counteract this tendency to work within local constraints.
- Treatments identified in the studies have mostly been carried out or are ongoing.

Best Practice

- The strength of the Zamecka & Buchanan NDRM Guidelines and Manual and of the studies that have eventuated is a systematic evaluation and analysis of natural hazard risk and the identification and prioritisation of mitigation activities. This was best practice at the time that these studies were commenced.
- Active involvement of council employees and business and community members in the whole process enhanced ownership of knowledge and hazard mitigation that will ultimately strengthen the community.
- The strength of the guidelines lies in the involvement of managers, stakeholders and community in developing their own risk management.
- The outcomes of the NDRMSP process will be increased safety, secure lifelines in particular and a reduction in the cost of natural hazards and disasters.

- Reliance on outside consultants potentially disempowers the community. An in-house study is best practice. Where this is not feasible for smaller shires consultants should have a long association with the community.
- There was generally a high level of Council satisfaction with the NDRMS process and their own evaluation of the study reports. This reflects a good working relationship between the consultant and the local government. Such a relationship counteracts the disempowerment that may result from having to rely on an outside consultant.
- Best practice will develop an appropriate level of useful information rather than attempt to cover every remote eventuality.
- There is a positive advantage in clarity and brevity to lead through a logical process to a prioritisation of necessary actions.
- There exists extensive cooperation and exchange of information and knowledge between councils. Linkages transcend formal disaster districts and simple nearest neighbourliness. The way forward is an enhancement of such broad links.
- Communication is a mitigation treatment that must be developed and extended at all levels of operations, stakeholder and community involvement. Recommendation: the Zamecka & Buchanan NDRM Guidelines and Manual clearly spell out community involvement both as part of the process and an opportunity for education. Councils avoided or minimised community involvement, most probably through lack of time and funding. Much greater funding may be the only solution to raising awareness.
- Community engagement is an essential element in the NDRMS process. This may have been a missed opportunity in many of the studies, although it was clearly a priority in Sarina and Pompuraaw. Outside Queensland the Shire of Yarra Ranges, Victoria, provides many examples of best practice, especially in community engagement. Recommendation: much greater emphasis on local government responsibility to educate the community in hazard awareness and preparedness. The fear of political repercussions may ultimately have to be countered through an enforced legislative responsibility.
- The Cairns and Pompuraaw studies are recommended as examples of best practice – one of a city council, the other a remote aboriginal community. Both were effectively carried out “in house”.

Issues

- Although the risk evaluation was multi hazard, there still exist unknown hazards. Local governments must accept that hazard prioritisation is an ongoing process and that the nature of hazards changes over time as a consequence of natural cycles and human interventions.
- There is an issue of problems of census data in Indigenous communities that may lead to flaws in vulnerability assessments
- There is an issue of where to draw disaster mitigation regions, and how to determine combinations of studies (other than for consultants convenience), and issues of funding for mitigation. Disasters have no boundaries.
- There is a lack of council (and NDRMS) influence over other organisations. Recommendation: there is a need for further legislation to extend mitigation responsibility to private enterprise and the business community.
- There was evidence of complacency or a lack of appropriate awareness concerning the Bushfire Hazard. Recommendation: the bushfire threat is underplayed in most

local government community hazard awareness campaigns and needs to be given greater emphasis.

- Safe evacuation shelters are sought for events such as cyclones and storm surge.

Characteristics of Studies

- Risk evaluations are not repeated or identified in the risk treatments, thus providing no direct link from risk assessment to treatment.
- The NDRMS guidelines lack a mechanism for developing treatments from the risk priority inventory. Recommendation: a workshop with local government emergency managers, or a research project to investigate a workable method for directly linking risk to treatment that will also identify bolder treatments and solutions.
- There is no relationship between the size and detail of a study and the size of the LGA's population
- Many studies were extremely dense, long winded and difficult to access information. This was not necessarily a problem for councils where individuals who worked on the study are still with council, but it is a problem for newcomers who have to use some of the studies in order to develop further mitigation treatments.

Specific Recommendations

- Recommendation: much greater levels of community education and provision of space in safe shelters for households without local support.
- Recommendation: the shelter issue is not going away. All levels of government and private enterprise need to investigate how safe shelters might be made available. In small communities this need may be met by the construction of strengthening of community facilities. In larger towns an assessment of cyclone or flood safe structures will identify many public and private enterprise buildings. The issues that then need to be addressed are the areas of liability, insurance and security.
- Recommendation: all studies should list treatments under relevant organisations and stakeholders as identified in the Cairns City Council study.
- Private enterprise operations need to be educated and made hazard aware with the same priority as the general public. Companies, peak body representatives and leading industries (such as the tourist industry) should be involved in local counter disaster committees and hazard management planning.
- Recommendation: significant funding from state or commonwealth levels will have some impact on counteracting this tendency to work within local constraints.
- Leadership from a level such as COAG needs to be ongoing in pushing all stakeholders towards a community wide recognition of responsibility for hazard management and mitigation.
- Recommendation: the Zamecka & Buchanan NDRM Guidelines and Manual clearly spell out community involvement both as part of the process and an opportunity for education. Councils avoided or minimised community involvement, most probably through lack of time and funding. Much greater funding may be the only solution to raising awareness.
- Recommendation: much greater emphasis on local government responsibility to educate the community in hazard awareness and preparedness. The fear of political repercussions may ultimately have to be countered through an enforced legislative responsibility.

- Recommendation: a workshop with local government emergency managers, or a research project to investigate a workable method for directly linking risk to treatment that will also identify bolder treatments and solutions.
- Recommendation: there is a need for further legislation to extend mitigation responsibility to private enterprise and the business community.
- Recommendation: vulnerability assessments of indigenous communities must be community based, dependant on information supplied by the council and community members. Unfortunately this is not likely to be a quick process, but where carried out in house, or by a consultant with a long association with the community the process will be both quicker and supply accurate information.
- Recommendation: the bushfire threat is underplayed in most local government community hazard awareness campaigns, and in the mitigation treatments and needs to be given greater emphasis, particularly at the level of community awareness and knowledge.

This summary of key points and issues is derived from the information contained in the report, but these issues are particularly discussed in the next section, where further details are provided of examples of studies. An analysis and ranking of all of the studies is also presented in the next section.

Section 3 – Analysis and Discussion of Issues

1. Discussion of Summary Points

1.1 Outcomes

Safe evacuation as a mitigation treatment. Evacuation from flood threatened locations, including the storm surge zone, is ordered by emergency management authorities, but people are left to arrange their own evacuation. This is therefore an existing risk management strategy. Risk of loss of life or injury is reduced by evacuating out of the hazard zone. In reducing and managing risk the role of local government is to facilitate safe evacuation, although local government will not necessarily play any part in giving the order to evacuate. Specific strategies that have been identified relate to education and awareness, management of evacuation routes and shelters for evacuees.

For example: Cairns – Identify essential buildings that are required to withstand category 5 cyclone and/or probable maximum flooding event.

Doomadgee – develop an evacuation plan for flood afflicted residents of Old Doomadgee and outstations.

Murweh – develop evacuation procedures for levee overtopping flood.

Emerald – develop evacuation plan as part of counter disaster plan.

Redlands – develop a comprehensive Shire evacuation, community and economic recovery plan – details referred to included sign posting routes away from hazard zones (especially storm surge and flood) and bushfire evacuations from the offshore islands.

Sarina and Broadsound – develop evacuation plans for all seaside towns addressing storm tide risk – and reference to sign posting and storm tide proofing of evacuation routes away from storm tide prone areas.

Pompuraaw – in the event of storm surge the whole community should be evacuated. Furthermore outstations and fishing camps will be closed down during the wet season.

While these treatments are all valid they are at a very basic starting point as far as effective mitigation is concerned. Signposting of evacuation routes and information of these routes is supplied to vulnerable households and stated as a mitigation treatment. Individual households are then expected to be in full knowledge of the evacuation route, to have a household emergency plan, to possess functional transport, all at a time of danger, stress and poor conditions, and to have a destination evacuation billet—usually “friends or relatives in high places”. These are too many assumptions. Research (Anderson-Berry & King 2005 for example) has shown that most households do not have an emergency plan, some do not have transport, many require assistance, and many have no planned destination. Apart from these problems many people have limited hazard awareness and low levels of preparedness. Evacuation as a mitigation treatment is currently very flawed. It also relates to the issue of shelters and the role of NGOs and private enterprise in providing transport, shelter and services.

- Recommendations: much greater levels of community education and provision of space in safe shelters for households without local support.

Safe evacuation shelters for events such as cyclones and storm surge. Shelters are places of temporary refuge during the passage of a hazard event and are distinguished from relief centres that come into operation after the event has passed, and may not be safe as shelters during an event. Councils perceive that there is an expectation among

members of the community that safe shelters already exist or that the council is or should be responsible for providing shelters.

Examples of treatments are:

Sarina and Broadsound – identify and assess structural adequacy of shelter/evacuation centres (community halls etc.

Pompuraaw – In the event of evacuation not being possible the treatment strategy identifies a community shelter plan, implying a suitable building.

Pine Rivers – liaise with authorities to enable facilities such as schools, shelters, police and fire stations etc. to be assessed for cyclone loads.

The reality is that such structures do not exist, and while strong buildings may be designated as temporary shelters there are many problems of liability, litigation, security and appropriateness. These issues are borne out by literature from the United States as well as more locally (Smith et al 2005, Berry 1999) on the roles and problems of shelters. Because Americans use shelters extensively during hurricanes and tornadoes, and this behaviour is broadcast by the media in this country there is a developing expectation that shelters are or should be available during severe hazards.

- Recommendation: the shelter issue is not going away. All levels of government and private enterprise need to investigate how safe shelters might be made available. In small communities this need may be met by the construction or strengthening of community facilities. In larger towns an assessment of cyclone or flood safe structures will identify many public and private enterprise buildings. The issues that then need to be addressed are the areas of liability, insurance and security.

The risk inventory and the mitigation treatments are outcomes of the NDRMSP. The NDRM studies have identified, described and prioritised natural hazard risks. This inventory is a very real outcome, which seems in most cases to be linked directly to hazard mapping that forms a component, or is in the process of being incorporated into the IPA planning scheme. The second primary outcome is the list of treatments. These have been copied along with the risk inventory into the appendices as externally funded projects and as NDRM treatment tables where the majority of treatments are internally funded by the council. Furthermore, the risk inventory informs a whole series of internal plans: social, planning scheme, land-use, corporate, operational etc. In influencing and informing these other plans the risk evaluation is an active outcome. The mitigation treatments are actions that in most cases have been carried out or are ongoing. The NDRMS was not a management exercise. It has generated real outcomes and these are copied in the appendices as an illustration of the outcome orientation of the process.

The NDRMS process was oriented to Local Government Authorities. LGAs have the primary responsibility to mitigate and plan for natural hazards. Thus most hazard emergency managers are identified from emergency management agencies or council positions. There are exceptions where Local Counter Disaster Groups (such as in Cairns) are much broader in terms of membership, but which still do not include members of the business community, or community groups etc. Thus inevitably a process that had limited time and funds available, tended to stress council operations and responsibilities over which councils have direct control. The treatment lists are dominated by council business. Thus LGA's have done well in a first stage of mitigation whereby they have protected their own assets and all services and facilities that are their responsibility. But clearly this does not include most of all the other structures, infrastructure and population of the shire/city.

The best treatment list is that of Cairns – another example of best practice of the Cairns study. In this study the treatments are broken down by organisation, council department and all other government departments and statutory organisations that participated, thereby indicating the responsibility for each treatment.

Informants in Cairns acknowledged the enormous challenge of driving other government departments towards a responsibility for hazard mitigation. Mitigation treatments are responsibilities of a wide range of organisations, which are committed in varying degrees to risk management. Of the emergency services the police were pinpointed in the five case study discussions as having been first to lose interest and reduce attendance at Study Advisory Group Meetings. Other government departments identified treatments but in having to fund these from their budgets, the councils found themselves with no control over mitigation. A systemic problem is the siloisation of state and federal government departments.

An even greater problem is the lack of engagement with private enterprise. Most buildings and structures in any shire or city are privately owned, as are most services and facilities etc. Involvement of private enterprise in Study Advisory Groups or in local counter disaster committees is minimal or no existent.

Best Practice example: Cairns Local Counter Disaster Group.

Indigenous communities lack a private sector, but still face challenges in coordinating and engaging the large number of government departments and organisations that operate in their communities.

- Recommendation: all studies should list treatments under relevant organisations and stakeholders as identified in the Cairns City Council study. Private enterprise operations need to be educated and made hazard aware with the same priority as the general public. Companies, peak body representatives and leading industries (such as the tourist industry) should be involved in local counter disaster committees and hazard management planning.

The mitigation treatments are mostly conservative. Most of the treatments identified in the studies are council core business. The Cairns study is the strongest exception and is recommended as a best practice study in this respect. In a sense the councils have done a good and sensible job. They have identified treatments that were within their capacity and have succeeded in achieving most of them. They worked through consensus consultation and avoided radical, expensive or unattainable goals. This is a true reflection of the local government manner of operations—mostly under-resourced, under-staffed, and responsible to their own local community for the provision of a wide range of basic services. They do these things well, or to the best of their ability, and seemed to have been sensibly guided by an awareness of their own constraints in determining priority treatments. But are these treatments true priorities in mitigating their local risks, or have they selected the lesser treatments simply because they are achievable? The criticism is that they appear to have thought small. The treatments are mostly sensible, cautious, conservative and achievable. This is not best practice in the long term, but it was probably inevitable at this first stage of an ongoing process.

- Recommendation: significant funding from state or commonwealth levels will have some impact on counteracting this tendency to work within local constraints.

Leadership from a level such as COAG needs to be ongoing in pushing all stakeholders towards a community wide recognition of responsibility for hazard management and mitigation.

1.2 Best Practice

Communication as a mitigation treatment is still in its infancy. A hierarchy of communication activities exists in mitigation treatments. Operational and response communication is identified in most council treatment forms and is ongoing and involved those officers and organisations closest to the council response. Communications with NGOs and private enterprise are scantily referred to, both at response and recovery level, and in terms of awareness and preparedness at the mitigation stage.

Examples: There are exceptions, such as Sarina Shire's engagement with the CSR distillery and Doomadgee's engagement with Century Zinc Mine. On the other side there is a strong lack of involvement with such crucial sectors as the tourism industry, the retail sector and virtually the whole of the rest of private enterprise. The treatments target the government and related sectors, to the exclusion of the majority of businesses.

The third area of mitigation communication is with the general public in its role as residents. Treatments are identified to maintain ongoing hazard education and information campaigns. These are often top-down from council to households and separately to community groups and schoolchildren. The media is scantily mentioned in treatment options and yet this is one of the most powerful avenues for communication of hazard awareness and preparedness. Communication with the public is in all treatment lists, but it is not innovative or new. It is primarily ongoing—more of the same. This is not to say that this is not necessary. However, the primary form of communication is passive (i.e. brochures and leaflets). Only with schoolchildren and some community groups is mitigation awareness raising in any way truly active. The Mayor of Sarina particularly stressed the importance of communication, including the generation of more interactive methods and packages that may be generically produced but will have specific council information added.

The Shire of Yarra Ranges in Victoria is a best practice example of community engagement in the NDRMS process. This issue links to the lost opportunity of community involvement.

- Recommendation: the Zamecka & Buchanan NDRM Guidelines and Manual clearly spell out community involvement both as part of the process and an opportunity for education. Councils avoided or minimised community involvement, most probably through lack of time and funding. Much greater funding may be the only solution to raising awareness.

Involvement in the risk management process informs and empowers the actors. Active involvement of council employees and those business and community members who were involved in the whole process enhanced ownership of knowledge and hazard mitigation that will ultimately strengthen the community.

Examples: Cairns City Council Local Counter Disaster Group that led the study. Locally based study advisory groups, such as at Pompuraaw. All five of the case study councils made this same point in interviews, and it may be assumed that all studies (except possibly some of the Ganza group of studies) generated a

sense of ownership, knowledge and involvement amongst actors and participants in the process.

Reliance on outside consultants potentially disempowers the community. An in-house study is best practice. While this may not be feasible for smaller shires, the preferred solution is the use of consultants with a long and personal experience of the community.

Examples: Pompuraaw is one of the smallest communities and effectively carried out the study in house with strong community involvement.

Doomadgee did not have a suitable study leader within the community, but effectively used a consulting company that had a long association with that community.

Community engagement was a missed opportunity. The manual and guidelines clearly recommend interactive community involvement in the NDRMS process. Mostly what occurred was tokenism. However, it is unfair to entirely blame the LGAs or consultants for this lack. Funding was not set aside for extensive community involvement, especially in larger shires or council areas. Some did a good job and these were mostly small LGAs, such as Sarina and Pompuraaw, while in some other studies interviews and meetings were held in various parts of the shire. However, the best practise is clearly a locally dominant SAG (that ideally has some longevity) and extensive community engagement in identifying risks and treatments. The poorest community engagement seems to have been with some of the indigenous communities where, for example, most members of the SAG were non-indigenous, or outsiders, and indigenous members of the community appear not to have been consulted. This was also a problem in some non indigenous communities, possibly as a consequence of conservative attitudes. An opportunity was lost to educate people while involving them in decision-making and ownership.

- Recommendation: much greater emphasis on local government responsibility to educate the community in hazard awareness and preparedness. The fear of political repercussions may ultimately have to be countered through an enforced legislative responsibility.

The NDRMSP guidelines lack a mechanism for developing treatments from the risk priority inventory. Furthermore risk evaluations are not repeated or identified in the risk treatments, thus providing no direct link from risk assessment to treatment.

In all of the five case study councils the only mechanism for moving from risk priority to treatment was consultation and consensus. It is probable that the consultation process reinforces conservatism and small-scale solutions. This appears to be a process flaw in the Zamecka & Buchanan NDRM Guidelines and Manual. It is conceivable that at the local level there is no better process. However, this is an area that needs further analysis to improve upon and achieve best practice.

- Recommendation: a workshop with local government emergency managers, or a research project to investigate a workable method for directly linking risk to treatment that will also identify bolder treatments and solutions.

Council satisfaction with the NDRMSP process and evaluation of reports. Each study was evaluated on a simple three point scale that ranks the report in relation to its ease of accessibility, its adherence to the Zamecka & Buchanan NDRM Guidelines and Manual and its adherence to its own aims and objectives. This evaluation is appended at the foot of each of the summaries of the studies in part two of this report. However it was interesting in the meetings at the five case study councils that all were pleased with the

reports, reported a good relationship with the consultant (excluding Cairns who did their own), and felt that they had benefited enormously from the process. This issue has been discussed in the evaluation analysis above.

1.3 Issues

Lack of council (and NDRMS) influence over other organisations. Best practice mitigation is multi-hazard and whole of community. Councils made an effort to involve other government sectors and departments, NGOs, private enterprise and the resident community to varying extents. Cairns went furthest in defining mitigation treatments for other agencies, and Pompuraaw and Sarina went furthest in engaging the community. Cairns in particular drew attention to the problem of requiring the mitigation treatments of state and federal government departments and statutory bodies, let alone those organisations that were not represented on the Cairns Local Counter Disaster Committee which carried out the NDRMS. This is a serious constraint to natural hazard mitigation which is clearly not a fault of any council.

Best Practice Examples: the Cairns study was multi hazard and identified treatment responsibilities that lay outside the control of council.

The Pompuraaw study was whole of community. It is however, a small community with relatively limited non council stakeholders.

The Zamecka & Buchanan NDRM Guidelines and Manual were best practice models for the NDRMS which incorporate whole of community – including private enterprise and the business community.

- Recommendation: there is a need for further legislation to extend mitigation responsibility to private enterprise and the business community.

There is an issue of problems of census data in Indigenous communities that may lead to flaws in vulnerability assessments. Census data must be assessed against population figures that are known to the community, because of the high levels of mobility of the population, both seasonally as well as on a regular basis, and the detailed personal knowledge within communities of who is where.

- Recommendation: vulnerability assessments of indigenous communities must be community based, dependant on information supplied by the council and community members. Unfortunately this is not likely to be a quick process, but where carried out in house, or by a consultant with a long association with the community the process will be both quicker and supply accurate information.

Under Acknowledgement of the Bushfire Hazard. During interviews with councils I gained a perception that the bushfire threat was under assessed and accorded a lower priority than it deserves. All shires and councils identified bushfire as a hazard and included some treatments. A commonly stated treatment was to ground truth bushfire maps. The implication is that the maps are too general and there are specific hot spots that need greater emphasis, and mapping that may conceivably play down the risk in some mapped areas. For example in Redlands Shire the primary area of concern was North Stradbroke Island while urbanisation in some other parts of the shire is reducing the hazard. However, the informant in Doomadgee stated that not only was the community complacent or unconcerned about the bushfire threat (in comparison to well developed awareness of the flood hazard) but that members were frequently the cause of local bushfires. At Murweh Shire it was not suggested that members of the community were the cause of bushfire, but

it was the strong opinion of informants that bushfire was not a serious threat in the shire and that most fires were in bush areas where they could be left to burn themselves out. However, Murweh Shire's own potted history in its shire information booklet records a major bushfire in 1951 when fires completely ringed and threatened Charleville. In reflecting on these comments and attitudes an underplayed latent threat also exists in the wet tropics. During recent drought years the drying out of the range rainforest caused great concern to emergency managers and scientists but did not develop in terms of public awareness. Forest fires have occurred on Cairns' hillslopes in the past and have potential under extreme climate conditions to be as threatening and destructive as the Canberra bushfires. If climate change brings more extremes of wet and dry it is conceivable that this hazard will increase as a threat. This issue is reiterated in research from the Bushfire CRC (Cottrell 2005).

Example of Best Practice: Pine Rivers Bushfire Mitigation Program has won a Safer Communities Award for 2006. While most councils identified treatments that related to bushfire mitigation and community awareness raising, and as informants at the five case study councils confirmed that most treatments had been carried out, Pine Rivers Shire clearly went further in its community and organisational engagement.

- Recommendation: the bushfire threat is underplayed in most local government community hazard awareness campaigns, and in the mitigation treatments and needs to be given greater emphasis, particularly at the level of community awareness and knowledge.

1.4 Other Characteristics of the Studies

Many studies were extremely dense, long winded and difficult to access information.

This was not necessarily a problem for councils where individuals who worked on the study are still with council, but it is a problem for newcomers who have to use some of the studies in order to develop further mitigation treatments. The main review section of this review of NDRMS has summarised each study under main headings that are, or should be, common to all studies. These summaries are the core information that is needed in order to drive mitigation treatments.

Example of Best Practice: The Cairns study and its very compact executive study contain all the information that is needed and present that information clearly and concisely. The stages that lead to the risk inventory, as identified in the Zamecka & Buchanan NDRM Guidelines and Manual are best incorporated into an appendix.

2. Quality of Study Reports

Each study was evaluated as a stand alone document in relation to the aims and structure of the program. The interviews with informants at the five case study councils indicated high levels of satisfaction with both the process of the NDRMSP and the consultant or group that led it. This was particularly reflected by individuals who remained with the council having participated in the process. Even though some of the reports were extremely large and complex, these individuals knew their way through them and were comfortable with the resulting report. This point is further discussed below. However, even if the evaluation that follows should not be treated as an absolute assessment of quality, there are significant issues of best practice that may be concluded from the table.

Evaluation of the Utility and Presentation Quality of the NDRMSP Reports

Council/Shire	Ease of use of study	Adherence to Guidelines & Manual	Relevance to Aims & Objectives	Evaluation Total	Consultant
Case Studies					
Cairns	9	9	9	27	Cairns CC
Doomadgee	8	9	8	25	Maunsell
Murweh	4	5	5	14	KTG
Redlands	6	6	7	19	QRMC
Sarina/Broadsound	4	5	5	14	KTG
Calliope/Gladstone	7	8	4	19	Earthtec
Ipswich	6	8	6	20	JWP
Pine Rivers	6	6	7	19	Hatch
Cooloola	8	8	6	22	QRMC
Monto	6	5	4	15	QRMC
Cloncurry	8	8	9	25	Maunsell
Croydon	8	8	7	23	Ganza
Emerald	5	5	5	15	KTG
Winton	8	7	6	21	GBA
Ilfracombe	8	8	6	22	GBA
Pompuraaw	8	5	9	22	Monaghan
Umagico	8	3	5	16	Ganza
Hopevale	8	6	5	19	Ganza
Injinoo	8	6	5	19	Ganza
New Mapoon	8	3	5	16	Ganza
Wujal Wujal	8	6	5	19	Ganza

Each study was summarised in a standard format for the sake of comparing very diverse and large documents. The format was as follows:

1. Structure of the reports
2. Aims and Objectives
3. Membership of the Study Advisory Group (SAG)
4. SAG Meetings, Attendance and Community Engagement
5. Community Vulnerability Profile

6. Hazard Identification
7. Risk Evaluation
8. Risk Treatments
9. Evaluation of the study

These categories relate directly to Zamecka & Buchanan's Guidelines and should be common to each study. It was an initial conclusion of this review, stated in chapter 4, that the guidelines and manual represented best practice at the time that these studies were conducted and councils were directed towards these documents as a method and structure. They encapsulate the core elements that contribute to both the outcomes and best practice. It is therefore reasonable to expect each study to follow this format and to contain these standard elements. Notwithstanding the diversity of the councils/shires themselves there was otherwise no reason why the studies and their final reports should be as diverse as they actually are.

Therefore the evaluation of the reports is based on an expectation that the key elements listed above, that formed the structure of the summaries, would clearly be present. The ease with which these core pieces of information could be found is extremely relevant so each report has firstly been evaluated on the basis of its ease of use and the accessibility of its information, analyses and treatments etc. Secondly given the recommendation that Zamecka & Buchanan's Guidelines were best practice at the time of the study, each study has been evaluated in terms of its adherence to Zamecka & Buchanan NDRM Guidelines and Manual. Thirdly each study/report was evaluated in relation to the aims and objectives of the scheme, which were expected to be framed at the beginning of each study. A qualitative score on a scale of 1 to 10 was allocated to each of these three categories.

The table above lists all of these evaluations and totals them for comparison. Two of the best studies, Cairns and Pompuraaw both score highly, although the Pompuraaw study diverged from the Guidelines and is scored lower in this area. The fact that this study chose to do this may be an indication of the special needs of remote indigenous communities. This would certainly be an explanation from the consultant, who was a long term resident of the Western Gulf (in fact primarily resident in Kowanyama, but working with both communities). However both Maunsell studies score highly and one of these is of a difficult and complex remote community. The Maunsell studies chose not to diverge from the Zamecka & Buchanan NDRM Guidelines and Manual. As reports by a consultant they are the highest ranked and must be commended as best practice in terms of this evaluation of the reports.

It is interesting that Ganza does well in the Croydon study, but is ranked much lower in the indigenous community studies. In chapter 5 other criticisms have already been made of these studies, and some issues, such as the reliability of census data in indigenous communities. However, the evaluation here is of each stand alone report, on just these three criteria. When considering the lack of separation between these five indigenous community studies and repetition of text from one study to another, without acknowledging the connectivity between 3 of the communities, the effective quality falls further. Additionally there are factual and interpretive flaws in these studies that suggest a lack of understanding of indigenous communities and a question as to why an engineer was doing this kind of study in the first place.

The other lowest scoring consultant is KTG. However, two KTG studies were selected as case studies. Murweh was chosen as representative of the inland shires and specifically selected in order to increase the coverage of shires in the south of the state, and because of its recent hazard history. Sarina was selected as a coastal shire from a small group of such shires. It had an additional advantage of having been studied alongside neighbouring Broadsound and neither was dominated by a large town within the shire. It was also an advantage to engage with a Mayor, Kevin Morgan, who has a strong interest in local government and hazard mitigation, being the representative of that group on the QTCCC. In neither case was KTG a reason for selection of the case study. The interviews recorded a strong level of satisfaction with the work of the consultant and the report he produced. Thus in evaluating the reports themselves it is fair to record the qualification that the NDRMSP process was probably more important than the final report which does not necessarily illustrate the working relationship between consultant and advisory group.

Section 4 – Scope and Methodology of the Study and Review

An analysis of natural disaster risk management and mitigation practices was made from available literature and internet websites. This review is presented in chapter 3. This was followed by a review of the Zamecka & Buchanan NDRM Guidelines and Manual in chapter 4. A selection of 21 Natural Disaster Risk Management Studies was determined by QDES. These were assessed in part one of the project to identify issues, summarise characteristics and attempt a typology of the diversity of local governments. This preliminary assessment of the studies is presented in chapter 5. Specific issues and characteristics are discussed in that chapter, with key points from both chapters 4 and 5 having been identified as issues, outcomes, characteristics and best practice in the executive summary of chapter 1. From the preliminary assessment and the typology, a standard summary of each study was devised and five studies were selected as case studies for field visits. The 5 case studies are presented in chapter 6 including the key hazard identification and treatment tables. The remaining 16 studies are summarised in the same way in chapter 8 but their hazard and treatment tables have been reproduced in the appendix to save space in the main report.

All of the studies were summarised and evaluated on a standard profile. Sixteen of the 21 studies are presented in chapter 8, while the five that were selected as case studies for fieldwork visits and interviews are presented separately in the chapter 6 and the summary of the visits to those shires is presented in the chapter 7. They are broken up in this way simply to aid accessibility.

The intention of the standard profile was to extract the key elements of each study with some comment on the effectiveness of the study. The format was as follows:

1. Structure of the reports
2. Aims and Objectives
3. Membership of the Study Advisory Group (SAG)
4. SAG Meetings, Attendance and Community Engagement
5. Community Vulnerability Profile
6. Hazard Identification
7. Risk Evaluation
8. Risk Treatments
9. Evaluation of the study

These categories relate directly to Zamecka & Buchanan's Guidelines and should be common to each study. They encapsulate the core elements that contribute to both the outcomes and best practice. The key tables and outcomes of the study were considered to be the final risk evaluation table, and the risk treatment table. These two were scanned and are mostly appended to this report. After each study had been summarised three evaluation questions were applied and each ranked on a scale of 1 to 10. The evaluation is of the quality of the report as a stand alone document considering;

1. Evaluation of the study in terms of ease of use and accessibility
2. Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual
3. Relevance to aims and objectives of the scheme

The evaluation cannot be interpreted as a summary of best practice, but it does contribute in the sense of the clarity of both purpose and utility.

The five case studies had their risk evaluation and treatment tables scanned and incorporated into each council summary report. This was useful in the field visits, but proved to be extremely time consuming and problematic in terms of insertion into the word document. Thus with most of the sixteen non case study councils the risk and treatment tables have been reproduced as appendices. However, it is these two tables in each study which are the primary outcomes. The aim of the fieldwork was to test the extent to which the treatment outcomes had eventuated and the incorporation of the risk evaluation into other council planning documents and processes.

One council was selected from each of the five types of Local Government Organisations. The selection was done in consultation with QDES and resulted in a broad geographical spread. A visit was made to each council using the case study summaries as a basis for discussion that was structured by a series of open ended questions and areas for discussion.

The aim was to elicit details of process, community benefits/involvement and outcomes. Questions for each council were as follows.

- Who were the local people on the Study Advisory Group?
- Who is still here now?
- How did you identify risks?
- Who primarily identified the risks? Individuals, groups, departments
- Who decided the evaluation of the risks?
- Who decided the prioritization of risks? How was this done?
- Was there any community consultation? If so, what took place? Who carried it out and how was it done?
- Was this study done in conjunction with other councils/shires? If so describe the process.
- What disaster arrangements exist with other councils/shires?
- What joint or regional arrangements exist with other shires/councils? Describe arrangements, councils, departments involved etc.
- If a consultant facilitated the study describe the relationship and working arrangements with the consultant/team. What was the council's involvement with the consultancy team? How many departments and councillors etc were involved? How holistic was the process?
- What parts of the NDRM have been incorporated into other parts of council operations – which departments/sections.
- Have the results of the study been used to inform a disaster management plan, or town planning?
- Has the study been used to develop strategies to minimise the impact of natural disasters, and enhance a response capacity?
- Are there any further LG plans / projects that would be better informed due to this study?
- Who led the process from within council eg. risk manager, engineer, CEO.
- Go through each of the treatments and assess where each is at, who (department) is responsible), where funding has or will come from.

All three of these chapters are then summarised in the final chapter, 9, from which key points have been extracted into the executive summary at the beginning of the report.

Section 5 – Review of other Natural Disaster Risk Management and Mitigation models – national and international best practice

Natural Disaster Risk Management and Mitigation programs have developed relatively recently, both nationally and internationally. The UN International Decade for Natural Disaster Reduction led the shift away from an emphasis on the hazard to a concentration on the human impact. This gave encouragement to the broader concerns of emergency management for preparedness and prevention of disasters rather than just the traditional response and recovery. A greater emphasis on community risk management and mitigation inevitably required a much fuller engagement of government at the local level. This process is occurring worldwide (Briceno 2004) within severe constraints of local governance, especially in the developing world (Lewis & Mioch 2005, Medd & Marvin 2005), and entrenched conservatism, such as in France, although Lagadec's (2002) account of a conservative government system being forced to adapt to change through crisis, could be applied to most of Europe. Australia's advantages as a developed country with a long history of state and local government that operate against a background of multiple natural hazards, has resulted in a mainstream role for emergency management that engages all levels of government (Tarrant 2006). Some examples of the developing involvement of local government relate to initiatives in specific states (Gabriel 2003, Tasmanian State Emergency Service 2006), sector initiatives, such as agriculture for example (Eggleston & Koob 2004) and remote indigenous communities (Newman 2006).

However, in exploring journals for further studies of Local Government risk management and mitigation there were relatively few examples. Best practice risk management, mitigation and community engagement in the Shire of Yarra Ranges in Victoria has been presented in forums and conferences by the former Shire Emergency Manager, Norm Free, but little has been published in the formal literature because of a lack of necessity to meet such requirements. Most of the following examples of state and international risk management and mitigation practices are derived from websites and are meant to be explanatory for users, rather than an evaluation. Much method and experience is locked away in the grey literature, leaving many organisations to have to reinvent parts of the wheel. Of particular interest is the role and practice of professional planners. In a review of the last seven year's copies of *The Australian Planner* there were only a couple of articles about natural hazards in any context, whereas a review of *The Australian Journal of Emergency Management* over the same period revealed over twenty articles about aspects of planning (King 2006). A recent edition of the *Australian Planner* (Vol 42 no 4 2005) was entirely devoted to coastal planning, yet contained no reference to risk or hazard. The June 2006 issue (Vol 46 no 2) of the *Queensland Planner* was entirely devoted to social planning, without any reference to hazards or risk. Burton (2006) in the previous edition of the same journal had addressed the issue of South East Queensland's approach to climate change mitigation, in which he considered hazards as only one of a number of consequences. Planners, as key partners in the local government response to risk management and mitigation, are not yet engaged and regard hazard mitigation as a low priority. It is only legislation through the State Planning Policy on Natural Hazards that has brought them into the same room. Against the background of these comments is the very real achievement of the NDRMSP in bringing together not only emergency managers and planners, but many other departments of councils in a concerted approach to hazard management and mitigation.

The following summaries of programs and practices illustrate some of the diversity as well as a commonality in hazard management practice. The information available varies considerably between states as well as what was easily available internationally. Some websites were much better than others and contained more detail. Variations in quality and quantity of hazard information reflect this availability. However, the primary purpose for a review of practices nationally and internationally was to assess where the Queensland methodology stood. There is no doubt that the Zamecka & Buchanan NDRM Guidelines and Manual were best practice at the time of the studies that are reviewed here.

1. National Approaches

1.1 Natural Disaster Risk Mitigation/Management Program

The Constitution of Australia precludes the Federal Government from directing State and Territory Governments with regard to Disaster Management. However, given that States and Territories may need, from time to time, to collaboratively deal with a disaster, the Australian Government instead, encourages the States and Territories to pursue the same principles. (SEMO, 2004)

<http://www.semo.sa.gov.au/site/page.cfm?u=222>

The Natural Disaster Risk Management Studies Program funded Natural Disaster Risk Management Studies. The Natural Disaster Mitigation Program funds studies, but also allows for mitigation works. Some NDMP projects were outcomes of earlier studies undertaken through NDRMSP. The primary source of funding of the projects under review commenced in 1999 to 2000, aimed at Local Government undertaking risk assessments. The NDMP began in 2003 to 2004 as an outcome of the COAG Review of Natural Disasters. NDRMSP ended in June 2005 and was incorporated into the broader NDMP. The NDRMSP was limited to risk assessment only, while NDMP incorporated mitigation works as well as risk assessment and research.

1.2 Natural Disaster Risk Management Studies Program

About the program

The purpose of the natural disaster risk management studies program was to encourage State Territory and Local Governments to undertake worthwhile risk management studies to identify, analyse and evaluate risks from natural disasters. The Commonwealth provided financial assistance towards the cost of these studies. The program was also intended to stimulate the introduction of preventative measures by state or local governments to reduce the risks identified in the study.

Provision of funds

The Commonwealth provided \$3 million a year to fund the program and allocated these funds to meet up to a third of the costs of each study. States and Local Government provided the balance, that is at least two thirds of funding for each study. With Commonwealth funding of \$3 million each year, the overall program had a potential total funding pool of \$9 million per annum. State and Local Governments were to decide how they shared their joint proportion of the funding.

The Commonwealth made specific purpose payments to the States for their allocation of Commonwealth funds for the implementation of jointly approved risk management studies.

Eligible organisations

Organisations eligible for Commonwealth funding were all State and Local Government entities including departments, agencies, authorities and trusts that had local government functions or were responsible for natural disaster risk management.

Eligibility criteria

To be eligible for Commonwealth funding studies must:

- relate to risks posed by bushfires, cyclones, floods, storms and/or earthquakes;
- be a study only and not involve any actual implementation or works programs;
- have commenced within the funding period;
- have funding provided by the State and/or local government for at least two thirds of the cost of the study; and
- not have received funding from other Commonwealth programs.

Assessment process

The assessment process followed a three stage systems:

1. The state, through its lead agency, undertook the technical assessment of the applications against the assessment criteria, including combining studies where appropriate. While the State assessment process and structure was essentially a matter for the State to determine, the Commonwealth recommended the use of an expert assessment committee
2. The State Minister advised the Commonwealth Government of the supported applications. These were projects in which the State/Local Governments were prepared to fund at least two thirds of the costs.
3. Commonwealth Government officials considered all applications received and independently recommended to the Commonwealth Minister for Finance and Administration the eligibility of each application and priority options.

Assessment criteria

Applications for studies were assessed having regard to:

- Context for the study—including such elements as rationale behind the study, geographic location and topography, climate and climatic patterns, population and future projections, economic base for the community, and history of previous hazard events.
- Study methodology—providing an understanding of proposed methodology with costed project plan, community and industry involvement, and the joint or complementary applications including other jurisdictions.
- Key outcomes—the anticipated reduction in the consequences of the hazard in respect of persons, society, economy and the environment, and plans of mitigation actions designed to reduce disaster impact.
- Capacity—the degree of expectations that outcomes would be achieved, and appropriate experience of applicants.
- The budget summary—identification of overall cost of study and sources of funds.

Study evaluation

States would ensure the monitoring and evaluation of each study was undertaken by local agencies using the measurable performance indicators outlined in the application form and contained in the state and local agency agreements. The state was to provide a final summary report to the Commonwealth for each completed study.

Summary of roles and responsibilities

Commonwealth government

The Commonwealth, through the Department Of Finance and Administration would:

- establish and administer the program;
- develop guidelines, application procedures and administrative and financial arrangements;
- advise the Minister for Finance and Administration on priority studies for Commonwealth financial support;
- provide the Commonwealth share of funds for approved studies for each State to that States lead agency;
- monitor and report on the use of those funds and the results achieved; and
- undertake evaluation of the program in accordance with agreed outcomes and performance criteria.

State government

The State through its nominated lead agencies would:

- undertake the technical assessment of the applications against the assessment criteria;
- determine state priorities and advise the Commonwealth of studies which the state is prepared to fund under the program;
- enter into suitable area arrangements with local agencies regarding the implementation of approved studies and expenditure of funds;
- provide the State share of funding and agree with local agencies the amount and nature of their contribution to the study;
- distribute Commonwealth funds to the successful applicants;
- ensure all studies are undertaken according to the appropriate legislative requirements and in accordance with best practice;
- oversee and monitor progress and achievement of milestones of approved studies;
- evaluate program studies in accordance with agreed outcomes and performance criteria; and
- provide the Commonwealth with a summary report on each completed study.

Local governments/authorities

Local agencies, as either single proponents or jointly with other Local Government or eligible applicants would:

- submit applications with an appropriate level of detail and supporting documentation to enable assessment against the criteria;
- enter into suitable arrangements with the State regarding implementation of studies and expenditure of program funds;
- provide funding to the study as agreed by the State;
- undertake or oversee all studies according to the appropriate legislative requirements and in accordance with accepted best practise;

- monitor work progress, achievement of milestones and report as required by the State lead agency;
- submit requests for payments to the States lead agency, administer funding and acquit expenditure; and
- in conjunction with the State lead agency, undertake evaluation of the study program in accordance with agreed outcomes and performance criteria.

Risk management studies

Formally, risk management is defined by the Australian/New Zealand Risk Management Standard (AS/NZS 4360:1999) as:

“the culture, process and structure which come together to optimise the management of potential opportunities and adverse affects.”

EMA and a number of States have developed methodologies for emergency risk management which build on the Australian and New Zealand Standard. EMA has defined emergency risk management as:

“a systematic process that produces a range of measures that contribute to the well-being of communities and the environment. It includes: context definition; risk evaluation; risk treatment; monitoring and reviewing; and communicating and consulting.”

Risk management studies can be broken down into:

1. Risk assessments, which involve the application of risk management techniques to identify and analyse the impact of potential hazards on the community. The outcomes for risk assessment would include the identification of potential hazards and risks to life, property, infrastructure and the environment. It should also include any specialist studies such as flood, floodplain management, hydrological studies, environmental, storm surge etc that may need to be undertaken to enable disaster mitigation measures to be implemented; and
2. Risk treatments which identify measures to modify the characteristics of hazards, communities, and environments to reduce risk including options where applicable for implementation.

Studies should include the examination of physical mitigation measures and social and community based strategies which could reduce the vulnerability of those elements at risk from the particular hazards.

The Risk Management Standard – AS/NZS 4360:1999 has been adopted by EMA and several states and can be used as a guide on how to:

- identify, assess and analyse risks;
- determine treatment options for risk; and
- involve stakeholders and community in the process.

Applicants were to seek advice from their State lead agency in relation to their recommended approach.

New South Wales

- In NSW the preference is to call the plans the “Emergency Risk Management Process” as it is their legislation that directs this.

- In 2003/04 one project to establish an Emergency Management Risk Management Plan had funding of \$5,000 approved from Natural Disaster Mitigation Program (NDMP) funding from DOTARS.
- In 2004/05 the number of projects of this type had increased to 11 with a total funding approval of more than \$216,000.
- In 2005/06 the number of projects of this type had increased to 14 with a total funding approval of more than \$191,000.
- Most of the funding was allocated to local government authorities with a small number allocated to local emergency management committees.
- The total NDMP funding for NSW for 2003 to 2006 was greater than \$9M.

Queensland

- In 2003/04 one project to establish a Local Disaster Management Plan had funding of \$5,000 approved from Natural Disaster Mitigation Program (NDMP) funding from DOTARS.
- In 2004/05 there were no applications for expenditure relating to disaster management plans or risk management plans.
- In 2005/06 projects were approved to establish a Natural Disaster Risk Management Study at Aurukun Shire Council, Torres Shire Council and the Weipa Town Office with a total funding approval of \$45,000.
- The total NDMP funding for Queensland for 2003 to 2006 was greater than \$6.5M.

Western Australia

- Western Australia uses the term "Emergency Risk Management".
- In 2003/04 one project to establish an Emergency Risk Management Plan for the City of Bunbury had funding of \$7,500 approved from Natural Disaster Mitigation Program (NDMP) funding from DOTARS.
- In 2004/05 and 2005/06 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for Western Australia for 2003 to 2006 was greater than \$4.3M.
- Local Government has specific responsibilities in accordance with the Emergency Management Act 2005. The main broad responsibility of Local Government is to ensure that its community is prepared to respond and have the ability to recover from any emergency incident or disaster.
- In accordance with the Act, there are three committees made up of representatives from various organisations who may have a role prior to, during and after an emergency. The three committees are
 - State Emergency Management Committee - SEMC - Responsible for emergency matters at a State level;
 - District Emergency Management Committee - DEMC - Responsible for emergency matters at a District level;
 - Local Emergency Management Committee - LEMC - Responsible for emergency matters at a Local level.
 - The representatives that participate on the above committee structures are from such organisations as the WA Police, Fire and Emergency Services Authority (Fire Brigades, State Emergency Service), Local Government, Department of Community Development, Western Power, Telstra, Alinta Gas and many others.
- City of Bunbury <http://www.bunbury.wa.gov.au/do/page?p=9000&i=278>

- Community Emergency Risk Management_ Western Australia has adopted AS/NZS Standard 4360:2004 (Risk Management) which provides communities with a systematic process in which they can identify, analyse, evaluate and treat risks within their community.
- It focuses on the vulnerability rather than the emergencies that may result from risk.
- STATE EMERGENCY MANAGEMENT COMMITTEE
 - State Emergency Management Arrangements
 - State Emergency Management Policy No. 1.1
- **Western Australian Emergency Risk Management Guide 2005**



Main Elements of the Emergency Risk Management Process

Abridged example of Risk Register

Risk Register Part A			
Hazard	Vulnerable Element	Risk	Consequences
Flood	People	There is a risk that approximately 5000 people may be directly affected by flood.	<ul style="list-style-type: none"> • There may be loss of life and injury. • People may be homeless. • People may need to be evacuated. • People may need to be fed and accommodated. • Many people suffer from post-disaster psychological trauma. • There may be long term economic hardship for families.

Risk Register Part B				
Hazard	Risk	Likelihood Rating	Consequence Rating	Risk Rating
Flood	There is a risk that approximately 5000 people may be directly affected by flood.	Possible	Catastrophic	Extreme

Analyse the Risks

Example of prioritisation of unacceptable risks

Risk	Risk Rating	Risk Evaluation	Risk Priority
Approximately 5000 people may be directly affected by flood	Extreme	A very serious risk that can be better managed. The prospect of high loss of life and injury is unacceptable and requires urgent attention.	Top Priority
Critical facilities may be damaged	High	Loss of critical facilities has a serious effect on the community and could potentially cause loss of life. The matter should be addressed urgently.	High Priority

Evaluate the Risk

South Australia

- South Australia has adopted a Risk Management approach to Disaster Management in accordance with the methodology outlined in the Risk Management Standard AS/NZS 4360.
- A key strategy in the Risk Management approach is the implementation of mitigation (either preventing or reducing as much as possible) measures to treat risk. This requires a collaborative effort with the Commonwealth, State and local Governments, private enterprise and the general community
- South Australia has adopted the four disaster management concepts recommended by the Commonwealth Government. They are:
 - The All Hazards Approach
 - The Comprehensive Approach
 - The All Agencies Approach
 - The Prepared Community
- The Central Local Government Region had approved in 2004/05 NDMP funding of \$90,000 to undertake a disaster risk assessment and treatment study of its 15 member councils.
- In 2003/04 and 2005/06 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for South Australia for 2003 to 2006 was greater than \$3.1M.

Victoria

- In 2003/04, 2004/05 and 2005/06 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for Victoria for 2003 to 2006 was greater than \$2.4M.
- Victoria has conducted extensive projects that link into broader programs. More details may be added.

Australian Capital Territory

- In 2003/04, 2004/05 and 2005/06 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for the ACT for 2003 to 2006 was greater than \$1.7M.

Tasmania

- The Southern Midlands Council had approved in 2005/06 NDMP funding of \$6,250 to develop an Emergency Risk Management Plan.

- In 2003/04 and 2004/05 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for Tasmania for 2003 to 2006 was greater than \$0.81M.
- Tasmania has completed a comprehensive state risk assessment.

Northern Territory

- In 2003/04, 2004/05 and 2005/06 there were no applications for expenditure relating to disaster management plans or risk management plans.
- The total NDMP funding for the NT for 2003 to 2006 was greater than \$0.26M.

Geoscience Australia

- The National Risk Assessments Project (NRAP) represents a significant and logical move towards investigating and assessing the national risk from natural disasters, effectively replacing the previous emphasis on individual major cities, such as Perth, Mackay, Newcastle, Cairns, Gladstone and Southeast Queensland.
- NRAP aims to provide accurate and timely information for decision makers and practitioners involved in all aspects of disaster risk management. Results produced can assist in constructing informed and effective policy, funding and mitigation decisions. For such an approach, it is necessary to have a long term commitment to developing nationally consistent hazard and risk modelling capabilities including vulnerability and economic loss estimates and data collection. A nationally consistent approach will highlight areas which are in need of further risk assessments, and areas which may have not previously been recognised as hazardous.
- NRAP will provide risk assessment methods, models and data for the Disaster Mitigation Australia Package (DMAP) and, in particular the Natural Disaster Mitigation Programme (NDMP) (DOTARS). Addressing rapid onset hazards with the potential to cause serious disruption to a community or region is of foremost importance. Therefore priority hazards for NRAP include severe storms with their associated threats (floods, winds, hail, storm tide, tsunami), earthquakes and bushfires.
- The anticipated NRAP output is:
 - A report on national priorities for natural hazard risk assessment, primarily for risk managers across whole of government.
- Natural Disaster Mitigation Program Disaster Mitigation Australia Package (DMAP)
 - Geoscience Australia aims to achieve the DMAP objectives by:
 - Developing nationally integrated, consistent and scientifically rigorous risk assessment approaches.
 - Integrating a wide base of input from experts and stakeholders into model development and applications.
 - Developing stakeholder and community ownership of the approach.
- The direct products and benefits of this work will be:
 - **A National Risk Assessment Framework**
 - This will act as a point of reference for all participants in risk assessment and mitigation projects.
 - **National information on risk for a range of sudden onset natural hazards**
 - This allows for objective comparisons of risks between regions and across hazards and will increase risk awareness.
 - **Web-based loss assessment tools, visualisation tools and datasets**
 - These will increase the capability of performing and accessing risk assessments.

- These products largely depend on effective collaboration between agencies (both government and non-government) and all levels of government across Australia in addition to a successful data analysis and collection program. The States, Territories, Local Government and other stakeholder organisations can provide valuable input to this process.
- Geoscience Australia recognises the national importance of the Disaster Mitigation Australia Package (DMAP) initiative and the commitment it will require from all levels of government and other stakeholders for success.
- <http://www.ga.gov.au/urban/projects/nrap/summary.jsp>

Emergency Management Australia

Government and communities working together to manage emergencies

- In 2004 the Australia Government announced the “Working Together to Manage Emergencies” policy initiative in recognition of the need to develop self –reliance at both the community and local government level in order to enhance community safety.
- Over a four-year period this initiative will provide \$49 million in grants through two programs, the Local Grants Scheme (LGS) and the National Emergency Volunteer Support Fund (NEVSF). The programs are managed by Emergency Management Australia (EMA), a division of the Attorney-General’s Department, through a partnership between State and Territory Governments, communities, local authorities and emergency services sector representatives.
- The LGS will provide grants at the local government level to assist communities to develop and implement emergency risk management initiatives, enhance protective measures for critical infrastructure and provide emergency management and security awareness training for local government staff.
- The NEVSF provides grants for projects developed to boost the recruitment, retention and training of volunteer organisations at the frontline of emergency management.
 - Local Grants Scheme
 - National Emergency Volunteer Support Fund
- <http://www.ema.gov.au/agd/ema/emainternet.nsf/Page/RWP7998FBAA46DDE654CA256FA200014EEC>
- *Local Grants Scheme (LGS)*
 - Eligibility
 - Local councils, non-incorporated local government areas, remote communities and indigenous communities are eligible to apply for funding under the Local Grants Scheme.
 - Local government associations or State Government agencies with an emergency management focus may submit an application on behalf of a community.
 - If you are unsure about your eligibility please seek advice from your State or Territory Contact listed below.
 - Eligible Projects
 - Priority will be given to projects that develop and promote effective community preparedness, response and recovery initiatives, enhance protective measures for critical infrastructure and provide emergency management and security awareness training to local government staff, in order to reduce vulnerability to identified risks within a community.

- Reviewing the list of projects that received funding for FY 2005/06, (see appendix 1), provides an indication of the types of projects eligible for grants under the Local Grants Scheme.
- National Emergency Volunteer Support Fund (NEVSF)
 - Eligibility
 - Grants are available under the National Emergency Volunteer Support Fund to member agencies of the Australian Emergency Management Volunteer Forum (AEMVF) and any agencies that have a defined role in State or Territory Response and Recovery Plans. Agencies seeking grants should confirm their eligibility with their State or Territory Contact listed below.
 - Eligible Projects
 - Priority will be given to projects submitted by agencies which seek funding for particular strategies that enhance recruitment, retention and training of volunteers in emergency management agencies. Applications for funding of capital equipment will also be considered.
 - Reviewing the list of projects that received funding for FY 2005/06 (see appendix 1), provides an indication of the type of projects eligible for grants under the National Emergency Volunteer Support Fund.

2. International Approaches

2.1 Natural Hazards Research and Applications Information Center, (NHRAIC) Boulder Colorado

In December 2005, the Multihazard Mitigation Council (MMC) of the National Institute of Building Sciences released to the Federal Emergency Management Agency (FEMA) **Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities**, the culmination of a three-year, congressionally mandated independent study. The MMC Board of Direction and oversight committee, a team of more than 30 researchers from academic institutions and private-sector organizations across the United States assembled by the Applied Technology Council, and many others contributed to the study, which represents the most comprehensive quantitative analysis of hazard mitigation activities to date.

The research findings provide independent evidence to support what nearly every member of the hazards community knows anecdotally – generally, FEMA mitigation grants are highly cost-effective. On average, across all grants, regions, and hazards studied, each dollar spent on mitigation saves society an average of \$4 in avoided future losses. Results also indicate that, based on the eight communities studied in depth, FEMA mitigation grants, including those associated with Project Impact, play a significant role in a community's mitigation history and often lead to additional loss reduction activities. (NHC, 2006)

There are 10 steps to the Community Rating System (CRS) planning process. Actually, there's nothing unique about it, since planners will recognize the classic planning approach

of gathering information, setting goals, reviewing alternatives, and deciding what to do. The steps are:

1. Organize to prepare the plan.
2. Involve the public.
3. Coordinate with other agencies.
4. Assess the hazard.
5. Evaluate the problem.
6. Set goals.
7. Review possible strategies and measures.
8. Draft an action plan.
9. Adopt the plan.
10. Implement, evaluate, and revise the plan. (NHRAIC, 1999)

2.2 United States of America

Federal Emergency Management Agency (FEMA) is part of the Department of Homeland Security.



State and Local Mitigation Planning how-to guide: Getting Started 2002
Federal Emergency Management Agency (FEMA)
<http://www.fema.gov/pdf/plan/mitplanning/howto1.pdf>

The Mitigation Division manages the National Flood Insurance Program (NFIP) and a range of programs designed to reduce future losses to homes, businesses, schools, public buildings and critical facilities from floods, earthquakes, tornadoes and other natural disasters.

Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation efforts provide value to the American people by creating safer communities and reducing loss of life and property. Mitigation includes such activities as:

- Complying with or exceeding NFIP floodplain management regulations.
- Enforcing stringent building codes, flood-proofing requirements, seismic design standards and wind-bracing requirements for new construction or repairing existing buildings.
- Adopting zoning ordinances that steer development away from areas subject to flooding, storm surge or coastal erosion.
- Retrofitting public buildings to withstand hurricane-strength winds or ground shaking.
- Acquiring damaged homes or businesses in flood-prone areas, relocating the structures, and returning the property to open space, wetlands or recreational uses.
- Building community shelters and tornado safe rooms to help protect people in their homes, public buildings and schools in hurricane- and tornado-prone areas.

<http://www.fema.gov/about/divisions/mitigation.shtm#content>

The Mitigation Division comprises three branches: Risk Analysis, Risk Reduction and Risk Insurance.

The primary functions of these branches includes:

- The **Risk Analysis Branch** applies engineering and planning practices in conjunction with advanced technology tools to identify hazards, assess vulnerabilities, and develop strategies to manage the risks associated with natural hazards.
- The **Risk Reduction Branch** works to reduce risk to life and property through the use of land use controls, building practices and other tools. These activities address risk in both the existing built environment and in future development, and they occur in both pre- and post-disaster environments.
- The **Risk Insurance Branch** helps reduce flood losses by providing affordable flood insurance for property owners and by encouraging communities to adopt and enforce floodplain management regulations that mitigate the effects of flooding on new and improved structures.
-

The Risk Reduction Branch manages the following programs:

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance Program (FMA)
- Pre-Disaster Mitigation (PDM)
- Severe Repetitive Loss (SRL)
- Community Rating System (CRS)
- National Earthquake Hazards Reduction Program (NEHRP)

The **Hazard Mitigation Grant Program (HMGP)** provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

The **Pre-Disaster Mitigation (PDM)** program provides funds to states, territories, Indian tribal governments, and communities for hazard mitigation planning and the implementation

of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. <http://www.fema.gov/plan/prevent/bestpractices/index.shtm>

FEMA also has a significant research arm, which has influenced research programs in EMA (the same is also applicable to New Zealand, although details are not available here).

2.3 United Kingdom

The UK Resilience Website is run as a news and information service for emergency practitioners by the Civil Contingencies Secretariat at The Cabinet Office. <http://www.ukresilience.info/about.shtm>

The key document is Emergency Preparedness <http://www.ukresilience.info/ccact/eppdfs/index.shtm>

Risk assessment is a modified version of the Risk Management Process from the Risk Management Standard 2002.



A Risk Management Standard 2002 AIRMIC, ALARM and IRM - UK

The Institute of Risk Management (IRM), The National Forum for Risk Management in the Public Sector (ALARM), and The Association of Insurance and Risk Managers (AIRMIC), http://www.theirm.org/publications/documents/Risk_Management_Standard_030820.pdf - 9 June 2006

High	Financial impact on the organisation is likely to exceed £x Significant impact on the organisation's strategy or operational activities Significant stakeholder concern
Medium	Financial impact on the organisation likely to be between £x and £y Moderate impact on the organisation's strategy or operational activities Moderate stakeholder concern
Low	Financial impact on the organisation likely to be less than £y Low impact on the organisation's strategy or operational activities Low stakeholder concern

Consequences - Both Threats and Opportunities

Estimation	Description	Indicators
High (Probable)	Likely to occur each year or more than 25% chance of occurrence.	Potential of it occurring several times within the time period (for example - ten years). Has occurred recently.
Medium (Possible)	Likely to occur in a ten year time period or less than 25% chance of occurrence.	Could occur more than once within the time period (for example - ten years). Could be difficult to control due to some external influences. Is there a history of occurrence?
Low (Remote)	Not likely to occur in a ten year period or less than 2% chance of occurrence.	Has not occurred. Unlikely to occur.

Probability of Occurrence - Threats

Estimation	Description	Indicators
High (Probable)	Favourable outcome is likely to be achieved in one year or better than 75% chance of occurrence.	Clear opportunity which can be relied on with reasonable certainty, to be achieved in the short term based on current management processes.
Medium (Possible)	Reasonable prospects of favourable results in one year of 25% to 75% chance of occurrence.	Opportunities which may be achievable but which require careful management. Opportunities which may arise over and above the plan.
Low (Remote)	Some chance of favourable outcome in the medium term or less than 25% chance of occurrence.	Possible opportunity which has yet to be fully investigated by management. Opportunity for which the likelihood of success is low on the basis of management resources currently being applied.

Probability of Occurrence - Opportunities

2.4 Germany

Deutsches Komitee Katastrophenvorsorge – German Committee for Disaster Reduction

<http://www.dkkv.org/>



Structure of the integrated risk management in the coastal protection

From Risikomanagement als Konzept zur Risikominderung (Risk management as concept for risk reduction)

Main boxes

risk analysis	risk management	risk handling
	risk reduction	disaster accomplishment
Risk analysis ovals		Risk reduction ovals
endangerment determination		technical measures
vulnerability analysis		area planning measures
risk regulation		readiness-increasing measures
		self-help of citizens

2.5 Canada

In Canada Disaster Mitigation is undertaken by Public Safety and Emergency Preparedness (PSEPC) <http://www.psepc-sppcc.gc.ca/prg/em/miti-en.asp/>

Disaster mitigation measures include:

- Hazard mapping;
- Adoption and enforcement of land use and zoning practices;
- Implementing earthquake resistant building codes;
- Enforcing building codes fire resistant;
- Flood plain mapping;
- Hail storm suppression;
- Reinforced tornado safe rooms
- Burying of electrical cables to prevent ice build-up;
- Dyke building and raising of homes in flood-prone areas;
- Disaster mitigation public awareness programs;
- Insurance programs.

PSEPC is currently developing Canada's National Disaster Mitigation Strategy (NDMS). The goals of the strategy are to reduce risks, impact and costs associated with natural disasters, as well as to foster a disaster-resilient society.

PSEPC works closely with the following four national and international partners to ensure that disaster mitigation policies, programs and best practices are integrated nationally and internationally.

Canadian Natural Hazards Assessment Project

- Collaborative project with Environment Canada designed to assess the risk to Canadians from natural hazards and determine how those risks might be mitigated, to take inventory of gaps in knowledge and to enhance public awareness.

Canadian Risk and Hazards Network (CRHNet)

- A not-for-profit organization that promotes and strengthens disaster risk reduction and emergency management in Canada.

Institute for Catastrophic Loss Reduction (ICLR)

- ICLR is a research institute established by Canada's property and casualty insurers, working to reduce disaster losses. The Institute is internationally recognized for leadership in multi-disciplinary disaster prevention research.

2.6 International Strategy for Disaster Reduction (UN/ISDR)

The UN/ISDR helps to coordinate global disaster reduction activities in the socio-economic, humanitarian and development fields, as well as to support international policy integration.

A Discussion paper on the National Disaster Mitigation Strategy (NDMS) is available at:

<http://www.psepc-sppcc.gc.ca/prg/em/ndms/discussionsnac-en.asp>

The results of the national consultation are available at:

<http://www.psepc-sppcc.gc.ca/prg/em/ndms/resultssnac-en.asp>

3. Best Practice Issues and Examples

Clearly the methods and framework adopted by Queensland as the basis for risk management and mitigation are in accordance with national and international best practice. These frameworks are models that structure a process, that requires evaluation as a tool to measure the effectiveness and appropriateness of both the framework or model and the outcomes. This review of the Queensland NDRMSP is such an evaluation. Three approaches to an evaluation are through identification of outcomes, comparative qualitative assessments and the identification of best practice examples and case studies (ADRC 2005, EMA 2000). These are also standards of project evaluation.

3.1 Best Practice Resources

- FEMA 479-CD, Developing and Promoting Mitigation Best Practices and Case Studies—Community Strategy Toolkit, is designed to help guide efforts to capture and promote effective mitigation techniques being employed throughout the country to reduce adverse impacts of disasters. The toolkit is based on Developing and Promoting Mitigation Best Practices and Case Studies Community Strategy, developed under a cooperative initiative among FEMA Mitigation, Public Affairs, and Recovery Division staffs.
- Case Studies are more in-depth, analytical reviews of applied mitigation measures. There are a number of articles and publications that chronicle innovative projects throughout the United States that deal with all types of hazards.
- FEMA has produced a website of best practice that can be used to select a portfolio of examples from the USA under regions, states and categories. This website is at <http://www.fema.gov/mitigationss/mitigationOverview.do>

- EMA's nearest comparison inventory of best practice is its list of Safer Communities Awards which can be downloaded from their website at <http://www.ema.gov.au/agd/ema/emaInternet.nsf/Page/RWPB6F8D98854D68C58CA256D3B001997A8?OpenDocument> This area provides a summary of each project.
- The Asian Disaster Reduction Centre has produced a document on good practice in total disaster risk management (ADRC 2005) which presents case studies under a variety of categories, including various aspects of mitigation and community awareness.
- The case study approach that is presented in all of the above examples is commonly used in international meetings and conferences. It may be in danger of being anecdotal, especially as each case is unique, but the intention is to underscore best practice in emergency management as a set of ideas and processes that may be adapted to other cases. Identification of such good practice or best practice examples of mitigation activities in Queensland would be a valuable next step in the NDRM process. Best practice examples also underscore the diversity of approaches, with the experience of local government organisations being presented as ideas to guide or inspire other LGCs.

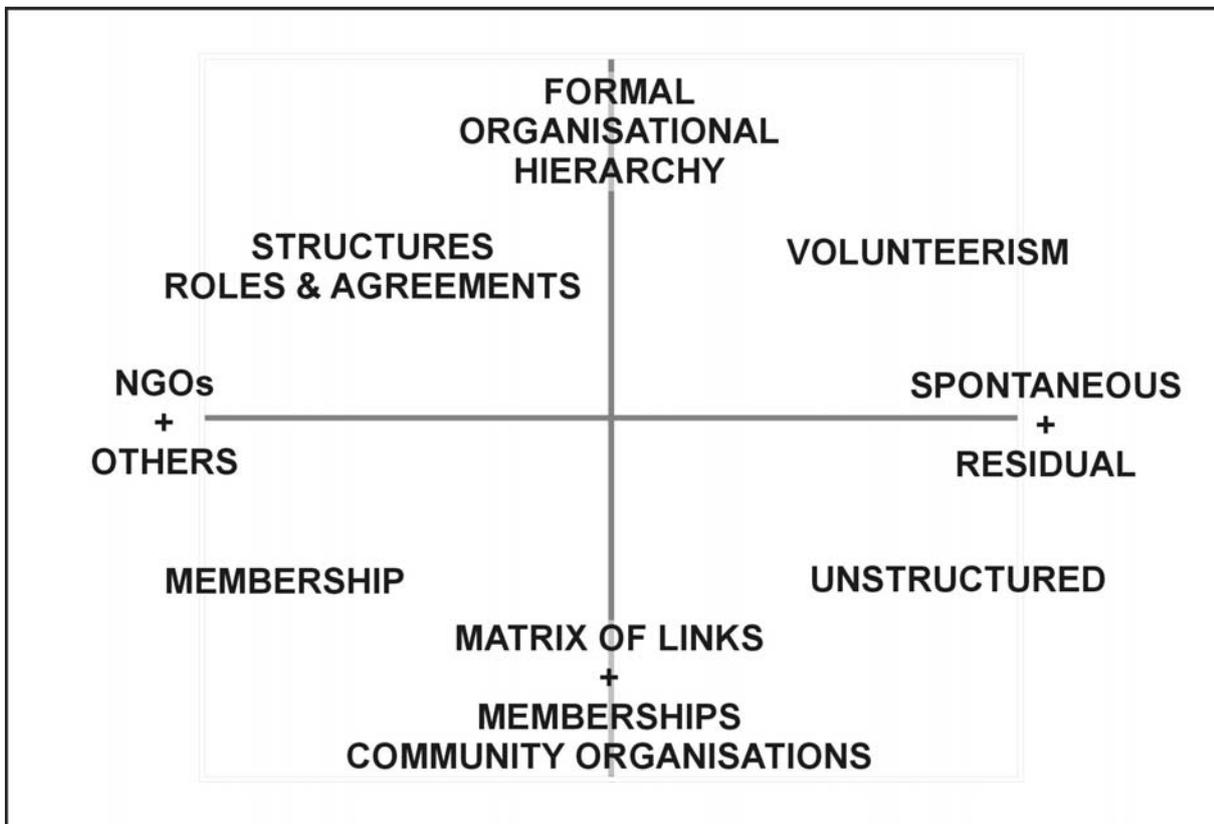
3.2 Best Practice in a Complex World

Management is a fundamentally top down approach. In a post modernist world, debates about top down and bottom up tend to argue a case for the relevance and empowerment of the bottom up, community based view, to the detriment of the top down approach, which is easily labelled an old paradigm of command and control. The reality for emergency managers is that they are necessarily at the top and have the responsibility to manage and plan for diverse and complex crises, through a layered and hierarchical system. The effectiveness of top down management is not necessarily its complete alternative but the extent to which it percolates and engages all levels of community and stakeholders.

Over a decade ago Dynes (1994) identified a range of attitudes and world views which different individuals and groups bring to emergency management. He classified these as models, but in acknowledging that they are often grouped, sometimes inconsistently, into single documents and plans he touched on the complexity of the ways in which people may interpret the same framework. He termed these the agent facts model (a scientific hazard based view), the big accident (often a police view), the end of the world (absolute catastrophe), the media model (heroes and villains), command and control, and its lesser variant, the administrative model. Dynes' main argument was that emergency managers themselves approach plan making from these different positions, but the same can be construed for those managers and local government public servants who are the users and interpreters of management frameworks and plans. A standardised structure does not mean the same to all users. The diversity of places, capacities and resources results in quite different emphases and priorities within the same management framework. This is clear in the diversity of the NDRM studies that have been reviewed here. For example the difference between a coastal city and an outback shire is not just a difference of scale or dominant hazard. It is a difference in culture, world view and political inclination, a contrast which we would see as obvious in differentiating indigenous and non indigenous communities, but which extends throughout the typology.

“Government is only one of many types of organisations that become involved in disasters. The trend in government has been towards less government and more privatisation. Former government roles in welfare and service provision are now provided by private enterprise. There is a blurred line between companies that are providing services to the public, and the traditional Non Government Organisations that began life as charities. At the further end of the business end of this continuum of organisations are companies that are in business to make profits for their shareholders, but which possess plant, machinery and expertise or infrastructure to play a very significant role in community recovery. On the other end of this continuum are charities and humanitarian NGOs whose members are driven principally by beliefs, altruism and often a strong political agenda.

On one scale there exists this continuum between altruistic NGOs at one end and purely commercial business operations at the other end. Stretching this scale is a size and spatial continuum that ranges from the international and national government organisations down to community, household and residual leadership. These are expressed in the figure below in terms of these continuums. The diagram expresses a range in size, organisational structure and scale. No organisation can encompass all of these types. They will sit primarily in one or more sectors.



The table below lists the types of organisations involved in emergency management and mitigation.

Table 1. Organisations Involved in Emergency Management

Direct	Indirect	Residual & Spontaneous
International	Businesses	Culture
Government Organisations	Economic Organisations	Community Networks
Non Government Organisations	Recreational organisations	Internet
Privatised Specialists	Religious organisations	Residual Leadership
Grass Roots Organisations	Cultural Groups	Volunteers
Community Organisations	Interest Groups	Fixers & Tradespersons
	Political groups	Illegal Groups
	Media	Family & Household
		Individuals & Visitors

The directly involved organisations are those that have a primary responsibility for emergency management and disaster mitigation. The NGOs include the traditional relief organisations and charities, but there are also NGOs that could be included in the indirectly involved group of organisations, such as Landcare, the formal organisations of religions, various types of youth groups that provide volunteers and so on. These are separate from organisations like the SES, which rely on volunteers, but are sponsored directly by government. However, many, including rural fire brigades, surf lifesaving clubs and others, are essentially community organisations. Grass Roots Organisations are very definitely local community groups. GROs have often been single issue, but otherwise quite loose organisations. Some of these have responded directly to disasters or the threat of a hazard, as victim support or lobby groups, but there are far more GROs that are indirectly involved in disaster Response and Recovery. They may not have been formed with any thought of hazard or disaster, but once formed they create and maintain community links and networks which may be rapidly used in a crisis.

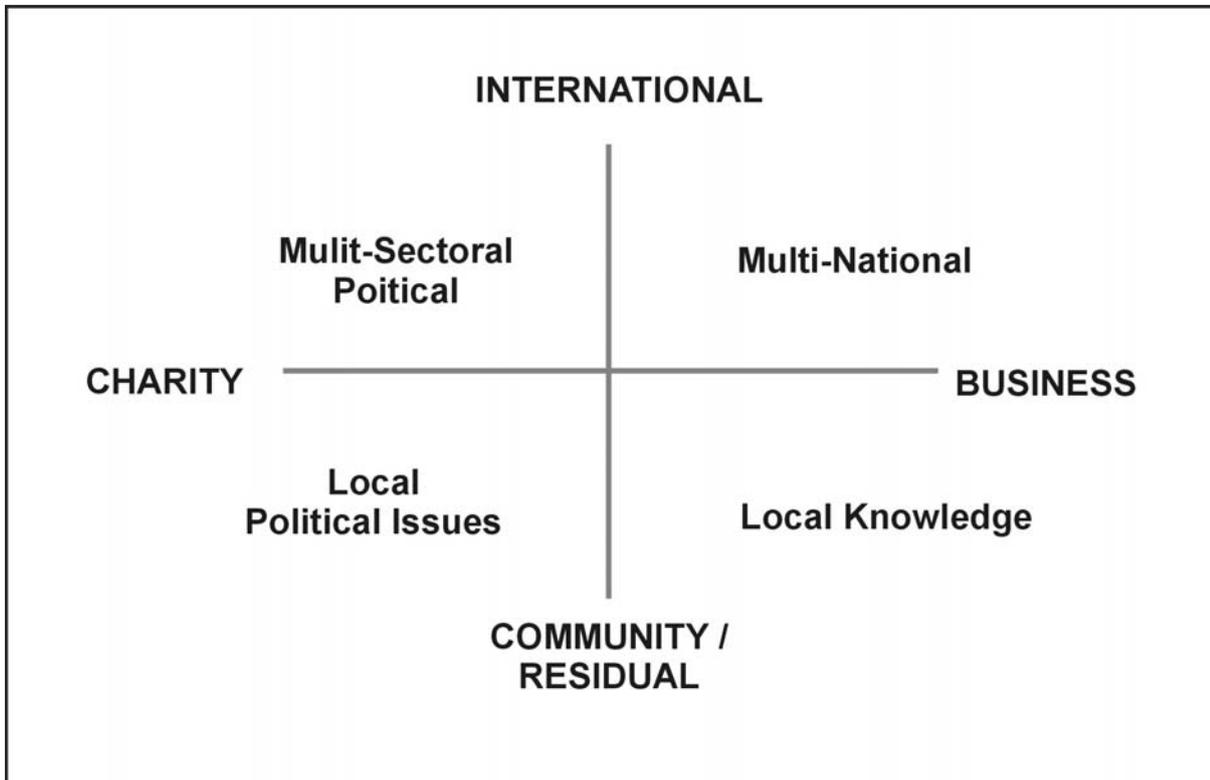
The indirect group of organisations are those which exist primarily for a purpose other than hazard mitigation, but which contribute resources, personnel, networks and knowledge during and after a disaster. Included here is the media, in all of its forms and roles.

The media is extremely powerful in advertising a crisis and prompting political and citizen response. The corollary of this power is the invisibility of unreported, or poorly reported disasters. Disasters are, in part, constructed by the media. They often exaggerate human interest elements, they look for scandals and government ineptitude, assign blame and instigate generous relief responses. They self censor some images of suffering, but are also guilty of misusing distressing images to increase the impact of their stories.

Emergency managers have no control over the media and need their positive support at all phases of emergency management. All organisations must therefore devote some of their resources to media liaison and must continually work at these networks. NGOs especially work hard at developing their media image and ensuring media visibility as citizen generosity is a key component of their income.

There also exists a level of informal organisation that we can group under residual and spontaneous organisations. These are two quite separate community processes. The

spontaneous response and resulting organisation, or community, or network, occurs directly as a consequence of the disaster event. The residual “organisations” are those elements of civil society that underpin all that we do, the ways in which we define and construct our society, the traditional, and the informal. Residual organisations are culturally constructed, grounded in community and civil society, representative of the ways we organise and network.



The size and numbers of organisations that participate in any disaster vary with the spatial extent, severity and population that is involved. The more organisations that are involved, the more complex is the task of emergency management. These organisations bring to the community a wide range of skills and approaches. The figure above illustrates the variety of structures within organisations and the community. The upper left area is structured, the lower right is unstructured. Urban society, in particular, is a highly complex, unstructured matrix of networks and linkages. It is like the structure of the internet, allowing enormous numbers of groupings and largely informal organisations. This is the community which is managed by formal emergency management with its clear cut organisational hierarchy. Cutting across this continuum is a range of organisations from the formally structured NGOs which may include businesses and companies, through to the spontaneous and residual. Where the community initiates and pursues its own Response and Recovery, it is in the bottom right area of the model, unstructured but not necessarily disorganised.” (King 2006)

Renn and others at the International Risk Governance Council have developed a model of risk mitigation that is adaptable for complex technologically dependant society. Their White Paper may be downloaded from their website at http://www.irgc.org/irgc/knowledge_centre/irgcpublications/ Much of the document is primarily concerned with the emergence of new mainly technological risks in complex urban society. Its value lies in its integrative framework for the analysis of risk. It has a global view

but in placing emphasis on the societal context and extensive risk knowledge Renn stresses the integrative roles of all stakeholders. He identifies three value based assumptions: 1) socio cultural dimensions of risk 2) the governance process that requires extensive stakeholder inclusiveness and 3) good governance. All of these are clearly central to the NDRM studies and ongoing hazard mitigation. Governance is a concept that extends management. "Governance describes structures and processes for collective decision making involving governmental and non governmental actors." Page 22.

Many of the other ideas outlined in this paper are common to emergency management generally and to the NDRMS process. However, it is the extension towards complexity and uncertainty that adds a new dimension. The paper identifies simple and complex risk problems, where the simple level relies on best practice. It is stressed that simple hazards are not necessarily small or negligible, but are simple in the sense of cause and effect. Complex risks are defined in the context of the scientific characterisation of risk. "Complexity refers to both the risk agent and its causal connections and the risk absorbing system and its vulnerabilities." Page 45

The next stage is risk problems that are due to interpretative and normative ambiguity where risk is interpreted differently by stakeholders with differing or opposing views. Renn does not mention climate change and sea level rise, but clearly these risks are both complex and ambiguous.

Knowledge Characterisation	Management Strategy	Appropriate Instruments	Stakeholder Participation
1 'Simple' risk problems	Routine-based: (tolerability/ acceptability judgement) (risk reduction)	Applying 'traditional' decision-making Risk-benefit analysis Risk-risk trade-offs Trial and error Technical standards Economic incentives Education, labelling, information Voluntary agreements	Instrumental discourse
2 Complexity-induced risk problems	Risk-informed: (risk agent and causal chain)	Characterising the available evidence Expert consensus seeking tools: o Delphi or consensus conferencing o Meta analysis o Scenario construction, etc. Results fed into routine operation	Epistemological discourse
	Robustness-focussed: (risk absorbing system)	Improving buffer capacity of risk target through: Additional safety factors Redundancy and diversity in designing safety devices Improving coping capacity Establishing high reliability organisations	

3	Uncertainty-induced risk problems	Precaution-based: (risk agent)	Using hazard characteristics such as persistence, ubiquity etc. as proxies for risk estimates Tools include: • Containment • ALARA (as low as reasonably achievable) and ALARP (as low as reasonably possible) • BACT (best available control technology), etc.	Reflective discourse
		Resilience-focussed: (risk absorbing system)	Improving capability to cope with sur-prises Diversity of means to accomplish desired benefits Avoiding high vulnerability Allowing for flexible responses Preparedness for adaptation	
4	Ambiguity-induced risk problems	Discourse-based:	Application of conflict resolution methods for reaching consensus or tolerance for risk evaluation results and management option selection Integration of stakeholder involvement in reaching closure Emphasis on communication and social discourse	Participative discourse

Source: Renn 2005

There are four classes of risk as identified in the diagrams. The escalator model takes these levels and moves towards some identification of the increasing stakeholder involvement. (Read the diagram from bottom to top).

The Risk Management Escalator and Stakeholder Involvement (from simple via complex and uncertain to ambiguous phenomena)

			Risk Trade-off Analysis & Deliberation necessary + Risk Balancing + Probabilistic Risk modelling
		Risk Balancing Necessary + Probabilistic Risk Modelling	Remedy
	Probabilistic Risk Modelling	Remedy	
Statistical Risk Analysis	Remedy	Cognitive • Evaluative	•Cognitive •Evaluative •Normative
	Cognitive		
Remedy	Type of Conflict	Type of Conflict	Type of Conflict
Agency Staff	•Agency Staff •External Experts	•Agency Staff •External Experts •Stakeholders • Industry • Directly affected groups	• Agency Staff • External Experts • Stakeholders • Industry • Directly affected groups • General public
Actors	Actors	Actors	Actors
Instrumental	Epistemological	Reflective	Participative
Type of Discourse	Type of Discourse	Type of Discourse	Type of Discourse
Simple	Complexity induced	Uncertainty induced	Ambiguity induced
Risk Problem	Risk Problem	Risk Problem	Risk Problem
Function:	Allocation of risks to one or several of the four routes		
Type of Discourse: Participants:	Design discourse A team of risk and concern assessors, risk managers, stake-holders and representatives of related agencies		

Source: Renn 2005

It is quite clear that the NDRMS framework is primarily at the simple end of the escalator, with an overflow according to the risk context, into complexity induced. The next step is clearly towards the more complex levels and Renn's suggestion is that best practice is a rather primitive tool at the simpler end of the escalator.

Section 6. Review and critique of the Queensland NDRM model— specifically the Zamecka & Buchanan NDRM guidelines

Critiquing the Zamecka & Buchanan NDRM Guidelines and Manual is a difficult task, because their work is based soundly on the standard: it builds on procedures, models and studies that have been formulated both nationally and internationally. It is a culmination of attempts to provide clear guidelines and a methodology to identify hazards, evaluate risks and prioritise mitigation treatments. The Zamecka & Buchanan NDRM Guidelines and Manual do all the right things in presentation, clarity, simplicity and coverage of procedures. The guidelines have consequently been recognised for excellence as a planning document and received a national award as such from the Planning Institute of Australia.

The consequence of the excellence of the document is that all of the NDRM case studies which have followed its procedures precisely, produce comparable outputs from a very diverse range of shires and communities. That the NDRM studies are variable in quality, the detail, and possibly reliability, is more a reflection of the diversity and abilities of the councils and consultants involved, and of the diversity of the places themselves.

A major modification of the original risk management guidelines was the production and publication of “A Guide to Disaster Risk Management in Queensland Aboriginal and Torres Strait Islander Communities” in 2004. This document was not therefore available to guide the indigenous communities that are reviewed in this study. It clearly reflects some of the experience of the indigenous community studies and significantly reflects aspects of the Pompuraaw study. On the other hand a potential flaw of this guide is the absence in the acknowledgements of any reference to communities in the Gulf lowlands or western Cape York Peninsula. Given the strong cultural division between this part of Queensland and the eastern coast, both Cape York Peninsula and southwards, such an exclusion may prompt a lack of interest or engagement with the western communities.

The primary **strength** of the Zamecka & Buchanan NDRM Guidelines and Manual and of the studies that have eventuated is a systematic evaluation and analysis of natural hazard risk and the identification and prioritisation of mitigation activities. Where council employees and business and community members have been actively involved in the whole process, ownership of knowledge and hazard mitigation will strengthen the community. Outcomes of the NDRM process will be increased safety, secure lifelines and a reduction in the cost of natural hazards and disasters. The strength of the guidelines lies in the involvement of managers, stakeholders and community in developing their own risk management.

Potential **weaknesses** of NDRMS lie more in the reality of institutional processes than in the intent of the guidelines. The Zamecka & Buchanan NDRM Guidelines and Manual are in a sense an idealistic model, even though the intent was entirely practical. It is probable that most councils have not involved the community in any realistic manner. This is partly a result of a lack of funding and resources, and partly a lack of skilled staff. Reliance on outside consultants potentially disempowers the community. The process is run by the consultant who may easily follow the minimal structure of the guidelines rather than the intended best practise. There is a tendency for consultants to plant the guidelines on the community rather than to use it as a lens to analyse the community. Important issues involve the experience and accreditation of the consultants. Similarly there is reliance on

the advice of external agencies and stakeholders whose voices may dominate the community. There is a difficulty in communicating the process to the broader community, which in its many forms brings perceptions, prejudices and fears in relation to hazard risk. Over a period of time council personnel change—both politicians and public servants. Although the risk evaluation was multi hazard, there still exist unknown hazards, especially in the sense of the vulnerability of particular places and structures. The multi hazard approach is in itself a weakness of the studies in swamping them with too much detail. It may even be argued that the multi hazard approach could be a weakness ie the local, priority hazard is what must be mitigated. There is a danger of attempting to do too much. However, an all hazards approach is separate from an all hazards risk study – a point probably imperfectly understood by participants. A final weakness is the problem alluded to in the next section of deciding where to draw the line—community, local government, region etc. Note that there is a flaw in the Zamecka & Buchanan NDRM Guidelines and Manual whereby the risk evaluations are not repeated or identified in the risk treatments, thus providing no direct link from risk assessment to treatment.

There are great **opportunities** in carrying out NDRMS. It provides a forum for hazard issues, it encourages a proactive culture and may lead to much wider applications of community responsibility and safety. It is also an approach that encourages partnerships. A clear strength of local government in Queensland is its small size and local nature where co-operation grows out of a strong sense of community. As population size increases, and more resources become available, this local level responsibility may lessen. Good communication is essential and may be enhanced by the process.

The NDRMSP process creates **threats** both for the council and community. The allocation of scarce resources is always a political process. Hazard mitigation is a political process in competition with other priorities and issues. The identification of risk implies acceptance, both of the risk and of the necessity to confront it, as well as the treatment of risk. Once identified, hazard risk becomes part of future council business, thereby encouraging council passivity in avoiding the NDRM process as long as possible. Some priority treatments may be unaffordable, while others may require scarce resources to maintain the mitigation strategy. Finally, NDRM comes amidst a group of competing philosophies—community, safety, crime etc.

Best practice and achievable outcomes emerge from the reconciliation of all of these issues.

Section 7. A Classification Of The NDRMSP Case Study Councils: Typology And Issues

It is obvious in a state as diverse as Queensland that one NDRM type will not fit all, at least in terms of evaluation. The method used in the NDRMs was driven by the Zamecka & Buchanan NDRM guidelines. Thus all of the studies follow the basic structure laid down by these guidelines. It is a strong comparative structure common to all of the studies, although there is significant interpretation and individuality from one study to another. As all of the studies followed the Zamecka & Buchanan NDRM guidelines and replicated its format, any decision on best practice has to re-examine their work. This review of the NDRM studies may partially do that if shortcomings and limitations are a consequence of the guidelines. Therefore this review will revisit the guidelines both as a document and as an output in the form of the NDRM studies under review. The studies are the direct output of the NDRM guidelines as applied to specific localities. Any divergence from the guidelines may illustrate either a flaw in the consultancy process or a flaw in the guidelines themselves. The corollary of this is that a divergence from the guidelines may reflect the flexibility of the NDRM guidelines and may contribute an addition or improvement that may add to best practice.

1. Classify Studies into Broad Typologies of Approach

1.1 A Classification based on Approach

Simply and conclusively all of the studies followed the Zamecka & Buchanan NDRM guidelines. There is no separation of studies on the basis of their approach. This is hardly surprising as the approach was specified in the tender documentation.

1.2 A Classification based on a Broad Typology of Hazard

There is a fundamental problem in classifying NDRM studies on the basis of hazard type. They were intended to be multi hazard. Furthermore almost the entire state is flood prone and the whole coast is cyclone prone. While there are geographical concentrations of specific hazard risks the main mitigative hazards transcend geography.

1.3 A Classification based on Administrative Areas

Beyond LGAs, which are themselves relatively arbitrary, larger administrative regions lack a legislative/political basis although regional planning agreements, catchment planning and shared arrangements are increasing within Queensland. However it is not a meaningful basis for the comparison of the current set of NDRM studies. Several shared arrangements are implicit in the selected studies especially Sarina/Broadsound and Gladstone/Calliope and a number of other studies of LGAs that are part of larger regional plans.

However, a fundamental intent of NDRM is to focus down onto some very local specific treatments and strategies. Thus a larger regional approach for purposes of comparison and analysis is not particularly useful.

1.4 A Classification based on Urban/Rural

A division between urban and rural shires logically leads towards a continuum of urban percentage and societies/density that impose powerful constraints on resources, vulnerability, capability and priorities.

At one end of the scale are clearly defined city councils and at the other end are mainly remote indigenous councils or communities, with generally small populations. Many of the inland western shire councils also have small population bases as low as or even smaller than those of the indigenous communities, but mostly administer much larger areas and generally contain majority non indigenous populations. The inland shires are significantly different from the coastal shires, primarily in terms of the density of population and settlements, and density of infrastructure. However there is a subgroup of inland shires such as those on the Darling Downs and the Atherton Tableland, which are more appropriately grouped with the coastal Shire councils because of their larger and denser populations. These features of the coastal shires sets them apart from the generally semiarid low-density inland—the archetypal outback.

There is a further subgroup of shire councils that contain significant proportions of a neighbouring city population. In the case of Thuringowa the council has long had the status of a city, whereas Redland and Pine Rivers have remained as shire councils. These are the peri-urban regions of the outer suburbs of larger cities, especially Brisbane.

However, all of the council areas contain predominantly urban populations. The ABS minimum size of an urban settlement is 1000, but many smaller places, including indigenous communities are not agricultural settlements and mostly provide urban services to the township and its surrounding rural population. Most shires have more than half of their population concentrated in central places, the majority of which are not rural in function, but which may often have less than the urban threshold of 1000. The point of this observation is that most people in all shires are concentrated in urban or semi-urban settlements, regardless of whether or not the council is ostensibly rural or urban. In terms of population and resources vulnerability and mitigation are primarily urban or central place issues.

The NDRM Case Studies

Type of LGA	Organisation	Consultant
City	Cairns City Council	Cairns City Council
	Gladstone City Council & Calliope Shire Council	Earthtec
	Ipswich City Council	JWP
Coastal Shire/ Major Urban – Peri- Urban	Pine Rivers Shire Council	Hatch
	Redland Shire Council	QRMC
Coastal & Range Shires	Sarina/Broadsound Shire Councils	KTG
	Cooloola Shire Council	QRMC
	Monto Shire Council	QRMC
Inland Shire	Cloncurry Shire Council	Maunsell
	Croydon Shire Council	Ganza
	Emerald Shire Council	KTG
	Winton Shire Council	GBA
	Ilfracombe Shire Council	GBA
	Murweh Shire Council	KTG
Indigenous Council	Doomadgee Aboriginal Community Council	Maunsell
	Pormpuraaw Aboriginal Council	Monaghan
	Wujal Wujal Community Council	Ganza
	Hopevale Community Council	Ganza
	Umagico Community Council	Ganza
	Injinoo Community Council	Ganza
	New Mapoon Community Council	Ganza

Note: Thuringowa was not on the original list of case study councils, but was included amongst the reports that were made available. However it is not a council study but consists of just 2 reports on specific creek hazards and mitigation of flood hazards in just those catchments. In that sense it is an interesting approach, although it is in no way comparable with any of the other studies and does not follow the guidelines. Its easiest to ignore it at this stage, but ironically it might actually contribute to best practice in that the multi hazard approach and inventory of all hazards in a local government area seems to swamp the priorities, whereas the identification of these two problem creeks that caused significant property loss in the 1998 floods as well as cyclone Tessi in 2000, is a clear route to direct outcomes.

2. Observations on Types of Shires and Emergent Issues

2.1 City Councils

There are three City Council studies: Cairns, Ipswich and Gladstone.

Issue: readability or accessibility—bulking up or leaving out

The Cairns study was carried out internally by Cairns City Council in a total of 188 pages. At the other extreme, Ipswich with roughly the same population was assessed by consultants JWP in more than 500 pages complemented by a bulky Ipswich rivers flood study carried out by Halliburton KBR at the same time.

This initial observation of the relative size of studies, unrelated to population, applies to all of the studies. Some are slim, others are very bulky and yet all followed the Zamecka & Buchanan NDRM guidelines. The age-old question—does size reflect quality—is a double-edged issue. How can one city have covered mitigation issues properly in only a fraction of the space utilised for a similar sized city? Has Cairns missed important details? The size issue of these reports is presented merely as an illustration of the significant variability in quality of the NDRM studies. The second stage of this evaluation will go into the detail of each report with a particular emphasis on treatments. Clearly the Ipswich studies contains some excellent details and real treatments. So also does the Cairns study. There may be a tendency to bulk up reports in relation to perceived significance, as well as a great deal of work that has goes into them. Related to this is an increasing trend towards illustration and presentation in order to make the final product more impressive.

The point of this observation on size, including multiple staged reports that bulk up on repetition, is that it makes the final study unattractive and difficult to navigate and thus much more likely to be unused. Engineering and accounting reports are equally detailed and uninteresting, but every detail is essential and must be included. Are the NDRM studies engineering reports or are they a call to action? If the primary aim of the studies is to lead through a logical process to a prioritisation of necessary actions, there is a positive advantage in clarity and brevity. The Cairns City Council study was answerable principally to itself and its own community. It also, importantly had been the recipient of extensive multi-hazard assessments during the 1990s (the AGSO Cities Project) and had much of the background data readily available in well presented and detailed reports. It therefore did not need to bulk up its own report, but produced a clear document that is easy to read and to follow. In the same vein, illustration and presentation contribute to that clarity. Monaghan's Pompuraaw report, at the opposite end of the council continuum does the same thing. It is clear, readable, well and appropriately illustrated and easy to navigate.

I therefore make the observation that shorter, compact, well presented studies are more likely to enjoy future use, consultation and hopefully reference to outcomes. Best practice will achieve the appropriate level of useful information.

2.1.1 Comparison of Cities

Despite similar population sizes, Cairns is an isolated regional city while Ipswich is part of the Brisbane and Gold Coast South-East conurbation, and is virtually a suburb of Brisbane. Ipswich is also relatively inland compared to Cairns and most vulnerable to some different hazards, especially severe storms in Ipswich and tropical cyclones/storm surge in Cairns, although both were vulnerable to flood, landslide etc.

Gladstone is a much smaller city than either Cairns or Ipswich and adds an element of vulnerability through heavy industry not found in either Cairns or Ipswich. Additionally the consultants have sensibly considered both Gladstone and its surrounding rural Calliope Shire as a combined entity although separate reports have been produced for each. There is considerable diversity in the city case studies—examples of different issues and situations rather than direct comparability.

2.2 The Peri-Urban Shires

Gladstone/Calliope is more peri-urban or even more rural than either Pine Rivers or Redland Shires, but these two shires are primarily peri-urban. The peri-urban sector is a combination of rural and urban land uses, particularly susceptible to such hazards as bushfire in flood. It is a zone of transition where natural systems are experiencing human interference and transformation towards denser settlement patterns without having been tamed or controlled. Outer suburbs of the peri-urban area have basic facilities and limited services. Their lifelines are the least developed of the urban sector. These are characteristics that they share with rural areas, but their vulnerability is much enhanced by the larger urban population they contain and the newness/recent migration of residents who are often less aware of local hazards in a new location.

Outer suburbs also contain groups that we may consider more vulnerable to natural hazards—younger families in new estates without extended family support, retiree communities, and low-cost/low rental outer suburbs into which poorer residents and single-parent families are often concentrated.

Pine Rivers and Redland Shires have similar populations to Cairns and Ipswich, and are part of and dependent upon the Brisbane economy, but most of their land area is non-urban. Pine Rivers and Redland Shires are virtually copies each being the North East and South-East fringes of Brisbane. These two studies are both highly comparable and share very similar hazards and environments. As the studies were carried out by different consultants they will make particularly useful comparative analyses to test the differences in approach, shortcomings, innovative ideas and best practise.

2.3 Indigenous Community Councils

Of the seven indigenous community councils, the Doomadgee study was carried out by an experienced external consulting company, Maunsell and Pompuraaw by Monaghan and Taylor both of whom were resident within the community. The other five were carried out by a Cairns based engineering consultant, Ganza, under the auspices of what was then the Indigenous Coordinating Council – Umagico, Injinoo and New Mapoon at Cape York, Hopevale and Wujal Wujal. The different ways in which these communities were approached prompt some observations.

Umagico, Injinoo and New Mapoon are unusual in that they are part of a group of small settlements at the very tip of Cape York Peninsula. It may therefore be reasonable that the studies used a virtually common Study Advisory Group, but the reports suggest limited local membership and poor attendance at meetings and an unnecessarily top down approach for such very small communities. The communities are relatively close together and effectively share the same hazards, but they are significantly different places and this is not made clear in the studies.

Umagico is an indigenous community surrounded by Torres Shire Council. It also contains a mixture of people including some from Injinoos as well as Torres Strait Islanders. Injinoos is a DOGIT community also surrounded by Torres Shire Council but with significant control over land and access in the Cape York area. New Mapoon was an artificially created community from the forced relocation of the population of Mapoon: yet there is no mention of old Mapoon and the exchange of population between the two settlements.

All three communities share the same environment and are susceptible to the same or similar hazards. Injinoos's extensive DOGIT lands can host visitors and tourists. Some of these sites function as outstations but are not necessarily used by their own community members. Umagico on the other hand has a very small land area and like New Mapoon is little more than a community settlement.

No reference is made to Bamaga, the main town and service centre, or Seisia, the port as well as a tourist centre. Both are Torres Strait Islander communities, functioning as separate councils, and all five are "islands" within Torres Shire which is administered from Thursday Island. Thus, although these three community studies are grouped as indigenous communities, each has a significantly different history and circumstances that have a direct impact on both vulnerability and an ability to achieve outcomes. At the same time all three are strongly dependent on Bamaga and Seisia for port, airstrip, lifelines and services.

A similar problem arises with Doomadgee, studied by different consultants, but similarly an "island" community and surrounded by Burke Shire and dependent on Burke Shire's infrastructure and lifelines. Doomadgee and Burke Shire work closely together as symbiotic councils, but have not been treated together in natural disaster risk management studies. This is not necessarily the fault of either the consultant or Doomadgee Council, but rather it may be a reflection of a flaw inherent in the NDRM process or an illustration of the problem of regional groupings within the state. In relation to this for example, Queensland's 23 disaster districts are neither geographical nor political entities. If these were all rational hazard zones there might have been more logic in driving regional mitigation activities, subdivided as needed to local government councils. The COAG review has statements on indigenous communities, and one should also be aware of the Queensland Audit Review on Disaster Management Arrangements.

Hopevale has the same study advisory group and risk management teams with the exception of small local representation. Although far distant from the tip of Cape York Peninsula the Hopevale report contains much the same words. In this case the significance of Cook Shire NDRM is noted along with Hopevale's role within a larger Shire.

At Wujal Wujal the same consultant has applied the standard approach of the other four ACC managed community studies. Identical words and phrases are used in places in all of the reports. Reference made on page 9 to surrounding shires is reasonable in the sense that the consultant was only engaged to study Wujal Wujal, but this approach entirely misses the reality of the broader Bloomfield community in which Wujal Wujal is a core, but in no way separate.

2.3.1 Issue: problems of Census data in Indigenous communities

The official population of Wujal Wujal of 280 is drawn from the 2001 census, but is only one quarter of the population that lives within the valley, of whom half are indigenous. Thus the vulnerability assessment is flawed from the outset. When working in indigenous

communities you must be guided by the population figures that are maintained by the community council itself, and use the census data for supplementary information.

An illustration of this problem was our experience in conducting the population analysis of Cape York Peninsula as part of the Cape York Peninsula Land Use Study (CYPLUS) project of the mid-1990s. This study utilised existing census figures from the 1991 census and carried out independent counts in each community, as well as and non indigenous locations, during 1993. The independent community counts simply took figures of residents as supplied by each council, broken down into those on the main community and those who were residing in outstations. That study found a significant undercount of indigenous people (more than a third had not been counted), but numbers of non-indigenous people were comparable to the census. This report was used by other CYPLUS studies as the basis for sample surveys and needed figures at each community level rather than the ABS Collection District level. Indigenous representatives on the CYPLUS advisory body agreed with our count and explained that not only were their people more mobile, that it was the season to be on outstations (many of which cannot be located without guidance), apart from the fact that many indigenous families do not trust the government, and further, many householders are not very literate. There is an extensive literature in demography that acknowledges census under counts, especially among the marginalised and remote populations. Indigenous people in Australia are significantly undercounted and there are often wide discrepancies between numbers recorded in the census and numbers of actual residents and visitors stated by community councils.

Monaghan also quotes the ABS statistics for Pompuraaw, and herein lies a further problem with the administration of the census. Monaghan and Taylor had kept extensive population records, they were resident in the community, the council, collaborated with the census collection (and possibly there was the added incentive of the Wik native title claim, not to be excluded).

The message of this commentary is the exercise of caution when using indigenous population figures directly from the census. They should always be supplemented by information, estimates and explanation from the community council.

In the case of Wujal Wujal there is probably both an undercount of the community population as well as an exclusion of the indigenous outstations. More significantly the exclusion of the roughly equal population of non-indigenous residents (both sides of the river) who are dependent upon the community facilities and whose numbers increase vulnerability and pressure on lifelines is a significant flaw of this study.

Apart from population issues there are other problems in this study, such as for example the unfortunate overstatement in the penultimate paragraph of page 15 that refers to the quality of the weather warnings. Our centre's involvement with Wujal Wujal began after they were isolated by Cyclone Rona in 1999, having had no prior warning of the cyclone. Our involvement with this community continued through an EMA grant to examine vulnerability and mitigation strategies of the whole Bloomfield Valley population, indigenous and non-indigenous, because of the symbiotic nature of their relationship and because of the extreme isolation brought on by severe weather, rather than straightforward linear distance. These issues are not addressed, underscoring the importance of regional approaches, dealt with elsewhere in this report.

The Pompuraaw report is a good study. It is evident that the local population was involved in extreme detail and knowledge of local country without loss of the NDRM procedure. Pompuraaw is not effectively in another Shire, but shares interests with Kowanyama and Aurukun and links externally through Cook Shire. In the situation of the community and its population is more clearly identified and its place in the landscape is clearly evident. While the rest of western Cape York Peninsula/Eastern Gulf share hazards, each community is sufficiently remote and self sufficient to justify individual studies.

2.4 Coastal and Coastal Range Shires

For Monto the only report available is the final risk register and treatment plan. There appears to be a section missing or it is very abbreviated as the executive summary implies a much larger analysis preceding revision B. However hazard treatments are clearly identified as well as costed.

The Cooloola report follows a similar pattern to that of Monto. There are no funding estimates just sources of funds. It consists of three substantial reports that present different parts i.e. summary, identification and assessment of hazards, and the risk mitigation plan. Both reports are conventional and raise no further issues.

The Sarina and Broadsound report raises the regional/neighbouring shire issue alluded to elsewhere in this report, as both are dealt with together. Why? The local cities for Sarina are either Mackay or Rockhampton. Sarina is a small coastal satellite of Mackay— Broadsound is mostly ranges and inland. There is no logical reason as to why these two shires should be dealt with as a region any more than any other neighbour to either of them. Both are small shires but their reports are enormous. They are very detailed and conscientious, but the sheer quantity of information constrains clarity and ease of use. However, key treatments are clear and identifiable.

2.5 Inland Shires

The inland shires form three main groups, although all share common features such as extensive river plains, low populations and low density of population.

In the south both Murweh and Emerald studies were carried out by the same consultant and in the central region it was a single, but different consultant who carried out the studies of Ilfracombe and Winton. The two shires in the north, Cloncurry and Croydon were carried out separately. Both are in mining areas although Croydon's mining days have passed and a large part of this Shire also consists of Gulf rivers and lowlands.

All have small populations, Croydon and Ilfracombe just 300 plus and only Emerald, the most coastal oriented shire has a population that approaches that of the coastal shires. However the size of the Emerald study is quite astonishing for so small shire and population. Murweh with only 5000 population is also a bulky report, making both of these studies less accessible than they might have been if their presentation had been simplified. However this criticism is only relative, as the 300 plus populations of Croydon and Ilfracombe also benefit from studies almost as large as that of Cairns City Council. They are, on the other hand both clear and relatively accessible.

3. Conclusion

These case study shires and councils are a good representation of the diversity, geography, population size and density, position and urban rural balance of the State.

There are problems and issues for councils and communities that are embedded within larger shires that have either not carried out NDRM or which have conducted their studies separately and independently of their neighbours. The corollary of this is where to draw regions, how to determine combinations of studies (other than for consultants convenience), and issues of funding for mitigation. The primary purpose of this classification of shires and councils has been to identify issues, problems, commonalities and to judge quality and balance. It has also enabled an assessment of coverage—urban, peri-urban, inland and indigenous communities are well represented. Coastal non-urban shires and rural range shires, especially Downs and the Tablelands areas have not been so well represented. This observation is for noting.

Section 8 – Critique of each case study in relation to Zamecka & Buchanan NDRM guidelines - description and evaluation of each process.

1 Cairns City Council

The study comprises two parts—part A the full report, and part B the executive summary, all of which is contained within part A.

1.1 Aims and Objectives

The study identified major hazards that affect the Cairns region, the risks posed by these hazards and feasible mitigation strategies to minimise economic and social impacts. The stated focus is long-term preparedness and prevention of loss of life. The study followed the Australia/New Zealand standard and the Zamecka & Buchanan NDRM Guidelines and Manual. Cairns City Council carried out the study in house, using its own resources and personnel. The city had been used as a trial for multi hazard assessment during the 1990s. This had resulted in a comprehensive publication produced by AGSO (now GA) “Community Risks In Cairns” and the subsequent 2000 report “Local Government Disaster Mitigation Project”. This study therefore drew on the data that had already been collected and published, rather than replicating previous work. This probably explains the brevity and clarity of the Cairns report.

The study establishes the context as physical/environmental, population and settlement and risk management requirements within the constraints of existing legislation, timeframe, policy, information, resources and commitment to the process. It defines clients and stakeholders as the Natural Disaster Risk Management Committee, Commonwealth, State and local government, the general public, non-government organisations, the business community, tourists and animals.

1.2 The Risk Management Team

The report does not refer to a study advisory group. The disaster risk management team was established as a subcommittee of the Cairns Local Counter Disaster Committee. Organisations were identified as stakeholders and provided members to the team. Membership was as follows:

- | | |
|--------------------------------------|---|
| ▪ Manager strategic planning | Cairns City Council |
| ▪ Project officer strategic planning | Cairns City Council |
| ▪ Operations officer | 51 st Bat Far North Qld Regiment |
| ▪ Director corporate services | Cairns Base Hospital |
| ▪ CEO | Cairns City Council |
| ▪ Councillor and chair Cairns | Cairns City Council |
| ▪ Local Counter Disaster Committee | |
| ▪ Executive officer | Cairns City Council |
| ▪ Local counter disaster committee | |
| ▪ Support officer SES | Cairns City Council |
| ▪ General manager corporate strategy | Cairns City Council |
| ▪ Assistant manager operations Air | Cairns Port authority |
| ▪ General manager | Cairns Water |
| ▪ Nurse manager | Calvary Hospital/aged care |
| ▪ Officer in charge | Bureau Of Meteorology |

▪ District coordinator	Counter Disaster & Rescue Services
▪ District operations officer	Counter Disaster & Rescue Service
▪ Manager assets and traffic	Department of Main roads
▪ Principal environmental officer	Environment Protection Agency
▪ Senior environmental health officer	Environmental Health Services
▪ Operations area manager	Ergon Energy
▪ Manager	Far North building certification
▪ Regional manager	Q Build
▪ Area manager Cairns and coastal	Queensland Ambulance Service
▪ Inspector	Queensland Police
▪ Manager public transport	Queensland Transport
▪ Technical manager	Telstra
▪ Remote community coordinator	Telstra

All representatives were local, all contact telephone numbers were local and most of the individuals in these positions were also the representatives on the Cairns local counter disaster committee.

1.3 Meetings, attendance and Community involvement

There is no reference to numbers of meetings or attendance at meetings. There is a suggestion that the team manager and project officer prepared most of the documentation, with the role of the management team being more advisory. However details of meetings are not supplied in the report. The final draft of the natural disaster risk management report was made available to the public for comment. Its availability was advertised in the newspapers. There is no suggestion that public consultation, surveys or broader community involvement played any part in the preparation of this mitigation strategy. However, the data were drawn from the earlier AGSO multi hazard assessments, and these did involve community consultation and survey work, although this is not clear from this particular report. On the basis of the report alone, one would conclude that no public involvement had taken place in evaluating risk and prioritising mitigation treatments, but the documents were made available to the public, were open to scrutiny and acceptable to further comments.

1.4 Hazards

The vulnerability profile is identified in the context of each hazard.

The study identified five hazards:

- Cyclones—severe wind (subdivided into categories of 1, 2 and 3, and categories four and five) and storm surge
- Flood—including Dam Break
- Landslide
- Earthquake
- Fire

1.5 Community Vulnerability Profile

The report evaluates risk and identifies treatments under the categories of each hazard.

The community is described as 50 suburbs with a population in excess of 120,000. It is a young population with significant numbers of local, domestic and overseas visitors. Approximately 91% of buildings are residential and older housing stock is in city centre areas that are generally more hazard vulnerable. Lifelines and critical facilities are

concentrated in or cross through hazard prone areas. The report notes the environmental features which contribute to hazard vulnerability—the steep forested ranges, low lying coastal strip on which most urban development has occurred and the Barron River and associated creeks.

The report uses the terminology of vulnerability that was employed in the AGSO “Community Risks in Cairns”—people, buildings, business, lifelines, and critical facilities. This is a useful subdivision of categories of vulnerability.

- *Cyclones category one to three*
 - people—homeless, tourists, campers, caravan occupants, but residents, schoolchildren and residents in the older homes.
- *Cyclones category four and five*
 - people—adverse effects upon most people in Cairns.
 - Buildings—damage and destruction.
 - Business—disruption or cessation.
 - Lifelines—disruption or cessation.
 - Critical facilities—disruption, damage or destruction.
- *Storm tide—probable maximum up to 4.5 m above AHD*
 - people—resident in storm surge areas.
 - Buildings—damage or destruction in storm surge zone.
 - Business, Lifelines and critical facilities—damage, destruction or cessation in storm surge zone.
- *Flooding up to Q100*
 - buildings—the damage in flood prone areas.
- *Flooding PMF*
 - people—residents in flood prone areas.
 - Buildings, business, lifelines, critical facilities—the damage, destruction or cessation of activities.
- *Landslide*
 - lifelines—transport systems disrupted, and damaged or destroyed.
- *Earthquakes*
 - people—residents may be injured or killed.
 - Buildings—damage or destruction.
 - Business disruption or cessation.
 - Lifelines and critical facilities—damage, disruption or cessation.
- *Fire*
 - people—residents in fire prone areas may be injured or killed.
 - Buildings—damage or destruction.

As each hazard is identified, it is followed by a community vulnerability profile under the headings of people, social structures, buildings, lifelines, and critical facilities. Details of

specific vulnerability to that hazard are included under each of these broad subheadings. This is followed by a risk register for that specific hazard, in which environment and business are added. The register details the consequence for each of these vulnerabilities while the risk evaluation that follows takes the same vulnerability categories and assesses likelihood, consequence and the risk rating. Thus community vulnerability is linked directly to hazard and risk, thereby leading to specific places, buildings, people, lifelines and critical facilities etc.

1.6 Risk Evaluation

The report provides a very effective risk evaluation summary under each of the hazards identified. It breaks down each of the vulnerable elements into specific impacts and assesses likelihood, consequence and the risk rating. Table 4.2, below summarises all of the high and extreme ratings under each hazard category. These have been extracted from the risk registers that occur in the rest of the report appendices. The main risk register for each hazard rates each identified vulnerable element according to the risk matrix (copied as appendix M at the end of the report) from low through moderate to high and extreme. Table 4 .2 has extracted the high and extreme ratings. The remainder of the risk registers record all of the other low and most of the moderate ratings. The only moderate rating that has crept into this summary table is for commercial buildings' vulnerability to category four or five cyclones. All other vulnerable elements in the summary table are rated as high with the exception of the impact of Q100 flooding of commercial and residential buildings, where the rating has been assessed as extreme. However the consequence of many of those vulnerable elements classified as a high risk rating is based on a likelihood of the rarity of the events. The consequence of these events particularly storm tide and earthquake would be catastrophic.

This summary table is extremely valuable. It has extracted the priority vulnerabilities which have been used to identify the priority treatments. Thus we have in the Cairns City Council report three key tables which are placed at the front of the study and are backed up by the detail of the appendices tables. These key tables are:

Recommended Mitigation Strategies grouped by the agency responsible.

Table 4 .1. Summary of key risks and consequences grouped by hazard and group of vulnerable elements.

Table 4 .2. Summary of the key likelihood, consequences and risk rating by hazard group. These tables are then followed by the full list of risk treatment strategies.

4.2 Summary of the key likelihood and consequences evaluation of the risks, by hazard grouping.

Below is a summary of the risks and the likelihood, consequences and risk rating for each of the identified hazards that affect the Cairns region. Only those risks that were evaluated to have a high or extreme risk rating were included. The scales of likelihood, consequences and risk used for risk evaluation are described in full in Appendix M.

Table 4.2 Summary of key likelihood and consequences evaluation of the risks, by hazard grouping

Cyclone Severe Wind (Category 1-3)				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	The homeless, tourists, campers, caravan occupants, yachties, school children and residents living in older homes may be adversely affected by a Category 1-3 cyclone.	Likely	Minor	High
Cyclone Severe Wind (Category 4 and over)				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	A category 4 or greater cyclone may adversely affect most people in Cairns.	Rare	Catastrophic	High
Buildings Essential Services	Essential service buildings may have reduced capacity, be damaged or destroyed.	Rare	Catastrophic	High
Power	Substation, power station and power communication buildings may be damaged or destroyed.	Rare	Major	High
Communication	Communication facilities/transmitters may be disrupted, damaged or destroyed.	Rare	Major	High
Water	Water facilities buildings may be damaged or destroyed.	Rare	Major	High
Wastewater	Wastewater facility buildings may be damaged or destroyed.	Rare	Major	High
Commercial	Commercial buildings may be damaged or destroyed.	Rare	Moderate	Moderate
Residential	Residential buildings may be damaged or destroyed.	Rare	Catastrophic	High
Lifelines	Communication facilities and transmitters may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Power	Power supplies may be disrupted, damaged or destroyed.	Rare	Major	High
Water	Water supplies may be disrupted, damaged or destroyed.	Rare	Major	High
Fuel	Fuel supplies (including petrol stations) may be damaged or destroyed.	Rare	Major	High
Food	Food storage facilities (including major supermarkets) may be damaged or destroyed.	Rare	Major	High
Transport	Transport systems (road, rail, sea, air) may be disrupted or damaged or destroyed.	Rare	Major	High
Hospital	Hospitals may be disrupted or damaged or destroyed.	Rare	Major	High
Medical	Medical facilities and pharmaceutical outlets may be disrupted or damaged or destroyed.	Rare	Major	High
	Nursing homes may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
Bulk Food	Bulk food supply facilities may be disrupted or damaged or destroyed.	Rare	Major	High

Bulk Fuel	Bulk fuel supply facilities may be disrupted or damaged or destroyed.	Rare	Major	High
Storm tide (PROBABLE MAXIMUM EVENT Up to 4.5m above AHD)				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	People living in storm tide prone areas may be directly affected.	Rare	Catastrophic	High
Buildings Essential Services	Hospitals may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
	Nursing Homes may be damaged.	Rare	Catastrophic	High
Power	Substation and power station buildings located in storm tide prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Communication	Communication facilities and transmitters located in storm tide prone areas may be disrupted or damaged.	Rare	Catastrophic	High
Commercial	Commercial buildings located in storm tide prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Residential	Houses and flats located in storm tide prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Business	Business activity undertaken in storm tide prone areas may be disrupted or cease.	Rare	Catastrophic	High
Lifelines Power	Power supplies may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
Communication	Communication transmissions may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
Water	Water supplies may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
Wastewater	Wastewater systems may be disrupted or damaged or destroyed.	Rare	Catastrophic	High
Transport	Transport systems (road, rail, sea, air) located in storm tide affected areas may be disrupted or damaged.	Rare	Catastrophic	High
Critical Facilities	Hospitals may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
	Bulk fuel supply facilities located in storm tide prone areas may be disrupted or damaged.	Rare	Catastrophic	High
Flooding (Up to Q100 Event)				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
Commercial	Commercial buildings located in flood prone areas may be damaged or destroyed.	Possibly	Major	Extreme
Residential	Residential buildings located in flood prone areas may be damaged or destroyed.	Possibly	Major	Extreme
Flooding (Probable Maximum Flood)				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	Residents in flood prone areas may be directly affected	Rare	Major	High
Buildings	Essential Service buildings located in flood prone areas may be damaged or destroyed.	Rare	Major	High
Power	Substation, power station and power communication buildings located in flood prone areas may be damaged or destroyed.	Rare	Major	High
Communication	Communication facilities and transmitter located in flood prone areas may be disrupted or damaged or destroyed.	Rare	Major	High
Water	Water facilities buildings located in flood prone areas may be damaged or destroyed.	Rare	Major	High

Wastewater	Wastewater facility buildings located in flood prone areas may be disrupted or damaged or destroyed	Rare	Major	High
Commercial	Commercial buildings located in flood prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Residential	Residential buildings located in flood prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Business	Business activity undertaken in flood prone areas may be disrupted or cease.	Rare	Major	High
Lifelines Power	Power supplies located in flood prone areas may be disrupted or damaged.	Rare	Major	High
Communication	Communication facilities located in flood prone areas may be disrupted or damaged or destroyed.	Rare	Major	High
Water	Water supplies may be disrupted or damaged.	Rare	Major	High
Wastewater	Wastewater facilities may be disrupted or damaged.	Rare	Major	High
Fuel	Fuel supplies (including petrol stations) located in flood prone areas may be inaccessible or damaged.	Rare	Major	High
Food	Food storage facilities (including major supermarkets) located in flood prone areas may be damaged or destroyed.	Rare	Major	High
Transport	Transport systems (road, rail, sea, air) located in flood prone areas may be disrupted or damaged or destroyed.	Rare	Major	High
Critical Facilities	Hospitals located in flood prone areas may be disrupted or damaged.	Rare	Major	High
Medical	Medical facilities and pharmaceutical outlets located in flood prone areas may be disrupted or damaged.	Rare	Major	High
Bulk food	Bulk food supply facilities located in flood prone areas may be disrupted or damaged or destroyed.	Rare	Major	High
Bulk fuel	Bulk fuel supply facilities located in flood prone areas may be disrupted or damaged.	Rare	Major	High
Landslide				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
Transport	Transport systems (road, rail, sea, air) located in landslide prone areas may be disrupted, damaged or destroyed	Possibly	Moderate	High
Earthquake				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	Residents in earthquake prone areas may be injured or killed.	Rare	Catastrophic	High
Buildings Essential Services	Essential Service buildings located in earthquake prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Power	Substation, power station and power communication buildings located in earthquake prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Communication	Communication facilities/ transmitters located in earthquake prone areas may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Water	Water facilities buildings located in earthquake prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Wastewater	Wastewater facility buildings located in earthquake prone areas may be damaged or	Rare	Catastrophic	High

	destroyed.			
Commercial	Commercial buildings located in earthquake prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Residential	Residential buildings located in earthquake prone areas may be damaged or destroyed.	Rare	Catastrophic	High
Business	Business activity undertaken in earthquake prone areas may be disrupted or cease.	Rare	Catastrophic	High
Lifelines	Communications may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Power	Power supplies may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Water	Water supplies may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Fuel	Fuel supplies (including petrol stations) located in earthquake prone areas may be damaged, destroyed or inaccessible.	Rare	Catastrophic	High
Food	Food storage facilities (including major supermarkets) may be damaged or destroyed.	Rare	Catastrophic	High
Transport	Transport systems (road, rail, sea, air) located in earthquake prone areas may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Critical Facilities Medical	Hospitals may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
	Medical facilities and pharmaceutical outlets located in earthquake prone areas may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Bulk fuel	Bulk fuel supply facilities located in earthquake prone areas may be disrupted, damaged or destroyed.	Rare	Catastrophic	High
Fire				
VULNERABLE ELEMENTS	RISK	LIKELIHOOD RATING	CONSEQUENCE RATING	RISK RATING
People	Residents in fire prone areas may be injured or killed.	Likely	Minor	High

1.7 Risk Treatment

Recommended Mitigation Strategies

Specific mitigation strategies recommended are set out in the following tables. The treatment options are categorised under the Responsible Agency and those treatments that are the responsibility of Cairns City Council are allocated to the appropriate Division. Each mitigation strategy is described along with the estimated costs, potential funding source and the timeframe needed to achieve the outcome.

Cairns City Council

Strategic Planning

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Identify in CairnsPlan and regulate development accordingly for: storm tide risk areas flooding risk areas landslide risk areas earthquake risk areas (when revised mapping and report is completed)	Within existing budget	CCC – Strategic Planning	12 months
2.	Update and maintain GIS planning maps to display identified: storm tide risk areas flooding risk areas landslide risk areas. earthquake risk areas (when revised mapping and reporting is complete).	Within existing budget	CCC – Strategic Planning	12 months
3.	Upgrade the Barron River Delta Flood Model to at least a 2D level.	\$120,000	Possibly Regional Flood Mitigation Programme	2 years
4.	Design and construct Caravonica / Lake Placid levee and Break Out Channel.	\$330,000	Possibly Regional Flood Mitigation Programme	3 years
5.	Conduct feasibility study of installing improved floodgates to reduce tidal and catchment flooding hazard in the CBD.	\$20,000	Possibly NDRM Studies program	12 months
6.	Prioritise the upgrade or installation of floodgates in identified locations.	TBA from outcome of study.	Possibly Regional Flood Mitigation Programme	5 years
7.	Conduct feasibility study of installing tidal weirs on CBD and Environs creek and drain systems to reduce tidal and catchment flooding hazards.	\$50,000	Possibly NDRM Studies Program	2 years
8.	Prioritise the installation of tidal weirs in identified locations.	TBA from outcome of study.	Possibly Regional Flood Mitigation Programme	5 years
9.	Investigate the Airport road for inundation levels.	Within existing budget	CCC – Strategic Planning	Ongoing
10.	Extend Lake Street to intersect Airport Avenue to improve access to the airport.	TBA by Strategic Planning	CCC – Strategic Planning	TBA
11.	Request AGSO to review and revise earthquake hazard mapping and reporting.	Approximately \$200,000	Possibly NDRM Studies Program	3 years

Cairns Water

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Conduct study to determine height of electrical systems in Cairns Water buildings susceptible to flooding.	Within existing budget	Information will be obtained from network modelling study currently being undertaken	12 months
2.	Prioritise the upgrade of electrical system to ensure they are immune to Q100 level.	TBA by Cairns Water when study is completed.	TBA by Cairns Water	TBA by Cairns Water

City Assessment

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Recommend that no further land to be freeholded at Russell Head.	Within existing budget	CCC – City Assessment	Immediately

Waste Services

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
	Encourage annual pre-cyclone clean up by promoting free entry into Portsmith Landfill for dumping of residential rubbish up to 1 cubic metre per trip.	Within existing budget	CCC – Waste Services	Annual update

Other Organisations

Cairns Local Counter Disaster Committee

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Conduct public awareness campaign to ensure all residents are aware of the risk and the steps needed to be taken for: Cyclones (sever wind and storm tide) Flooding Landslide Earthquake	Partly from within existing budget and approximately \$50,000 to be applied across all hazards	CCC existing budget Other source TBA	Annual event
2.	Incorporate information of benefits of cyclone shutters in public awareness campaign	As for point 1 above	As for point 1 above	As for point 1 above
3.	Identify essential service buildings that are required to withstand a category 5 cyclone and or a probable maximum flood.	TBA by identified agencies	TBA	12 months
4.	Prioritise the upgrade or relocation of identified essential service buildings that are required to withstand these probable maximum events.	TBA after identification of buildings completed	TBA after identification of buildings completed	TBA by individual organisations
5.	Encourage appropriate organisations to formulate an economic response plan for natural disaster.	Approximately \$100,000	Grant application to suitable funding body such as Regional Solutions Program	3 years

Individual Organisations

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Ensure Disaster Plans are current for all natural hazards.	Within existing budget	Individual Agencies	Annual update
2.	Prioritise the upgrade or relocation of identified essential service buildings that are required to withstand a category 5 cyclone or probable maximum flooding event.	TBA by identified agencies	TBA	TBA
3.	Consider the installation of cyclone shutters on essential service buildings.	TBA by identified agencies	TBA	TBA

Cairns Port Authority

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Investigate levees around airport to at least a Q50 flood immunity level subject to no adverse affect on adjoining lands and Machans Beach community.	TBA by Cairns Port Authority	TBA	TBA
2.	Investigate the Airport Road for inundation levels.	TBA by Cairns Port Authority	TBA	TBA

Australian Defence Force

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Investigate appropriate stretch of straight road that can be used for emergency aircraft landing (e.g. south of Edmonton).	TBA by Australian Defence Force	TBA	TBA

Main Roads Department

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Investigate appropriate stretch of straight road that can be used for emergency aircraft landing (e.g. south of Edmonton).	TBA by DMR	TBA	TBA
2.	Consider upgrading the inland road (Gregory Highway and Kennedy Highway) to suitable standard for use as alternative route when coast road is impassable.	TBA by DMR	TBA	TBA
3.	Consider identifying the frequently flooded areas of Bruce Highway and prioritise upgrading of these areas to an improved flood immunity level.	TBA by DMR	TBA	TBA
4.	Expedite the completion of the upgrade of Brinsmead-Kamerunga Road (north of the Barron River Bridge) to ensure entire length is immune to a minimum Q50 flood level.	TBA by DMR	TBA	TBA

Q-Build

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Identify essential service buildings that are required to withstand category 5 cyclone and/or probable maximum flooding event.	TBA by Q-Build and identified agencies	TBA	12 months
2.	Prioritise the upgrade or relocation of identified essential service buildings that are required to withstand a category 5 cyclone and/or a probable maximum flooding event.	TBA by Q-Build and identified agencies	TBA	TBA

Cairns Base Hospital

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Recommend any future hospital developments be built in lower hazard locations with appropriate access for local community.	TBA by Cairns Base Hospital	TBA	TBA
2.	Identify and confirm agreed back up facilities to use as emergency 'field hospital' (e.g. Whitfield Primary, Woree High, Smithfield Community Health Centre and Cairns Day Surgery).	TBA by Cairns Base Hospital	TBA	TBA

Calvary Hospital

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Recommend any future hospital developments be built in lower hazard locations with appropriate access for local community.	TBA by Calvary Hospital	TBA	TBA

Queensland Rail

	Endorsed Treatment	Estimated Cost	Funding Source	Timeframe
1.	Investigate the flood immunity levels of Queensland Rail's track between Townsville and Cairns.	TBA by Queensland Rail	TBA	12 months

1.8 Evaluation of Cairns City Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 9

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 9

Relevance to aims and objectives of the scheme – 9

Note that there is a flaw in the Guidelines and Manual whereby the risk evaluations are not repeated or identified in the risk treatments. Cairns City Council has anticipated this by extracting the priority treatments and placing them clearly in a separate table and in the Executive Summary.

2. Doomadgee Aboriginal Community Council

The study comprises two parts – The first part is the full report titled ‘Disaster Risk Management Report’. The full report is about 400 pages long but is sensibly divided into the main report (39 pages), and then each appendix contains the relevant form as per the red books. These are very detailed and complete. The second part is entitled ‘Disaster Mitigation Plan’. It contains an executive summary of 5 pages and then the relevant Risk Analysis, Risk Evaluation and Risk Treatment forms.

2.1 Aims and Objectives

The study identifies five major hazards that may affect the Doomadgee region. It determines the risk associated with each natural hazard, recommends risk treatment options that decrease or negate the risk, thus reducing social and economic impacts of a natural disaster. The stated focus is to stimulate proactive and preventative planning and preparedness within Doomadgee. The study’s structure and methodology follows Zamecka & Buchanan NDRM Guidelines and Manual, Australia and New Zealand Risk Management Standards, and Queensland Department of Emergency Services Guidelines. The study was undertaken by a consultant, Maunsell Australia Pty Ltd., for the Doomadgee Aboriginal Community Council.

Overall aims and objectives of the study are:

- Identify the natural hazards that afflict the Doomadgee Community.
- Identify the elements of the Doomadgee Community that are vulnerable to the impact of these natural hazards
- Perform risk assessment and quantify risks in the terms of likelihood and consequences
- Develop mitigation strategies, or risk treatment options, that manage or control unacceptable risks
- Correctly document the study by producing a Disaster Risk Management Report and Disaster Mitigation Plan
- Review existing Doomadgee Aboriginal Community Council corporate governance plans and systems and recommend any actions or changes required.

2.2 The Risk Management Team

The report refers to a study advisory group.

Membership was as follows:

- | | |
|--|--|
| ▪ Study Manager/ Council CEO | Doomadgee Aboriginal Community Council |
| ▪ Consulting Senior Engineer | Maunsell Australia Pty Ltd. |
| ▪ Consulting Engineer | Maunsell Australia Pty Ltd. |
| ▪ Operations & Training Officer/Farwest | Counter Disaster and Rescue Services |
| ▪ District SES & Counter Disaster Services | |
| ▪ Senior Sergeant of Doomadgee | |
| ▪ Police/Local controller of Doomadgee | Queensland Police, Doomadgee |
| ▪ SES/Rural Fires | |
| ▪ Director of Nursing | Queensland Health, Doomadgee Hospital |

- | | |
|----------------------------------|---|
| ▪ Council Accountant | Doomadgee Aboriginal Community Council |
| ▪ Project Officer | Dept of Aboriginal & Torres Strait Islander Policy |
| ▪ Technical Officer | Natural Resources and Mines |
| ▪ Water Treatment Plant Operator | Doomadgee Aboriginal Community Council |
| ▪ Civil Works Supervisor | Gulf Constructions (Doomadgee Aboriginal Community Council) |

Most representatives were local from Doomadgee, but not necessarily indigenous. There were some representatives of other government departments and emergency services that were from other areas.

The Study Consultant conducted 'Face to face' interviews, where a questionnaire was filled out. Details of this questionnaire are found in Appendix D. Council members, community leaders/elders, business operators and community members were interviewed. It was ensured that a member of Council known to the community was in attendance at each interview.

The study also identifies clients and stakeholders in the community ranging from the council to community members, emergency services, health services, education services, infrastructure services and other government departments.

2.3 Meetings, Attendance and Community Involvement

Details of SAG meetings with Agenda and Minutes are supplied in Appendix D. Two meetings were held, one on 30 April 2003 and the second on 8 August 2003. All SAG members attended the first meeting, while Senior Sergeant – Queensland Police Service, Doomadgee and Technical Officer – Department of Natural Resources and Mines were absent from the second meeting.

Community involvement was in the form of face-to-face interviews, where a questionnaire was filled out.

2.4 Hazards

The study identified five hazards:

- Flooding
- Cyclones
- Bushfires
- Severe Thunderstorms (including flash flooding, damaging hailstones, destructive wind gusts, tornadoes)
- Earthquakes

2.5 Community Vulnerability Profile

The report evaluates community vulnerability profiles by hazard, which are then further categorised into vulnerable elements.

The total area under administration is 178,600ha and covers two separate areas, Doomadgee and Old Doomadgee. The resident population is approximately 1,120 with the vast majority being Aboriginal (980 people). The resident population typically increases before and during the wet season (1,400 people) due to people coming in from surrounding outstations in order to avoid isolation as floodwaters cut access roads and restrict vehicular travel. One family lives in Old Doomadgee, and six to thirty people reside at six outstations.

People in the Doomadgee community who are defined as a vulnerable group comprise 16% of the population.

There are 137 houses occupied by indigenous families and 19 other houses. A small number of residents live in old caravans and improvised homes. These forms of residence provide limited protections for people in natural disaster events.

The surrounding landscape also contributes to hazard vulnerability. Doomadgee consists of flat plains broken by small sand ridges and ephemeral creeks and swamps that drain to the Nicholson River, while low lying coastal plains and tidal lagoons characterise the landscape of Old Doomadgee. The report also identifies ethnicity and language difficulties as a contributor to a person's vulnerability, where warnings may not be understood. Many households also have very low income, are faced with long periods of isolation during flooding, and may not have savings to rely upon to stock up provisions. This observation characterises all of Queensland's remote indigenous communities.

The report identifies vulnerable elements of the community as – people, social structures, buildings, engineering infrastructure, critical facilities, employment, business and industry and other elements.

- Flooding
 - People – isolation for up to 6 months. Visitors and newcomers to the community who have little experience with flooding in rural areas are at greater risk than local residents.
- Cyclones
 - People – flash floods may present risks to unwary travellers.
 - Buildings – the majority of houses and buildings are vulnerable due to age. Power poles and telecommunications are vulnerable. Mobile and temporary structures such as caravans are vulnerable.
 - Critical Facilities – Delivery of food and essential consumables are vulnerable to disruption.
- Bushfires
 - People – those who live in outstations, fringes of grasslands and overgrown creeks are most vulnerable, but overall the risk is low.
 - Buildings – temporary and mobile dwellings, rural buildings and sheds surrounded by grassland are vulnerable.
 - Engineering Infrastructure – powerlines due to carry-on effect to water supply and sewerage reticulation. Smoke may cause visibility problems on roads.
 - Employment, Business and Industry – Economic losses to pastoral properties. Injury to livestock, loss of feed, damage to buildings and fences.
- Severe Thunderstorms
 - People – windgusts causing damage to homes telecommunications, power poles, trees. Lightning has potential to injure and kill, damage homes and infrastructure, and may also ignite grassfires. Flash Flooding – people attempting to traverse flooded crossings in vehicles or on foot.
 - Buildings – high threat due to age especially those built prior to wind code and other building standards.
 - Engineering Infrastructure – Interruptions to power supply, telecommunications, water and sewerage systems.
 - Critical Facilities – road access may be cut during flooding of local streets. Inability to fly aircraft due to severe thunderstorms

- Earthquakes
 - People – All people vulnerable, panic being main factor. May be struck by dislodged or collapsed buildings.
 - Buildings – total or partial collapse of homes and buildings and structural damage.
 - Engineering Infrastructure – severe damage and destruction to power, communications, water sewerage reticulation, water storage tanks, underground cable services, roads, and airfield pavements.
 - Critical Facilities – may be ineffective due to extent of damage and unable to cope with numbers of injured
 - Employment, Business and Industry – loss of employment and financial loss to Council
 - Environment – contamination from spillages of petroleum products and chemicals

The report indicates that remote communities are often more hardened to natural disasters such as flooding and cyclones. The Doomadgee community is fairly close-knit and resilient to the effects of natural hazards. However the most serious natural hazards would be flooding and severe storms. There is no history of flooding in developed areas in Domadgee and no homes or business premises have been threatened by floodwaters. Power supply, water supply, sewerage and communications are resilient to flooding. The hospital takes precautions and stockpiles 6 months of medical supplies during the wet season. There are re-supply operations by light aircraft that deliver to remote and isolated communities experiencing hardship.

2.6 Risk Evaluation

The report provides a description of each hazard, grouped by each vulnerable element and assessed for risk and consequence. Each hazard is then listed in the risk evaluation table and assessed for likelihood, consequence and the risk rating as per Zamecka & Buchanan. Form A10 below summarises the risks under each hazard category, and the extreme and high ratings have been identified with a star.

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Flooding	<ul style="list-style-type: none"> • People <ul style="list-style-type: none"> ○ <u>Drowning and injury</u> <ul style="list-style-type: none"> - people and vehicles swept off causeways and creek crossings - entrapment of people in vehicles - people traversing or working in flowing floodwaters ○ <u>Illness</u> <ul style="list-style-type: none"> - damp conditions in houses causing illness - contamination of water supply causing illness and infection - overflow of sewerage to populated areas/ backflow of sewerage to houses causing illness and infection ○ <u>Possessions</u> <ul style="list-style-type: none"> - peoples possessions (cars, clothes, furniture etc.) being lost or damaged by floodwaters ○ <u>Isolation</u> <ul style="list-style-type: none"> - people isolated from essential food and medical supplies, from family members and from support networks ○ <u>Homelessness</u> <ul style="list-style-type: none"> - homes inundated by floodwaters - people having to evacuate homes 	C	3	M
		C	2	M
		D	2	L
		D	2	L
		E	2	L

	<ul style="list-style-type: none"> • Social Structures <ul style="list-style-type: none"> - family groups/ social networks breakdown due to emotional and financial stress • Buildings <ul style="list-style-type: none"> - homes, business premises and community buildings at risk of floodwater inundation and damage. - scour damage to building foundations - damage to electrical connections to buildings 	D	2	L
		D	2	L
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Flooding (Cont'd)	<ul style="list-style-type: none"> • Engineering Infrastructure <ul style="list-style-type: none"> o Power <ul style="list-style-type: none"> - power outages for unacceptable period of time - severe damage to power generation and supply infrastructure o Water <ul style="list-style-type: none"> - contamination - supply stoppages for unacceptable period of time - severe damage to storage and supply infrastructure o Sewerage <ul style="list-style-type: none"> - overflow to populated areas/ backflow to houses - contamination of water supply - severe damage to reticulation and treatment infrastructure o Roads <ul style="list-style-type: none"> - closure of arterial and access roads - closure of local roads - severe damage to road infrastructure o Airstrip <ul style="list-style-type: none"> - closure of airstrip for unacceptable period of time - severe damage to airstrip pavement o Telecommunications <ul style="list-style-type: none"> - loss of telephone service for unacceptable period of time - loss of HF service - severe damage to telecommunications infrastructure • Critical Facilities <ul style="list-style-type: none"> o Emergency Response Agencies <ul style="list-style-type: none"> - Emergency Response Agencies ineffective in assisting community - damage to premises and equipment - loss of power and water supply, sewerage services to premises 	D	2	L
		E	3	L
		D	2	L
		A	3	H ★
		E	3	L
		B	2	M
		E	2	L
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Flooding (Cont.)	<ul style="list-style-type: none"> o Medical Services <ul style="list-style-type: none"> - Medical Services unable to cope with numbers of ill and injured - damage to premises - loss of supply lines for essential equipment, supplies and consumables - inadequate stored provisions of essential equipment, supplies and consumables - loss of power and water supply, sewerage services to premises o Supplies and Consumables <ul style="list-style-type: none"> - loss of supply lines - stored provisions inadequate to last between deliveries o Community Shelters <ul style="list-style-type: none"> - buildings at risk of floodwater inundation and damage - scour damage to building foundations - loss of power and water supply, sewerage services • Employment, Business and Industry <ul style="list-style-type: none"> - loss of employment and income of residents and severe economic hardship - financial losses and closure of businesses - financial losses for Council • Environment <ul style="list-style-type: none"> - severe erosion - trees and vegetation destroyed - pollutants introduced to creeks and rivers 	C	3	M
		D	3	M
		E	2	L
		D	2	L
		D	2	L
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Cyclones	<ul style="list-style-type: none"> • People <ul style="list-style-type: none"> o Fatalities and injury <ul style="list-style-type: none"> - people being struck by wind blown debris - people traversing or working in flowing floodwaters o Illness <ul style="list-style-type: none"> - damage to houses causing loss of protection for people from weather - damp conditions in houses causing illness - contamination of water supply and overflow/ backflow of sewerage causing illness and infection o Possessions <ul style="list-style-type: none"> - peoples possessions being lost or damaged o Isolation <ul style="list-style-type: none"> - people isolated from essential food and medical supplies, from family members and from support networks o Homelessness <ul style="list-style-type: none"> - people having to evacuate homes 	C	3	M
		C	2	M
		D	2	L
		D	2	L
		E	2	L

	<ul style="list-style-type: none"> • Social Structures <ul style="list-style-type: none"> - family groups/ social networks breakdown due to emotional and financial stress • Buildings <ul style="list-style-type: none"> - homes, business premises and community buildings at risk of roof and other damage from wind gusts and from floodwater inundation • Engineering Infrastructure <ul style="list-style-type: none"> o Power <ul style="list-style-type: none"> - power outages for unacceptable period of time - severe damage to supply infrastructure 	D	2	L
		C	2	L
		D	2	L
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Cyclones (Cont)	<ul style="list-style-type: none"> o Water <ul style="list-style-type: none"> - contamination - supply stoppages for unacceptable period of time - severe damage to supply infrastructure o Sewerage <ul style="list-style-type: none"> - Overflow to populated areas/ backflow to houses - contamination of water supply - severe damage to reticulation and treatment infrastructure o Roads <ul style="list-style-type: none"> - closure of arterial and access roads - closure of local roads - severe damage to road infrastructure o Airstrip <ul style="list-style-type: none"> - closure of airstrip for unacceptable period of time - severe damage to airstrip pavement o Telecommunications <ul style="list-style-type: none"> - loss of telephone service for unacceptable period of time - loss of UHF service - severe damage to telecommunications infrastructure • Critical Facilities <ul style="list-style-type: none"> o Emergency Response Agencies <ul style="list-style-type: none"> - Emergency Response Agencies ineffective in assisting community due to extent of damage/ lack of equipment - damage to premises and equipment - loss of power and water supply, sewerage services o Medical Services <ul style="list-style-type: none"> - Medical Services unable to cope with numbers of ill and injured - damage to premises - loss of supply lines for essential equipment, supplies and consumables - inadequate stored provisions of essential equipment, supplies and consumables 	E	3	L
		D	2	L
		A	3	H ★
		D	3	L
		C	3	L
		C	3	M
		C	3	M
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Cyclones (Cont)	<ul style="list-style-type: none"> - loss of power and water supply, sewerage services o Supplies and Consumables <ul style="list-style-type: none"> - inability of aircraft to fly in Gulf region due to cyclonic weather system - loss of supply lines - inadequate stored provisions o Community Shelters <ul style="list-style-type: none"> - buildings at risk of wind/ floodwater damage - loss of power and water supply, sewerage services • Employment, Business and Industry <ul style="list-style-type: none"> - loss of employment and income of residents and severe economic hardship - financial losses and closure of businesses - financial losses for Council • Environment <ul style="list-style-type: none"> - severe erosion - trees and vegetation destroyed - pollutants introduced to creeks and rivers 	B	2	M
		D	3	L
		E	2	L
		D	2	L
Bushfires	<ul style="list-style-type: none"> • People <ul style="list-style-type: none"> o Fatalities and injury <ul style="list-style-type: none"> - whilst carrying out controlled burns/ fighting fires in grasslands/ scrub - residents fighting house fires - smoke inhalation o Illness <ul style="list-style-type: none"> - smoke causing problems for people with respiratory illnesses o Possessions <ul style="list-style-type: none"> - peoples possessions burned or damaged by smoke in grasslands/ scrub fires - peoples possessions burned or damaged by smoke in 	B (D)	3	H (M) ★
		(B)		(H) ★
		C	2	M
		A (D)	2	H (M) ★
		(A)		(H) ★
Bushfires (Cont)	<ul style="list-style-type: none"> house fires o Homelessness <ul style="list-style-type: none"> - people having to evacuate their homes due to grass/ scrub fires - peoples homes being burned in residential fires • Social Structures <ul style="list-style-type: none"> - family groups/ social networks breakdown due to emotional and financial stress 	A (D)	2	H (M) ★
		(A)		(H) ★
		D	2	L

	<ul style="list-style-type: none"> • Buildings <ul style="list-style-type: none"> - homes and buildings damaged or destroyed in grasslands/ scrub fires - homes and buildings damaged or destroyed in residential fires • Engineering Infrastructure <ul style="list-style-type: none"> - loss of services for unacceptable periods of time - above ground infrastructure damaged or destroyed (i.e. power generators and transmission lines, water and sewerage storage and pumping infrastructure, telecommunications infrastructure etc.) - road and airstrip closures due to fires and smoke - rural water supplies depleted in fire fighting • Critical Facilities <ul style="list-style-type: none"> - Emergency Response Agencies ineffective in assisting community due to loss of control of grasslands/ scrub fire - Emergency Response Agencies ineffective in assisting community due to loss of control of residential fire - medical services unable to cope with numbers of ill and injured - the aged, infirmed, asthmatics and other vulnerable people needing to be relocated from the hospital and aged care hostel due to smoke 	<p>A (C)</p> <p>(A)</p> <p>D</p> <p>B (D)</p> <p>(B)</p>	<p>2</p> <p>3</p> <p>3</p>	<p>H (M) ★</p> <p>(H) ★</p> <p>M</p> <p>H (M) ★</p> <p>(H) ★</p>
Severe Thunderstorms	<ul style="list-style-type: none"> - premises and equipment damaged or destroyed - loss of power and water supply, sewerage services to premises • Employment, Business and Industry <ul style="list-style-type: none"> - loss of employment and income for residents - financial losses for Council • Environment <ul style="list-style-type: none"> - severe damage to environment • People <ul style="list-style-type: none"> o Fatalities and injury <ul style="list-style-type: none"> - people and vehicles swept off causeways and creek crossings in flash floods - people struck by lightening - people struck by wind blown debris o Illness <ul style="list-style-type: none"> - damage to houses causing loss of protection for people from weather o Possessions <ul style="list-style-type: none"> - peoples possessions (homes, cars, cloths, furniture etc.) suffering rainwater/ hail damage o Homelessness <ul style="list-style-type: none"> - peoples homes losing roofs and suffering other damage - peoples houses being destroyed • Social Structures <ul style="list-style-type: none"> - family groups/ social networks breakdown due to emotional and financial stress • Buildings <ul style="list-style-type: none"> - risk of roof and other damage from wind gusts, from rainwater inundation and wind blown debris 	<p>E</p> <p>C</p> <p>C</p> <p>C</p> <p>C</p> <p>B</p> <p>D</p> <p>B</p>	<p>2</p> <p>1</p> <p>3</p> <p>2</p> <p>2</p> <p>3</p> <p>2</p> <p>3</p>	<p>L</p> <p>L</p> <p>M</p> <p>L</p> <p>L</p> <p>H ★</p> <p>L</p> <p>H ★</p>
Severe Thunderstorms (Cont.)	<ul style="list-style-type: none"> - caravans and improvised houses damaged or destroyed • Engineering Infrastructure <ul style="list-style-type: none"> - loss of services for unacceptable periods of time - above ground infrastructure damaged or destroyed (i.e. power transmission lines, water storage tanks and windmills, telecommunications infrastructure etc.) - closures of local roads due to inadequate stormwater drainage and subsequent flooding of town streets • Critical Facilities <ul style="list-style-type: none"> - Emergency Response Agencies ineffective in assisting community due to extent of damage - Emergency Response Agencies ineffective in assisting community due to insufficient equipment - medical services unable to cope with numbers of ill and injured - inability of aircraft to fly in due to severe thunderstorms - access to critical facilities blocked by fallen trees or by stormwater damage to roads - community shelters damaged or destroyed - premises and equipment damaged or destroyed - loss of power and water supply, sewerage services to premises • Employment, Business and Industry <ul style="list-style-type: none"> - loss of employment and income for residents - financial losses for Council • Environment <ul style="list-style-type: none"> - widespread environmental damage 	<p>D</p> <p>B (D)</p> <p>(B)</p> <p>E</p> <p>D</p>	<p>2</p> <p>3</p> <p>3</p> <p>2</p> <p>2</p>	<p>L</p> <p>H (M) ★</p> <p>(H) ★</p> <p>L</p> <p>L</p>

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Earthquakes	<ul style="list-style-type: none"> • People <ul style="list-style-type: none"> - fatalities and injury due to people being struck by dislodged or collapsed building elements, fires and electrocution - major inconvenience and illness due to loss of engineering services - peoples possessions and homes damaged and destroyed 	E	4	M
	<ul style="list-style-type: none"> • Social Structures <ul style="list-style-type: none"> - family groups/ social networks breakdown due to emotional and financial stress 	E	2	L
	<ul style="list-style-type: none"> • Buildings <ul style="list-style-type: none"> - total or partial collapse of homes and buildings - buildings sustaining structural damage 	E	4	M
	<ul style="list-style-type: none"> • Engineering Infrastructure <ul style="list-style-type: none"> - loss of services for unacceptable periods of time - power, water, sewerage and telecommunications infrastructure damaged or destroyed - water tanks rupturing and spilling contents - damage to all roads, drainage structures and pavements 	E	4	M
	<ul style="list-style-type: none"> • Critical Facilities <ul style="list-style-type: none"> - Emergency Response Agencies ineffective in assisting community due to extent of damage and insufficient equipment - medical services unable to cope with numbers of injured - access to critical facilities blocked by fallen trees or by damage to roads - community shelters damaged or destroyed - premises and equipment damaged or destroyed - loss of power and water supply, sewerage services to premises 	E	4	M
Earthquakes (Cont.)	<ul style="list-style-type: none"> • Employment, Business and Industry <ul style="list-style-type: none"> - loss of employment and income for residents - financial losses for Council 	E	3	L
	<ul style="list-style-type: none"> • Environment <ul style="list-style-type: none"> - contamination from spillages of petroleum products and of chemicals - widespread damage 	E	3	L

2.7 Risk Treatment

Specific mitigation strategies and treatment options recommended are set out in the following table. Each hazard is listed separately and the treatment options are listed below that. However Form A14-1 does not show the priority setting of each treatment. Comparison with Form A10 shows no follow through from those risks that were identified as high into Form A14-1. However Form A11 (Identification and Evaluation of Treatment Options) does list High or Medium Risk Priority and the treatment options for those risks. As both forms A11 and A14-1 follow on relatively well from each other it can be assumed that the treatment options listed in A14-1 are all of High Priority. Both forms have been scanned into this section.

Form A11: Identification and Evaluation of Treatment Options. This table groups each hazard and lists the risks, treatment option and treatment feasibility. Only High and Medium Risk Priorities are identified in this table.

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	Treatment Feasibility
Flooding	People	High	Controls for future land and building development as part of IPA Town Plan	Essential and feasible
		Medium	Raise community awareness of the flood risk and of Bureau of Meteorology flood warnings through community awareness and education campaign (Council newsletter / other media)	Feasible
		Medium	Road flood immunity / upgrade works – (flood depth markers at causeways and creek crossings / construct concrete causeways / culvert structures / bitumen seal)	Feasible
	Buildings	Medium	Clear silt and debris from town stormwater drainage prior to wet season to allow stormwater to drain from town streets.	Feasible
	Engineering Infrastructure	Medium	Develop procedures for inspection and recommissioning of pumps etc. including clean-up of enclosures and removal of debris	Feasible

	Critical facilities	High	Upgrade and maintain SES / Police facilities and equipment	Feasible
		Medium	Emergency planning procedures for medical services / aged care	Feasible
	Environment	Medium	Develop procedures / assign responsibilities for environmental clean up	Feasible
Cyclones	People	Medium	Community awareness campaign for preventative action for protection of self and of property	Feasible
	Buildings	Medium	Ensure buildings designed and constructed in accordance with relevant Australian Standards	Feasible
Bushfire	People	Medium	Controls for future land and building development as part of IPA Town Plan / Develop a Bushfire Management Plan to assist in policy making and planning	Feasible
		Medium	Raise the community's awareness of their responsibilities of self protection, of fire weather warnings and total fire bans, and promote rural fire prevention and bushfire safety through a community awareness campaign. (Council newsletter / other media).	Feasible
		Medium	Establish / maintain program of firebreak burning and clearing around Doomadgee and on Council owned property	Feasible
	Buildings	Medium	Ensure buildings are constructed in compliance with the Fire and Rescue Service Act 1990, the Building Fire Safety Regulation 1991, the Building Code of Australia (current edition) and other relevant codes and standards	Feasible
	Lifelines / Critical facilities	Medium	Program of clearing / controlled burns	Feasible
Severe Thunderstorms	People	Medium	Raise the community's awareness of their responsibilities of self protection, of severe weather warnings, and of storm damage prevention measures through a community awareness campaign	Feasible
		Medium	Establish / maintain program of bulk rubbish collection prior to storm season to encourage the clearing of properties of loose materials and rubbish to prevent them from become projectiles	Feasible
	Buildings	Medium	Ensure buildings designed and constructed in accordance with relevant Australian Standards	Feasible
	Lifelines / Critical Facilities	Medium	Trim trees and tree branches from power and telecommunications transmission lines in conjunction with relevant agencies / service providers	Feasible
Earthquakes	People / Buildings etc.	Medium	Ensure structures are designed and constructed in accordance with relevant Australian Standards	Feasible

Form A14-1 Risk Treatment Options Development

This table groups each disaster, identifies the treatment options, project leader, estimated cost, funding source and timeframe. It can be assumed that this list of treatment options are all of high priority as it is not indicated otherwise and it follows through from the Identification and Evaluations of Treatment Options Form A11.

TREATMENT	PROJECT LEADER	RESPONSIBLE AGENCY	REQUIRED ACTION	ESTIMATED COST	FUNDING SOURCE	TIMEFRAME
Flooding						
Formulate controls for future land and building development as part of the development of an IPA Town Plan	Council Counter Disaster Committee	Chief Executive Officer	Refer to Town Planning Consultant to undertake plan review	\$20,000	External / DACC	24 months
Develop 'Natural Hazards Code' for inclusion in future IPA Town Plan addressing flooding	Council Counter Disaster Committee	Chief Executive Officer	Refer to Town Planning Consultant to undertake plan review	\$2,500	External / DACC	24 months
Raise the community's awareness of the flood risk and of flood advice and warnings through a community awareness and education campaign in Council newsletter/ other media	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Consult DES Counter Disaster and Rescue Service, plan and deliver campaign	Within existing budget	DACC	Ongoing
Install and maintain flood depth markers to all causeways and crossings	Council Counter Disaster Committee	Chief Executive Officer	Plan and deliver works	Within existing budget	DACC	12 months
Develop an evacuation plan for flood afflicted residents of Old Doomadgee and outstations for inclusion in the Counter Disaster Plan	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Compile brief, consult DES Counter Disaster and Rescue Service, draft plan	\$ 5,000	External / DACC	24 months
Clear silt / debris from stormwater drainage in Doomadgee prior to wet season	Council Counter Disaster Committee	Chief Executive Officer	Monitor requirement, plan and deliver works	\$ 5,000	DACC	Annually
Develop procedures / assign responsibilities for environmental clean up following flood event	Council Counter Disaster Committee	Chief Executive Officer	Compile brief, consult EPA, draft procedures	\$ 2,000	DACC	24 months
Flooding (continued)						
Develop procedures for inspection and recommissioning of water and sewerage systems including clean-up	Council Counter Disaster Committee	Chief Executive Officer	Compile brief, consult Council operations and maintenance personnel, draft procedures	\$ 8,000	DACC	24 months
Upgrade and maintain SES facilities and equipment	Council Counter Disaster Committee	DES	Plan and deliver works	\$ 35,000	DES/DACC	Ongoing
Develop procedures for inspection and recommissioning of critical facilities including clean-up	Council Counter Disaster Committee	Chief Executive Officer	Compile brief, consult Council operations and maintenance personnel, draft procedures	\$ 5 000	DACC/DES	24 months
Upgrade Burketown Rd, Wollgorang Rd and Old Doomadgee Rd to improve access	DACC	Chief Executive Officer	Ongoing TIDS applications to DMR	\$20,000,000	DMR	10+ years
Cyclones						
Raise the community's awareness of the risks associated with cyclones and the resultant flooding issues through a community awareness and education campaign in Council newsletter/ other media	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Consult DES Counter Disaster and Rescue Service, plan and deliver campaign	Within existing budget	DACC	Ongoing
Ensure buildings are constructed in compliance with the relevant Australian standards and building codes.	Council Counter Disaster Committee	Council Building Surveyor	Follow standard practice in approving future building development	Within existing budget	DACC	Ongoing

Severe Thunderstorms						
Raise the community's awareness of their responsibilities of self protection, of severe weather warnings, and of storm damage prevention measures through a community awareness and education campaign in Council newsletter/ other media	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Consult DES Counter Disaster and Rescue Service, plan and deliver campaign	Within existing budget	DACC	Ongoing
Establish program of bulk rubbish collection prior to storm season to encourage the clearing of properties of loose materials and rubbish to prevent them from become projectiles	Council Counter Disaster Committee	Council Environmental Officer	Plan, advertise and deliver program	Within existing budget	DACC	Bi-annually
Bushfire						
Develop 'Natural Hazards Code' in future IPA Town Plan addressing bushfire	Council Counter Disaster Committee	Town Planning Consultant	Refer to Town Planning Consultant to undertake plan review	\$2,500	External / DACC	24 months
Develop a Bushfire Management Plan to assist in policy making and planning	Council Counter Disaster Committee	Town Planning Consultant	Refer to Town Planning Consultant	\$2,500	External / DACC	24 months
Raise the community's awareness of their responsibilities of self protection, of fire weather warnings and total fire bans, and promote rural fire prevention and bushfire safety through a community awareness and education campaign in Council newsletter/ other media	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Consult DES Rural Fire Service, plan and deliver campaign	Within existing budget	DACC	Ongoing
Establish/ maintain program of hazard reduction burning around population centres (Doomadgee and Old Doomadgee)	Council Counter Disaster Committee	Local Rural Fire Brigade	Refer to appropriate Rural Fire Brigade/ property owners	Within existing budget	DACC	Ongoing
Establish/ maintain graded fire breaks around Doomadgee and Old Doomadgee	Council Counter Disaster Committee	Local Rural Fire Brigade Controller	Refer to appropriate Rural Fire Brigade/ property owners	Within existing budget	DACC	Ongoing
Ground truth Queensland Rural Fire Service Bushfire Hazard Map of DACC in conjunction with the Rural Fire Service	Council Counter Disaster Committee	DES Rural Fire Service	Refer to appropriate Rural Fire Brigade/ property owners	Within existing budget	DACC	12 months
Review Counter Disaster Plan arrangements addressing attendance of Rural Fire Brigades and SES to bushfires in neighbouring Shires	Council Counter Disaster Committee	Council Counter Disaster Committee, Counter Disaster Committee of neighbouring Cities/ Shires	Document agreed arrangements	\$2,500	External / DACC	12 months
Ensure buildings are constructed in compliance with the Fire and Rescue Service Act 1990, the Building Fire Safety Regulation 1991, the Building Code of Australia (current edition) and other relevant codes and standards	Council Counter Disaster Committee	Council Building Surveyor	Follow standard practice in approving future building development	Within existing budget	DACC	Ongoing
Coordinate fire management practices in conjunction with relevant agencies/ service providers to reduce fuel loads and provide cleared areas around critical facilities (ask before you burn)	Council Counter Disaster Committee	Council Counter Disaster Committee Executive Officer	Consult DES Rural Fire Service, discuss with relevant agencies/ service providers, document outcomes	Within existing budget	DACC	12 months

Ensure buildings are constructed in compliance with AS 1170.2 – 1989 the Australian Standard for Wind Loads, the Building Code of Australia (current edition) and other relevant codes and standards	Council Counter Disaster Committee	Council Building Surveyor	Follow standard practice in approving future building development	Within existing budget	DACC	Ongoing
Trim trees and tree branches from power and telecommunications transmission lines in conjunction with relevant agencies/ service providers	Council Counter Disaster Committee	Council Environmental Officer/ Urban Foreman	Consult Ergon, Telstra Country Wide		ERGON	Ongoing
TREATMENT	PROJECT LEADER	RESPONSIBLE AGENCY	REQUIRED ACTION	ESTIMATED COST	FUNDING SOURCE	TIMEFRAME
Earthquakes						
Ensure structures are constructed in compliance with AS1170.4 - 1993 Australian Standard for Earthquake Loads, the Building Code of Australia (current edition) and other relevant codes and standards	Council Counter Disaster Committee	Council Building Surveyor	Follow standard practice in approving future building development	Within existing budget	DACC	Ongoing
Corporate Plan						
Ensure Vision, Mission, Strategies and Goals include statements regarding the safety and well-being of the community from the perspective of natural hazard impacts	Council Counter Disaster Committee	DACC CEO	Refer to Town Planning Consultant to undertake plan review	Within existing budget	DACC	6 months
Include goals, objectives, strategies and actions addressing Council's fulfilment of its obligation to support SES units, hold Counter Disaster Committee meetings, maintain the Counter Disaster Plan and implement the recommendations of this Natural Disaster Risk Management Study	Council Counter Disaster Committee	DACC CEO	Refer to Town Planning Consultant to undertake plan review	Within existing budget	DACC	6 months
Operational Plan						
Make provision for expenditure on natural disaster mitigation (i.e. support for the SES, Counter Disaster Committee meetings, maintenance of the Counter Disaster Plan and implementation of the recommendations of this Natural Disaster Risk Management Study)	Council Counter Disaster Committee	DACC CEO	Refer to Town Planning Consultant to undertake plan review	Within existing budget	DACC	6 months
Town Plan						
Provide a definition of community safety that encompasses the concept of safety in the context of natural hazard impacts	Council Counter Disaster Committee	DACC CEO	Refer to Town Planning Consultant to undertake plan review	Within existing budget	DACC	6 months
Developed a new code titled 'Natural Disaster Mitigation', or amend existing codes to address issues such as development in areas subject to flooding (eg. habitable floor level and/ or septic tank effluent disposal area to be above the designated design flood level) and development in bushfire prone areas	Council Counter Disaster Committee	DACC CEO	Refer to Town Planning Consultant to undertake plan review	Within existing budget	DACC	6 months
Counter Disaster Plan						
Amend incorrect and outdated terminology including acronyms and text	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to undertake review	Within existing budget	DACC	6 months
Ensure the plan reflects an updated account of the natural hazards identified in the Natural Disaster Risk Management Study	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to undertake review	Within existing budget	DACC	6 months
Update and check relevant section against the current financial procedures of DES including NDRA procedures etc.	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to undertake review	Within existing budget	DACC	6 months
Ensure other documents referenced are either included in the plan or otherwise available	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to undertake review	Within existing budget	DACC	6 months
Develop and include a plan of the developed allotments within the Shire that are vulnerable to various levels of flooding	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to develop plan	\$5 000	DACC	6 months
Develop and include a flood plan outlining procedures to be followed in the event of flooding in Cloncurry and in other key areas. The flood plan should detail actions to be taken on receipt of river height bulletins and of flood warnings	Council Counter Disaster Committee	Counter Disaster Committee Chairperson	Refer to Town Planning Consultant to develop plan	\$8 000	DACC	6 months

2.8 Evaluation of Doomadgee Aboriginal Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 8

It was still difficult to discern which treatment options were of top priority as Form A14-1 did not indicate this.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 9

Relevance to aims and objectives of the scheme – 8

3. Murweh Shire Council

The study comprises two parts, which are distinguished by size and title. The first part is the full report titled 'Natural Hazards, Bushfire – Earthquake – Flooding – Dam Break Flood – Severe Weather and the Risks they Pose' and is a total of 425 pages long. The second part, the executive summary titled 'Disaster Mitigation Plan', is a total of 73 pages, all of which is contained within the first part of the study.

3.1 Aims and Objectives

The report represents a broad assessment of the hazards and risks they pose to the Murweh Shire. It identifies the risks posed by these hazards and feasible mitigation strategies to minimise economic and social impacts. The stated focus is long-term preparedness and planning to minimise the impact of natural hazards and prevention of loss of life. The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. Murweh Shire Council hired a consultant, KTG Engineering, led by Ken Durham and J M W Ryan.

Primary objectives of the study were to:

- Identify the natural disasters and community vulnerability
- Determine and analyse the risk
- Develop a comprehensive natural disaster risk register
- Determine appropriate treatment options
- Review the Shires' current Local Disaster Management Plan (Counter Disaster Plan)
- Recommend any actions or changes required to the Shires' current Local Disaster Management Plan (Counter Disaster Plan)
- Review Council's corporate governance systems and make appropriate recommendations

3.2 The Risk Management Team

The report refers to a study advisory group (SAG). Membership was as follows:

- | | |
|---|--|
| ▪ Mayor | Murweh Shire Council |
| ▪ Chief Executive Officer | Murweh Shire Council |
| ▪ Director Engineering Services | Murweh Shire Council |
| ▪ Director Corporate Services & Study Manager | Murweh Shire Council |
| ▪ Economic Development Officer | Murweh Shire Council |
| ▪ Works Overseer and SES Controller | Murweh Shire Council |
| ▪ Area Manager | Counter Disaster & Rescue Services, Roma |

The majority of the representatives were from the Murweh Shire council and all from the town of Charleville. There was one representative from the counter disaster and rescue services. Other local government, community agencies, emergency services groups, business owners, and residents were identified as stakeholders. None of these were represented on the SAG.

3.3 Meetings, Attendance and Community Involvement

There is no reference to numbers of meetings or attendance at SAG meetings. However, interviews were conducted with various stakeholders and members of the business community in the towns of Charleville, Augathella, and Morven. These responses are recorded in the report. There were no public meetings as it was agreed that the main issue of flooding had been adequately dealt with at previous public meetings and notes of these meetings were used to provide public input for flooding. No other hazards were reviewed with the general public.

3.4 Hazards

The vulnerability profile is identified in the context of each hazard.

The study identified six hazards:

- Bushfire
- Earthquake
- Landslide
- Severe weather (strong wind, hail and lightning)
- Flood—including Dam Break
- Ex cyclone/Severe Wind

3.5 Community Vulnerability Profile

Each hazard is extensively researched and written up in much detail and length ranging from 20-50 pages. The CERA methodology for vulnerability assessment is used thereby creating a vulnerability inventory (built and human environments); a vulnerability analysis (as vulnerability charts); an interdependence matrix; and a recovery service timetable. This approach is very confusing and ineffective and does not follow the Zamecka & Buchanan NDRM guidelines overall

Murweh Shire Council covers an area of 40,740 sq kms and houses approximately 4,960 people. The shire has three residential communities with the bulk of inhabitants, living in Charleville (3,300 people). Vulnerable age groups of 0-14 and 65+ represent approximately 20% of the population. The residents of the shire are engaged principally in cattle, sheep and other pastoral pursuits with tourism gaining in importance. There are 1,942 domestic structures in the Shire representing approximately 96% of the 2001 domestic stock. These buildings are predominantly timber, either low or high set and were built before wind code requirements.

The report notes that certain aspects of the natural environment may contribute to hazard vulnerability – the undulating plains dominated by grasses dry up during summers and may be prone to fires. The large Warrego River, which traverses the Shire in a northeast to southwest direction, has a broad flood plain. Flooding seems to be the most severe risk to this Shire.

Lifelines and critical facilities crossing streams are vulnerable to damage from floods. The road network is vulnerable to flooding or crosses through hazard prone areas. The telephone exchange at Charleville has been flood proofed to the 1990 flood level.

The report uses the terminology of 'vulnerable elements' and these are—people, buildings, environment, business, lifelines, and critical facilities.

- Bushfire
 - People – volunteers who fight the fire.
 - Buildings – rural infrastructure not protected by fire breaks.

- Environment – Good wet seasons promote high grass growth that can lead to a fire hazard but will recover.
- Business – Some loss of rural production and infrastructure but factored into yearly operations.
- Lifelines – Roads temporarily closed from fallen timber and lack of visibility from smoke. Timber structures such as bridges and power poles.
- Earthquake
 - People – May be killed or seriously injured.
 - Buildings – structures with un-reinforced masonry and concrete may be damaged.
 - Environment – Minor damage but will recover.
 - Lifelines – structures made of rigid material are all vulnerable.
- Landslide
 - Low threat with no events having been recorded – less than 1% of shire contains land with slopes greater than 15%.
- Severe weather (wind, hail, lightning)
 - People – people caught in the open subject to wind borne debris, hail and lightning.
 - Buildings – 1,942 domestic structures built before wind code requirements.
 - Environment – Crops, flora and fauna may be damaged but will recover.
 - Lifelines – Overhead powerlines may be subject to windborne debris therefore services relying on power such as water and sewerage.
- Flood
 - People – caught or deliberately entering floodwaters are at risk.
 - Buildings – rural infrastructure vulnerable especially outside levees. In a PMF event all properties in Charleville are vulnerable, plus the showgrounds and airport, with the exception of runways.
 - Environment – Damage but will recover.
 - Infrastructure – roads vulnerable to impacts, scour and saturation damage.
- Dam Break Flood
 - No known high hazard dams in the shire – flooding from dam break not an issue.
- Ex cyclone/Severe Wind
 - People – those that venture out at risk of injury from flying debris.
 - Buildings – structures not designed to wind code at risk.
 - Environment – damage to flora, scouring of land, environment will recover.
 - Infrastructure – Power reticulation vulnerable to flying debris and infrastructure that relies on power.

There is a lot of repetition in this section.

3.6 Risk Evaluation

The report provides a description of each hazard with each vulnerable element listed in a risk register format. Each hazard is then listed in the risk evaluation table and assessed for likelihood, consequence and the risk rating as per Zamecka & Buchanan. Table 7.5.1. below summarises the ratings under each hazard category, with the extreme and high ratings have been identified with a star.

Table 7.5.1 Risk register – risk evaluation. (*) identifies Extreme and High ratings

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Bush and Grass Fires	People being burnt or injured.	Unlikely	Insignificant	Low
	Rural buildings, rural infrastructure damaged and stock burnt	Unlikely	Insignificant	Low
	Environment (trees, flora & fauna) being destroyed	Unlikely	Insignificant	Low
	Business unlikely to be at risk from fire	Unlikely	Insignificant	Low
	Power and communication lines, wooden bridges and roads damaged or affected by smoke	Unlikely	Insignificant	Low
Flooding Up to the 1.0% AEP Scenario	A small number of properties may be affected. No critical facilities are affected.	Possibly	Minor	Moderate
	People may be drowned at flooded causeways or injured wading in flood waters	Possibly	Minor	Moderate
	Rural buildings, rural infrastructure damaged & stock drowned	Possible	Minor	Moderate
	Flooding may produce pollution and loss of soil	Unlikely	Minor	Low
	Most business areas are not at risk	Possibly	Minor	Moderate
		Unlikely	Insignificant	Low
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
PMF Scenario	Some roads may be cut No critical facilities at risk.			
	Whole of Charleville township flooded. All critical facilities are affected. Large area of Augathella flooded. All rural floodplains flooded to considerable depth.	Rare	Catastrophic	High *
	People may be drowned and injured wading in flood waters	Possibly	Moderate	High *
	Rural buildings, rural infrastructure damaged & extensive stock losses.	Possibly	Moderate	High *
	Flooding may produce pollution and loss of soil	Possibly	Moderate	High *
	All business in Charleville and Augathella flooded.	Possibly	Catastrophic	High *
	Extensive flooding of road and rail network.	Possibly	Major	Extreme *
All critical facilities flooded.	Possibly	Catastrophic	Extreme *	
Earthquakes Based on residential damage scenario	People may be injured or killed due to age of structures and some types of construction	Unlikely	Minor	Low
	Buildings destroyed or damaged due to age and type of construction	Unlikely	Minor	Low
	Environment at risk from secondary effects e.g. fire, pollution	Unlikely	Minor	Low
	Business is at risk due to secondary affects – loss of power and	Unlikely	Minor	Low

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
	communications Critical facilities – power, communication, road, rail hospitals, emergency services at risk due to structural damage	Unlikely	Minor	Low
Ex-tropical cyclones & severe wind & weather	People may be injured or killed due to flying debris	Unlikely	Minor	Low
	Buildings not designed to wind code, both residential, commercial & industrial may suffer structural damage	Unlikely	Minor	Low
	Environment- flora & fauna may be damaged	Possibly	Minor	Moderate
	Business at risk due to secondary affects – loss of power, communications etc	Unlikely	Minor	Low
	Power and communication lines may be damaged – other services affected	Possibly	Minor	Moderate
	Critical facilities including schools, emergency service facilities etc may be damaged	Unlikely	Minor	Low
HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Dam Break Flood	Not applicable	Not applicable	Not applicable	Not applicable
<u>NOT applicable in Murweh Shire no high hazard dams</u>				
Landslides	People may be injured	Rare	Insignificant	Low
	Residential buildings may be damaged	Rare	Insignificant	Low
	Environment is at risk	Unlikely	Insignificant	Low
	Business may be affected	Rare	Insignificant	Low
	Local Power and communication lines and other services may be damaged.	Rare	Insignificant	Low
	Roads in cuttings and on high fills may be damaged	Unlikely	Insignificant	Low
	Critical facilities may be damaged	Rare	Insignificant	Low

3.7 Risk Treatment

The risk treatment plan (Table 8.1) and overall disaster mitigation plan (Table 9) have been scanned into this section as they are quite different to the risk evaluation form Table 7.5.1 in the above section. The risk evaluation in table 7.5.1 determines most hazards and risks as low or moderate with insignificant consequences. Table 8.1 however identifies most risks as a high treatment priority and an essential treatment evaluation. This is not congruent.

Table 8.1 lists each hazard and identifies the risk, treatment priority, treatment option and treatment evaluation. Note that the author has modified the table from Zamecka & Buchanan where the third column now reads ‘Treatment Priority’ rather than ‘Risk Priority’. This means it is difficult to link Table 8.1 to the previous risk evaluation table 7.5.1. The most serious risk in Table 7.5.1 was flooding at PMF scenario. However, bushfire, severe weather and floods were all identified as high treatment priorities in Table 8.1. Table 9 is the most effective and provides a complete list of treatment options and actions to be taken.

Table 8.1 Risk Register Identification and Evaluation of Treatment Options – Form A11

HAZARD	RISK	TREATMENT PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
BUSH/GRASS FIRE	People may be killed or injured	High	Review town planning requirements	Essential
		High	Develop 'Natural Hazards Code as part of IPA town plan	Essential & feasible
		High	Undertake hazard reduction burns	Essential & feasible
		High	Encourage establishment of fire breaks	Essential & feasible
		High	Ground truth the Rural Fire Service risk mapping	Essential & feasible
	Buildings may be damaged	High	Ensure buildings are constructed in accordance with relevant Australian Standard & Building Code of Australia	Essential & feasible
High		Future residential subdivisions to conform to best practice guidelines for fire management	Feasible	
SEVERE WEATHER	People may be injured & buildings may be damaged or destroyed	High	Maintain an annual rubbish clean-up campaign	Essential and feasible
		Medium	Ensure buildings are constructed for severe weather in accordance with Australian Standard & Building Code of Australia	
	Lifelines may be damaged	High	Identify trees that need trimming from power lines serving Council infrastructure	Essential and feasible
		High	Prepare & promote policy & guidelines on undesired tree species in urban areas	
	Caravans & cabins may be damaged	High	Develop & implement policy on tie-down provisions for caravans &	Essential & feasible

HAZARD	RISK	TREATMENT PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION	
			demountable buildings in caravan parks		
FLOOD	People may be injured or killed	High	Formulate development controls as part of IPA town plan	Essential and feasible	
		High	Develop 'Natural Hazards Code' in IPA town plan addressing flooding	Essential, urgent & feasible	
		High	Enforce Council's Flood Policy on floor levels	Essential, urgent & feasible	
		High	Install flood depth markers on all causeways and floodways	Essential & feasible	
		High	Construct stage 1 levees at Charleville & Augathella	Essential & feasible	
		High	Relocate flood gauges outside levee	Essential and feasible	
		High	Develop new rating curves for Warrego River and Bradleys Gully	Essential and feasible	
		High	Develop community education package following levee construction & distribute to community	Essential and feasible	
		Medium	Develop evacuation procedures for levee overtopping flood	Essential and feasible	
		Building may be flooded and damaged	Medium	Update database of ground and floor level of all buildings in urban areas on the floodplain as result of levee construction	Essential & feasible
			High	Identify flood prone properties in urban areas and record detail	Essential & feasible
			Medium	Collect data on flood events	Essential & feasible
			Medium	Purchase computer & software to provide capability to monitor floods	Essential and feasible

HAZARD	RISK	TREATMENT PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
		Medium	Ensure buildings are constructed for flood in accordance with Australian Standard & Building Code of Australia	
		Medium	Clarify riverine flood impact as result of levee construction	Essential and feasible
		Medium	Develop procedures for levee flood gate operation	Essential and feasible

3.7.1 Table 9. Risk Action Plan (Disaster Mitigation Plan) – Form A1

This is a table of all treatments, grouped by hazard, corporate plan, local disaster management plan and operational plan. The last three in this list are additional factors the author highlighted as needing to be addressed and are complementary to the objectives of the study.

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
BUSHFIRE								
Formulate development controls as part of IPA town plan for bushfire	1	Murweh Shire Council	Murweh Shire Council	Refer to consultant undertaking plan review	Within existing budget	Murweh Shire Council	36 months	2002/2005
Develop 'Natural Hazards Code for bushfire as part of IPA town plan	1	Murweh Shire Council	Murweh Shire Council	Refer to consultant undertaking plan review	Within existing budget	Murweh Shire Council	36 months	2002//005
Ground truth the Rural fires risk mapping	1	Murweh Shire Council	Murweh Shire Council & Rural Brigades	Seek assistance of Dist. Inspector Rural Fires, Fire Brigades, & modify map as required	Within existing budget	Murweh Shire Council	1 month	2002/2005
Ensure buildings are constructed for bushfire risk in accordance with relevant Australian Standard & Building Code of Australia	4	Murweh Shire Council	Murweh Shire Council or private certifier	Promote awareness	Within existing budget	Murweh Shire Council	ongoing	Each Year
Undertake hazard reduction burns on outskirts of towns	7	Murweh Shire Council	Rural fire brigades	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each year
Encourage establishment of fire breaks	8	Murweh Shire Council	Rural Fire brigades State Agencies & Murweh Shire Council	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each Year
Future residential subdivisions to conform to best practice for fire management	12	Murweh Shire Council	Murweh Shire Council	Promote awareness of material available from DLGP & Rural fire Authority	Within existing budget	Murweh Shire Council	Ongoing	Each Year
SEVERE WEATHER Incl Cyclone								
Ensure buildings are constructed for severe weather in accordance with relevant Australian Standard & Building Code of Australia	4	Murweh Shire Council	Murweh Shire Council or private certifier	Promote awareness	Within existing budget	Murweh Shire Council	ongoing	Each Year
FLOOD								
Continue annual rubbish clean-up campaign	6	Murweh Shire Council	Murweh Shire Council	Prepare campaign, advise residents, arrange pick-up.	Within existing Budget	Murweh Shire Council	1 month	Each year
Identify trees that need clearing from power lines serving Council infrastructure	9	Murweh Shire Council	Murweh Shire Council	Inspect & discuss with Ergon. Ergon to undertake physical work.	Within Agencies Budget	Ergon	Ongoing	Each year
Develop & implement policy on tie-down provisions for caravans & demountable buildings in caravan parks	33	Murweh Shire Council	Murweh Shire Council or private certifier	Prepare & adopt & promulgate policy	\$1k	Murweh Shire Council	12 months	2005/2006
Prepare & promote a policy and guideline on undesired tree species in urban areas	37	Murweh Shire Council	Murweh Shire Council	Seek assistance District Inspector Rural Fire Service & Parks & Gardens Supervisor & public utilities	\$1K	Murweh Shire Council	12 months	2006/2007
FLOOD								
Formulate development controls as part of IPA town plan for riverine flooding	1	Murweh Shire Council	Murweh Shire Council	Refer to consultant undertaking plan review	Within existing budget	Murweh Shire Council	36 months	2002/2005
Develop 'Natural Hazards Code' in IPA town plan addressing flooding	1	Murweh Shire Council	Murweh Shire Council	Refer to consultant undertaking plan review	Within existing budget	Murweh Shire Council	36 months	2002/2005
Enforce Council's Flood Policy on floor levels.	2	Murweh Shire Council	Murweh Shire Council	Ensure persons approving building applications apply the policy	Within existing budget	Murweh Shire Council	On going	Each Yera
Construct stage 1 levees Charleville & Augathella	3	Murweh Shire Council	Murweh Shire Council	Finalise designs, call tenders award tender construct levees, submit exceptional circumstance funding application	\$7M	NDMP funding 1:11 Murweh Shire Council, State & Commonwealth Govts	48 Months	2004/2008
Ensure buildings are constructed for flooding in accordance with relevant Australian Standard & Building Code of Australia	4	Murweh Shire Council	Murweh Shire Council or private certifier	Promote awareness	Within existing budget	Murweh Shire Council	ongoing	Each Year
Install & maintain flood depth markers on all causeways and floodways	5	Murweh Shire Council	Murweh Shire Council	Prepare instructions to works staff	Within existing budget	Murweh Shire Council	12 months; each year	2004/2005 then each year

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
Collect data on past & future flood events	13	Murweh Shire Council	Murweh Shire Council	Develop data base Obtain GPS equipment if not already owned	Within existing programs	Murweh Shire Council	ongoing	Each Year
Relocate flood gauges following levee construction	14	Murweh Shire Council	Murweh Shire Council	Liaise with BoM supply, erect gauges & determine AHD value of gauge zero	\$1K	Murweh Shire Council & BoM	3 months	2004/2005
Re calibrate URBS flood model	16	Murweh Shire Council	BoM	Liaise with BoM to have model re run	Nil to Council	BoM	3 months	2005/2006
Develop procedures for levee flood gate operation	17	Murweh Shire Council	Murweh Shire Council	Refer to Dir Engineering services to develop and promulgate procedure	Within existing programs	Murweh Shire Council	3 months	2005/2006
Clarify riverine flood impact on Murweh Shire as result of levee construction	19	Murweh Shire Council	Murweh Shire Council	Prepare submission for NDMP funds in 2005/2006. Re-run Egls report flood model with as constructed levee detail to determine afflux.	\$10K	Future NDMP application 1:1:1 Murweh Shire, State & Commonwealth Govts.	12 Months	2005/2006
Develop evacuation procedure for levee overtopping flood	20	Murweh Shire Council	Murweh Shire Council	Refer Murweh Shire Local Disaster Management Committee in liaison with Dist Manager CDRS	Within existing programs	Murweh Shire Council	6months	2005/2006
Develop community education package following levee construction completion & distribute to community	21	Murweh Shire Council	Murweh Shire Council	Refer Murweh Shire Local Disaster Management Committee in liaison with Dist Manager CDRS to develop material. Distribute material to community	\$1K	NDMP funding 1:1 State & Commonwealth Govts.	6 months	2004/2005
Update & maintain database of ground and floor level of all building in Murweh Shire on the floodplain	34	Murweh Shire Council	Murweh Shire Council	Prepare procedures & instructions for staff, carry out field work, record data. Issue instructions to staff/persons approving building applications to ensure floor levels recorded on plans & transfer levels to database	\$5K + GPS equipment	NDMP funding 1:1:1 Murweh Shire Council, State & Commonwealth Govts.	Future NDRMS program	2006/2007 then each year then on going
Identify flood prone properties outside levees and record detail	35	Murweh Shire Council	Murweh Shire Council	Identify impact areas, record data	\$1K	Murweh Shire Council	12 months	2006/2007
Install ALERT upgrade	41	Murweh Shire Council	Murweh Shire Council	Discuss requirements with	ALERT upgrade	NDMP State & Funding	12 months	2007/2008
system @ 27 mile, Charleville & Raceview including repeater, base station, computer equipment & software to provide capability to monitor river flood levels in real time				BoM; purchase equipment & software NOTE: State & Commonwealth Govts share cost 50/50. Council maintains equipment	3@ \$7K Repeater \$6K Base Stn, computer & software \$10K Total \$37K	Commonwealth Govts 50/50		
CORPORATE PLAN								
Develop performance criteria to measure success of NDRMS options	11	Murweh Shire Council	Murweh Shire Council	Refer to Council senior staff of Corporate planning process	Within existing budget	Murweh Shire Council	6 months	2005/2006
Review Vision, Mission, Strategies & Goals to include 'safety & wellbeing of community' from impact of natural hazards	30	Murweh Shire Council	Murweh Shire Council	Modify vision, mission, goals & strategies at next corporate plan review	Within existing budget	Murweh Shire Council	6 months	2005/2006
LOCAL DISASTER MANAGEMENT (COUNTER DISASTER) PLAN								
Review & upgrade Local Disaster Management (Counter Disaster) Plan, terminology & abbreviations.	15	Murweh Shire Council	Murweh Shire Council	Following CDRS release of new CD format - Refer Murweh Shire Counter Disaster Committee for upgrade of CD plan	Within existing budget	Murweh Shire Council	6 months	2004/2005
Develop procedures for disaster management operations in Augathella & Morven when cut off from Charleville	16	Murweh Shire Council	Murweh Shire Council	Discuss at Local Disaster M Management Committee meeting & seek assistance of CDRS Mgr. to write procedures	Within existing budget	Murweh Shire Council	6 months	2005/2006
Include copy of O Vet Plan in Counter Disaster Plan	18	Murweh Shire Council	Murweh Shire Council	Murweh Shire Counter Disaster Committee	Within existing budget	Murweh Shire Council	1 month	2004/2005
Develop roster for long operations centre manning	22	Murweh Shire Council	Murweh Shire Council	Refer Murweh Shire Counter Disaster Committee	Within existing budget	Murweh Shire Council	6 months	2005/2006
Draw up duty statements for coordination centre staff	23	Murweh Shire Council	Murweh Shire Council	Murweh Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Murweh Shire Council	6 months	2005/2006
Determine equipment list for coordination centre and put	24	Murweh Shire Council	Murweh Shire Council	Murweh Shire Counter Disaster Committee in liaison with Dist	Within existing budget	Murweh Shire Council	6 months	2005/2006

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
aside items for use in locked container				Manager CDRS				
(a) Include detail of severe weather risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard severe weather in community directory or 'Midst The Mulga'	25	Murweh Shire Council	Murweh Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a)\$4K for 3000 copies less sponsorship (b) \$1K less sponsorship	NDMP funding 1:1:1 Murweh Shire State & Commonwealth Govts.	12 months	2005/2006
(a) Include material on bushfire risk in a 'Natural Hazards Community Action Guide' for all hazards. (b) Alternative: insert abridged material on natural hazard bushfire in community directory or in 'Midst The Mulga'.	25	Murweh Shire Council	Murweh Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) \$4K (3000 copies) less sponsorship (b) \$1K less sponsorship	NDMP funding 1:1:1 Murweh Shire State & Commonwealth Govts.	12 months	2005/2006
(a) Include detail of flood risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard flood in community directory or in 'Midst The Mulga'.	25	Murweh Shire Council	Murweh Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) See cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$1K less sponsorship	NDMP funding 1:1:1 Murweh Shire State & Commonwealth Govts.	12 months	2005/2006
Draw up operational layout plan of counter disaster centre operations	27	Murweh Shire Council	Murweh Shire Council	Murweh Shire Counter Local Disaster Management Committee in liaison with Dist Manager CDRS	Within existing budget	Murweh Shire Council	6 months	2005/2006
Fit out alternative Local Disaster Operations Centre at Raceview facility at showgrounds	28	Murweh Shire Council	Murweh Shire Council	Murweh Shire Counter Local Disaster Management Committee in liaison with Dist Manager CDRS	\$2K	Murweh Shire Council	6 months	2005/2006
TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
Establish training program for staff involved in Local Disaster Management Centre operations & control centre staffing	29	Murweh Shire Council	Murweh Shire Council	Refer Murweh Shire Local Disaster Management Committee in liaison with Dist Manager CDRS	Within existing budget	Murweh Shire Council	6 months	2004/2005
Review Local Disaster management (counter disaster) Plan arrangements & develop procedures addressing attendance at & cost recovery of brigades and SES, Council plant & staff to all incidents	31	Murweh Shire Council	Murweh Shire Council	Document arrangements	Within existing budget	Murweh Shire Council	6 month	2005/2006
Identify & assess structural adequacy of Govt./Community buildings as evacuation/shelter centre/s	36	Murweh Shire Council	Murweh Shire Council	Identify structures; Prepare funding submission; Engage competent professional to assess structural adequacy & prepare estimates to upgrade evacuation/shelter buildings not covered by Q Build survey	\$5K/structure	NDMP funding 1:1:1 Murweh Shire, Sytate & Commonwealth Govts.	12 months	2006/2007

OPERATIONAL PLAN

Provide funding to implement adopted NDRMS options	10	Murweh Shire Council	Murweh Shire Council	Refer to appropriate Senior Staff for budget planning	See individual items	Murweh Shire Council	ongoing	Each Year
Review Local Disaster Mitigation Plan (counter disaster plan) arrangements addressing attendance at & cost recovery of brigades, SES, Council staff & plant to all incidents	24	Murweh Shire Council	Murweh Shire Council	Document arrangements	Within existing budget	Murweh Shire Council & Neighbouring Shire Councils & agencies	6 month	2005/2006
Implement & maintain rural addressing	32	Murweh Shire Council	Murweh Shire Council	Prioritise roads; Erect new signs & property numbering as required	\$5k/ year	Murweh Shire Council	60 months	2005/2006
Expand Vulnerability inventory charts for infrastructure & human environment to include building details & sub	38	Murweh Shire Council	Murweh Shire Council	Council staff to identify essential buildings & infrastructure & expand chart detail	Within existing budget	Murweh Shire Council	9 months	2007/2008

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
elements of infrastructure								
Expand risk management culture to all areas of Council	39	Murweh Shire Council	Murweh Shire Council	Refer to Council senior executive management team	Within existing budget	Murweh Shire Council	12 months	2006/2007
Conduct risk assessment of water supply & sewerage systems in Murweh & for varying AEPs as part of 'Total Management Plan'	40	Murweh Shire Council	Murweh Shire Council	Prepare Brief for staff	Within existing budget	Murweh Shire Council	24 months	2007/2008

3.7.2 Summary of recommended mitigation strategies.

This table below is a summary of the disaster mitigation plan and identifies the top priority treatments listed as 1 and 2 in a complete list of treatment options. These are categorised by treatment, agency, estimated cost, funding source and time frame. The report was submitted in December 2004, which implies that the time frame of 36 months for completion of each treatment is December 2007.

Treatment	Agency	Estimated Cost	Funding source	Timeframe
Formulate development controls as part of IPA town plan for bushfire	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	36 months (Dec 2007)
Formulate development controls as part of IPA town plan for riverine flooding	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	36 months (Dec 2007)
Develop 'Natural Hazards Code' for bushfire as part of IPA town plan	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	36 months (Dec 2007)
Develop 'Natural' Hazards Code' in IPA town plan addressing flooding	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	36 months (Dec 2007)
Ground truth the Rural fires risk mapping	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	1 month (Jan 2005)
Enforce Council's Flood Policy on floor levels	Murweh Shire Council	Within Existing Budget	Murweh Shire Council	Ongoing

3.8 Evaluation of Murweh Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 4

Report is completely sidetracked from pages 116-267, 150 pages that add little to the study. They should have been tabulated as suggested by Zamecka & Buchanan.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 5
 CERA methodology used to assess vulnerability – not needed/superfluous (150 pages). Another vulnerability element appears, i.e. 'heritage' in the risk register section of report, without being explained.

Relevance to aims and objectives of the scheme – 5

The layout of the report is confusing and there is superfluous material. It is confusing that the author keeps changing the order of the list of hazards throughout the report. Most things could have been tabulated. Each hazard is listed with approximately 20-50 pages of written material. Earthquake was deemed as a low risk but the description of this as a hazard was over 50 pages. Altogether there was too much detail.

Between table 7.5 (Risk Evaluation) and 8.1 (Identification and Evaluation of Treatment Options) there is incongruence as most of 7.5 was rated as low or moderate level of risk

rating, whereas table 8.1 identifies everything as a High or Medium Treatment Priority. It is hard to see how either of these tables relate to the final 'Treatment Mitigation Table', which then only lists 6 priority treatments.

4. Redland Shire Council

The study comprises three parts – the Executive Summary (26 pages) all of which is included in ‘Part A – Identification and Assessment of Natural Hazards’ and ‘Part B – Risk Mitigation Plan’. Part A is 303 pages and Part B 138 pages. Part B is also entirely contained in Part A. Both are extremely detailed.

4.1 Aims and Objectives

The general aim of the Study is to increase community safety through identification, analysis, evaluation and treatment of risks from a preventative mitigation perspective within the area of the Redland Shire jurisdiction.

The study objectives were:

- Assess and describe the Redland community’s vulnerability to major events.
- Develop a comprehensive Natural Disaster Register and treatment options
- Develop a Natural Disaster Mitigation Plan.
- Develop a list of future study requirements to support the mitigation plan
- Review the Redland Shire Counter Disaster Plan.
- Coordinate the Natural Disaster Mitigation Plan with neighbouring local authorities and other government agencies within the Shire.
- Gauge community awareness of the risks posed within the Shire by natural disasters and the strategies for mitigating risks and responding to natural disasters.
- Establish a basis for inclusion of actions into Council’s Corporate and Operational Plans.
- To provide a reference document for future planning in Redland Shire and to assist in satisfying the impending obligations of the State Planning Policy for Natural Disaster Mitigation.

The study followed the Zamecka & Buchanan NDRM Guidelines and Manual. It also used as guidance, the Australian and New Zealand Standards for Risk Management 4360:1999, the Queensland Department of Emergency Services Guidelines and various other documents (see page 20).

The study establishes the context as physical/environmental, population and factors that affect the risk management process. It defines clients and stakeholders as Redland Shire Council, shire residents and visitors, Emergency Response Agencies, Counter Disaster Committee, Property owners, Tourism Industry, Primary producers, State and Federal Government agencies, Public and Private healthcare providers and Commercial and Industrial businesses.

4.2 The Risk Management Team

The report refers to a Study Advisory Group (SAG). From the report itself it was not possible to identify whether the members of the SAG were local, but it was made clear at the meeting at the Council that most were members/employees of the council. The study mentions that council formed the SAG to oversee the study.

Membership was as follows:

- Strategic Planning Advisor and Study Manager
- Deputy Mayor and Chair Counter Disaster Committee

- Manager Land Use Planning
- Manager Operations and Maintenance and Local Controller, SES
- Manager Infrastructure Development and Deputy Study Manager
- District Manager Disaster Operations (DES)
- Superintendent Queensland Police
- Department Emergency Services
- General Manager/Customer Services and EO, CDC

Advisors were as follows:

- Manager Risk and Liability Services
- Counter Disaster Committee
- Senior Advisor Community Development

Facilitators were as follows:

- Managing Director – QRMC Risk Management
- Senior Consultant – QRMC Risk Management

4.3 Meetings, attendance and Community involvement

The report refers to two SAG meetings, and the requirement for historical searches, interviews, and document review, individual and group meetings. There is no formal record of the meetings held. The First SAG workshop worked to identify hazards and areas of risk. The Second workshop was conducted to identify causation factors, consequences and current treatment strategies and the level of risk severity for each risk.

List of relevant dates:

- SAG final revision of draft report – 18th June 2003
- Report made available over a 4 week timeframe to allow Local Vounter Disaster Committee and lead agencies to propose changes.
- SAG to reconvene to review and comments or feedback.
- Council CEO, General Managers (ELG) and Mayor Workshop – 4th Aug 2003
- Update to ELG – 2nd Feb 2004
- Update to key Redland Shire Council parties involved in implementation of actions to consider budget implications – General Manager, Customer Services – 9th Feb 2004
- Consultation of draft Counter Disaster Committee and key internal officers (copy of draft also sent to DES for comment) – 1st April 2004
- The report is placed on the council web site and made available in hard copy form in the Council Customer Service Centres.

Community consultation occurred after the SAG reviewed and endorsed draft documents.

4.4 Hazards

The SAG gave consideration to other hazards such as tsunami, global warming and east coast lows but it was determined that the impacts of these events would be addressed in one or more of the hazard areas identified. The SAG decided to evaluate each hazard against areas prone to risk and these were divided into Mainland, Island, Urban and Rural.

The following areas of risk were identified through the process of consideration of hazard areas and impacts:

- Urban and Rural Cyclones Mainland (Category 1-5)
- Urban and Rural Flooding Mainland, Urban Dam Break
- Flooding Islands
- Urban and Rural, Mainland and Islands Earthquake/Tremor
- Urban Mainland Bushfire
- Rural Mainland Bushfire
- Island Bushfire
- Urban and Rural Mainland Severe Storm
- Island Storm Surge
- Landslide/slips – Rural – Isolated Events.

Throughout the study 'risk severity' can be found. This has been represented by an alpha-numeric character determined by two factors, the level of impact of the risk (consequence) and the likelihood that the event will arise. 'E' represents 'Extreme' level while 'H', 'M', 'L' represent assessed levels of 'High', 'Moderate', or 'Low'. The numerical value is applied to differentiate the levels from and extreme of '100' to '20'. The model emphasises 'consequence' over 'likelihood' in the ratio of 3:2, due to emotional and observed impact of consequences (See Report A pages 48 & 49 for more detail).

To summarise: each hazard is identified, grouped into geographical location, has a vulnerable element attached to it and is then given a risk severity rating.

For example (See page 8):

EXTREME

1. Island Bushfire: People E72

A list is provided of Extreme, High, Moderate and Low priorities.

4.5 Community Vulnerability Profile

The estimated residential population of Redland shire was 117,252 (2000) with an estimate of 124,683 for 2003. There is a rich diversity of landscapes, communities and industries in 539km² of mainland and islands in Moreton Bay. The highest urban concentrations are found in Alexandra Hills, Capalaba, Birkdale and Cleveland. The Bay islands accommodate only 5.5% of the Shire's population. There is high age vulnerability with 34% of the shire's population aged under 15 years and 65 years and over. The land use of the Shire is largely rural, with extensive areas of rich volcanic fertile farmlands, grazing country and coastal regions.

Residential buildings comprise 96% of all developed properties in Redland, ranging in age from new to 25/30 years post war. There is a known history of major natural events in the shire.

The report describes vulnerable elements of the Redland Shire as people, residential, commercial, engineering lifelines, and the natural environment.

- Urban and Rural Cyclones Mainland (Category 1-5)
 - People – Injury and inundation to people in Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the islands in category 3-5 cyclone. Also Woodland and Mount Cotton Roads; Pittwin Street and Brewer Street, Capalaba; Railway Parade, John Street and Agnes Street, Thorneside and Thomas Street, Murray Street and Cavell Street

Birkdale are subject to flooding at times of high rainfall, severe storms cyclones or tidal surge/high tides. A small number of residences exist below Q100 flood and tidal surge levels.

- Buildings – inundation and wind damage to buildings in the above-mentioned areas in category 5 cyclone. Some buildings are at risk in a 3-4 cyclone.
- Commercial – Businesses are subject to inundation and wind damage in a category 4-5 cyclone in those areas listed above.
- Engineering lifelines – including transport, electricity telephone, water supply and roads will be vulnerable to inundation and wind damage in category 3-5 cyclone.
- Natural Environment – Koala habitats at Redland Bay and other areas mentioned above are vulnerable to inundation and wind damage in a category 4-5 cyclone. The Marine Park may be impacted in a category 4-5 cyclone.
- Urban and Rural Flooding Mainland, Urban Dam Break
 - People – residents near Tingalpa Creek, Tarradarrpin Creek, Hillards Creek, Ross Creek, Eprapah Creek, Moogurrapum Creek, Weinam Creek, Serpentine Creek, California Creek and Native Dog Creek are vulnerable to inundation and danger to people in a category 3-5 cyclone. Also streets described in the above section under people are also subject to flooding.
 - Urban Dam Break – the total number of properties impacted by flood are 46,128. Out of this 1,014 properties have major impacts from flood.
 - Buildings – inundation in the areas identified above.
 - Commercial – inundation in areas identified above.
 - Engineering lifelines – inundation to transport, electricity, telephone, water supply and roads in areas identified above.
 - Natural Environment – Koala habitats at Redland Bay and other areas mentioned above are vulnerable to inundation and wind damage in a category 4-5 cyclone. Outflows from localised flooding may impact Moreton Bay Marine Park
- Flooding Islands
 - People – inundation and injury as a result of localised flooding.
 - Residential – buildings vulnerable.
 - Commercial – buildings vulnerable.
 - Engineering Lifelines – Some engineering lifelines vulnerable.
 - Natural Environment – Intermittent localised flooding – no significant concerns.
- Urban and Rural, Mainland and Islands Earthquake/Tremor
 - People – Shire residents subject to injury and those in coastal areas may be impacted by tidal surges or tsunami if an earthquake is centred offshore.
 - Residential – shire buildings damaged and those in coastal areas may be impacted by tidal surges.
 - Commercial – Shire businesses damaged and those in coastal areas may be impacted by tidal surges.
 - Engineering Lifelines – All lifelines are at risk including transport electricity, telephone, water supply, sewerage and roads.
 - Natural Environment – Limited degree of impact.
- Urban Mainland Bushfire
 - People – Injury to those specifically adjacent to Mt Cotton, Redland Bay, and Sheldon.
 - Residential – damage to buildings in areas listed above.

- Commercial – damage to businesses in areas listed above.
- Engineering Lifelines – damage to lifelines in areas listed above in particular transport (smoke), electricity, telephone and water supply.
- Natural Environment – Damage to Koala habitats and environmentally sensitive areas in the areas listed above.
- Rural Mainland Bushfire
 - As for urban bushfire above.
- Island Bushfire
 - People – at risk of injury.
 - Residential – damage to some buildings.
 - Commercial – damage to some businesses near natural vegetation and residential areas.
 - Engineering Lifelines – damage to lifelines located in or near bushfire prone areas, in particular transport (smoke), electricity, telephone and water supply.
 - Natural Environment – degradation to environmentally sensitive areas.
- Urban and Rural, Mainland Severe Storm (including East coast low and Severe Wind)
 - See description for Cyclones above.
- Island Storm Surge
 - See description for Cyclones above.
- Landslide/slips – Rural, Island and Urban Isolated events
 - People – injury to residents in some locations at Mt Cotton, the low sea cliffs around Wellington point, Cleveland, Ormiston and Redland Bay and specific areas on North Stradbroke Island.
 - Residential – damage to buildings in areas listed above.
 - Commercial – damage to a limited number of businesses in the areas listed above.
 - Engineering Lifelines – damage to lifelines in areas listed above but in particular transport, electricity, telephone, water supply and roads.
 - Natural environment – damage to environmentally sensitive in or near areas listed above.

4.5.1 List of Extreme and High Risks in Redland Shire

As this study was highly convoluted and complex it is necessary to create a short list of those hazards that were deemed as Extreme and High Risks to the community of Redland Shire Council. See Table 1 below.

Table 1. This table is a summary of the hazards, the area, and the vulnerable elements for each Extreme and High rated risks. * This variable has been added by the study please see section on Hazards for explanation

Hazard	Geographical Dimension	Vulnerable Element	Risk Rating	Risk severity*
Bushfire	Island	People	Extreme	E72
Bushfire	Island	Residential	Extreme	E72
Bushfire	Rural Mainland	People	High	H68
Bushfire	Rural Mainland	Residential	High	H68
Cyclones (Cat 1-5)	Urban & Rural Mainland	Residential	High	H64
Bushfire	Island	Commercial	High	H60
Cyclones (Cat 1-5)	Urban & Rural Mainland	People	High	H60
Cyclones (Cat 1-5)	Urban & Rural Mainland	Commercial	High	H60
Severe Storm	Urban & Rural Mainland	People	High	H60
Severe Storm	Urban & Rural Mainland	Residential	High	H60
Severe Storm	Urban & Rural Mainland	Commercial	High	H60
Cyclones (Cat 1-5)	Urban & Rural Mainland	Council Infrastructure	High	H56

4.6 Risk Evaluation

This report was over conscientious in categorising risks and hazards and although it was easy to follow it seemed somewhat unnecessary. A simple guideline was made very complicated. The Register of Prioritised Unacceptable risks has been scanned into this section as it was the clearest table in terms of risk evaluation..

Attachment 9.2: Register of prioritised unacceptable risks.

This table clearly prioritises those risks that are of highest priority and unacceptable to occur.

HAZARD	RISKS	RESIDUAL RISK RATING	RISK EVALUATION	ASSESSMENT	RISK PRIORITY
Urban and Rural Cyclones Mainland (Category 1 – 5)	Buildings at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a category 5 cyclone.	H64	Damage to buildings is unavoidable	Undesirable	2
Urban and Rural Cyclones Mainland (Category 1 – 5)	Residents at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and injury in a category 3-5 cyclone.	H60	Loss of life and serious injury is unacceptable	Unacceptable	1
Urban and Rural Cyclones Mainland (Category 1 – 5)	Some businesses at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a category 4-5 cyclone.	H60	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Urban and Rural Cyclones Mainland (Category 1 – 5)	Some engineering lifelines located in or near Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a category 3-5 cyclone. The lifelines most at risk include transport, electricity, telephone, water supply and roads.	H56	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2

HAZARD	RISKS	RESIDUAL RISK RATING	RISK EVALUATION	ASSESSMENT	RISK PRIORITY
Urban and Rural Cyclones Mainland (Category 1 – 5)	The koala habitats at Redland Bay and environmentally sensitive areas in or near Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a category 3-5 cyclone. The Moreton Bay Marine Park may be impacted in a category 4-5 cyclone.	M52	Long term deterioration of water and soil quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2
Urban and Rural Flooding Mainland, Urban Dam Break	Residents near Tingalpa Creek, Tarradarrapin Creek, Hilliards Creek, Ross Creek, Eprapah Creek, Moogurrupum Creek, Weinam Creek, Serpentine Creek, California Creek and Native Dog Creek are vulnerable to inundation and injury in a category 3-5 cyclone.	M52	Loss of life and serious injury is unacceptable	Unacceptable	1
Urban and Rural Flooding Mainland, Urban Dam Break	Buildings at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation.	M48	Damage to buildings is unavoidable	Undesirable	2
Urban and Rural Flooding Mainland, Urban Dam Break	Some businesses located in areas identified above are vulnerable to inundation and wind damage as a result of localised severe flooding.	M48	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Urban and Rural Flooding Mainland, Urban Dam Break	Some engineering lifelines located in areas identified above are vulnerable to inundation and wind damage as a result of localised severe flooding. The lifelines most at risk include transport, electricity, telephone, water supply and roads.	M48	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Urban and Rural Flooding Mainland, Urban Dam Break	The koala habitats at Redland Bay and environmentally sensitive areas in or near Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a category 3-5 cyclone. The Moreton Bay Marine Park may be impacted as a result of outflows from localised flooding.	M48	Long term deterioration of water and soil quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2
Urban and Rural, Mainland and Islands Earthquake/ Tremor	Shire buildings may be vulnerable to damage in an earthquake. Shire buildings in coastal areas may be impacted by tidal surges if an earthquake is centred off shore.	M44	Damage to buildings is unavoidable	Undesirable	2
Urban and Rural, Mainland and Islands Earthquake/ Tremor	Shire businesses may be vulnerable to damage in an earthquake. Shire businesses in coastal areas may be impacted by tidal surges if an earthquake is centred off shore.	M44	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Urban and Rural, Mainland and Islands Earthquake/ Tremor	Some engineering lifelines are vulnerable to damage in an earthquake. All lifelines are at risk, including transport, electricity, telephone, water supply, sewage and roads, depending on the magnitude and centre.	M44	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Urban Mainland Bushfire	Urban Residents generally and specifically adjacent to the rural areas at Mt Cotton, Redland Bay and Sheldon are vulnerable to injury as a result of bushfires.	M52	Loss of life and serious injury is unacceptable	Unacceptable	1
Urban Mainland Bushfire	Buildings adjacent to the rural areas at Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires.	M52	Damage to buildings is minimal	Undesirable	2
Urban Mainland Bushfire	Businesses at Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires.	M52	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Urban Mainland Bushfire	Some engineering lifelines located in or near Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires. The lifelines most at risk include transport (smoke), electricity, telephone and water supply.	M48	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Urban Mainland Bushfire	The koala habitats and environmentally sensitive areas in or near Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires.	M48	Long term deterioration of water and soil quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2

HAZARD	RISKS	RESIDUAL RISK RATING	RISK EVALUATION	ASSESSMENT	RISK PRIORITY
Rural Mainland Bushfire	Residents at Mt Cotton, Redland Bay and Sheldon located in or near rural/conservation areas are vulnerable to injury as a result of bushfires.	H68	Loss of life and serious injury is unacceptable	Unacceptable	1
Rural Mainland Bushfire	Buildings located in or near rural/conservation areas at Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires.	H68	Damage to buildings is minimal	Undesirable	2
Rural Mainland Bushfire	Businesses located in or near rural/conservation areas at Mt Cotton, Redland Bay and Sheldon are vulnerable to damage as a result of bushfires.	M52	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Island Bushfire	Island residents are at risk of injury from the effects of bushfires.	E72	Loss of life and serious injury is unacceptable	Unacceptable	1
Island Bushfire	Some buildings are at risk from damage from the effects of bushfire.	E72	Damage to buildings is minimal	Unacceptable	1
Island Bushfire	Some businesses located near natural vegetation and residential areas are at risk of damage from the effects of bushfires.	H60	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Island Bushfire	Some engineering lifelines located in or near bushfire prone areas are vulnerable to damage from the effects of bushfire. The lifelines most at risk include transport (smoke), electricity, telephone and water supply.	M48	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Island Bushfire	The environmentally sensitive areas on the Islands are vulnerable to degradation from the effects of bushfires.	M48	Long term deterioration of water and soil quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2
Urban and Rural Mainland Severe Storm (including East coast low and severe wind)	Residents at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and injury in a severe storm. It is recognised that some of these areas are amongst the fastest growing and in some cases have an aging population (e.g. Cleveland, Redland Bay).	H60	Loss of life and serious injury is unacceptable	Unacceptable	1
Urban and Rural Mainland Severe Storm (including East coast low and severe wind)	Some buildings at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a severe storm.	H60	Damage to buildings is unavoidable	Undesirable	2
Urban and Rural Mainland Severe Storm (including East coast low and severe wind)	Some businesses at Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a severe storm.	H60	Major economic loss and long term effects on business are unacceptable	Unacceptable	1
Urban and Rural Mainland Severe Storm (including East coast low and severe wind)	Some engineering lifelines located in or near Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a severe storm. The lifelines most at risk include transport, electricity, telephone, water supply and roads.	M52	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Urban and Rural Mainland Severe Storm (including East coast low and severe wind)	The koala habitats at Redland Bay and environmentally sensitive areas in or near Raby Bay, Aquatic Paradise, Thorneside, Redland Bay, Cleveland Point and fringe sections of the Islands are vulnerable to inundation and wind damage in a severe storm. The Moreton Bay Marine Park may be impacted in a severe storm.	M52	Long term deterioration of water and soil quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2

HAZARD	RISKS	RESIDUAL RISK RATING	RISK EVALUATION	ASSESSMENT	RISK PRIORITY
Island Storm Surge	Residents at fringe sections of the Islands open to the seas are vulnerable to inundation and injury in a storm surge induced by a category 3-5 cyclone.	H60	Loss of life and serious injury is unacceptable	Unacceptable	1
Island Storm Surge	Buildings at fringe sections of the Islands open to the seas are vulnerable to inundation in a storm surge induced by a category 5 cyclone. Some buildings are at risk in a storm surge induced by a category 3-4 cyclone.	M48	Damage to buildings is unavoidable	Undesirable	2
Island Storm Surge	Some businesses on the Islands are vulnerable to inundation in a storm surge induced by a category 3-5 cyclone.	M48	Major economic loss and long term effects on business are unacceptable	Undesirable	2
Island Storm Surge	Some engineering lifelines located in or near fringe sections of the Islands open to the seas are vulnerable to inundation in a storm surge induced by a category 3-5 cyclone. The lifelines most at risk include transport, electricity, telephone, water supply and roads.	M48	Damage to engineering lifelines for more than 24 hours is unacceptable	Undesirable	2
Island Storm Surge	The Moreton Bay Marine Park may be impacted in a storm surge induced by a category 4-5 cyclone.	M48	Long term deterioration of water quality is unacceptable Significant loss of ecological habitat is unacceptable Loss of threatened or endangered species is unacceptable	Undesirable	2
Landslide/Slips – Rural, Island and Urban – Isolated Events	Residents at some locations at Mt Cotton, the low sea cliffs around Wellington point, Cleveland, Ormiston and Redland Bay and specific areas on North Stradbroke Island are vulnerable to injury due to rare occurrences of land slippage.	M48	Loss of life and serious injury is unacceptable	Undesirable	2
Landslide/Slips – Rural, Island and Urban – Isolated Events	Buildings at some locations at Mt Cotton, the low sea cliffs around Wellington point, Cleveland, Ormiston and Redland Bay and specific areas on North Stradbroke Island are vulnerable to damage due to rare occurrences of land slippage.	L40-M48	Damage to buildings is unavoidable	Undesirable	2

4.7 Risk Treatment

At this point the study deviates from the recommended guidelines. In the introduction of the report, the SAG developed a list of 14 mitigation strategies. In the evaluation of treatment options table these numbers are used to describe what treatment option is used for each vulnerable element or 'risk' as stated by the report. This means the reader has to keep flipping back to the original list in the introduction to read what treatment options have been selected. This becomes quite annoying. In addition, the report repeats all of this, in another format, which is a little more accessible although flipping back to the list of mitigation strategies is still needed. This table has been scanned below.

4.7.1 Attachment 13: Treatment Strategy Development (Form A14) This table describes the endorsed treatment, the hazard it treats, the responsible agency for this, the consequential action, the funding source, timeframe and estimated cost. The report states that this plan is in operation from 2004-2009 hence each hazard has been listed with what should be happening in that particular year.

ENDORSED TREATMENT	HAZARD	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTIONS	FUNDING SOURCE	YEAR	TIMEFRAME	ESTIMATED COST (\$)
<p>(1) Develop and implement a revised framework for the Local Counter Disaster Plan that caters for its integration with Council's strategic/ corporate planning directions as well as related initiatives such as Strategic and Operational risk management, Business Continuity Planning, together with the inclusion of key operational requirements (e.g. key contacts/decision makers details – during and out of hours) and detailed, separate, risk area sub-plans (e.g. covering the requirements for evacuation (see also 3), communication, training and education coordination, transport, catering/utility, medical assistance and welfare and Environmental Health Sub-plan). It is expected that scenario exercise planning and review occurs annually (see also 2, 3, 6, 10, 13 and 15).</p> <p><i>(refer Part A Report page 184)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	<ul style="list-style-type: none"> • Appointment of Coordination Officer • Development of plan 	\$55,000
					2005/06	Implementation – actual timing (year) of action may differ – subject to Council priorities	\$55,000
					2006/07	Implementation – actual timing (year) of action may differ – subject to Council priorities	\$55,000
					2007/08	Implementation – actual timing (year) of action may differ – subject to Council priorities	\$55,000
					2008/09	Implementation – actual timing (year) of action may differ – subject to Council priorities	\$55,000
<p>(2) Develop a comprehensive Shire Evacuation, Community and Economic Recovery Plan (short, medium and long term impacts), that is consistent with the LCD Planning framework (see also 1 and 3).</p> <p><i>(refer Part A Report page 188)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available. Increased capacity for economic recovery	Council funds, subject to other priorities and funds availability	2004/05	Linked to Action 1 Paper developed by December 2004 Implementation later 2004/05	Minimal – Operational funds
					2005/06	Evaluation October 2005	Minimal – Operational funds
					2006/07	Evaluation	Minimal – Operational funds
					2007/08	Evaluation	Minimal – Operational funds
					2008/09	Evaluation	Minimal – Operational funds
<p>(3) Develop a comprehensive and coordinated public and staff Education Program (including tourists): in place strategies, warning systems, what to do (preparedness, during and post-event), where to go, who to call, when to evacuate, role of emergency services (SES, Police, Fire and Rescue), for all types of events (including beach safety and signage and the pre-cyclone season (dangerous materials) clean-up promotion) (see also 1 & 2).</p> <p><i>(refer Part A Report page 191)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Report to Council by end December 2004 Program delivery by end September 2005	\$5,000
					2005/06	Implementation September 2005	\$5,000
					2006/07	Implementation and Evaluation	\$5,000
					2007/08	Implementation and Evaluation	\$5,000
					2008/09	Implementation and Evaluation	\$5,000

ENDORSED TREATMENT	HAZARD	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTIONS	FUNDING SOURCE	YEAR	TIMEFRAME	ESTIMATED COST (\$)
<p>(4) Develop and implement Bushfire Management Plans for the mainland, Southern Moreton Bay Islands and North Stradbroke Island to provide for the coordinated mitigation and suppression of bushfires for:</p> <ul style="list-style-type: none"> the protection of life and property; and the protection, maintenance and wherever possible the enhancement of the natural, cultural and heritage values of the area through the management of appropriate fire regimes. <p>The plans should:</p> <ul style="list-style-type: none"> reflect the identified level of bushfire risk within the Shire; identify strategies which should be implemented to manage the identified bushfire risks; and identify processes for implementing bushfire risk abatement and Operational response strategies. <p><i>(refer Part A Report page 194)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community safety, education and support available	Council funds, subject to other priorities and funds availability	2004/05	Planning completed for Mainland and SMBI by June 2005	Operational budget – minimal additional cost
					2005/06	Planning completed for NSI by June 2006. Implementation – Mainland and SMBI – TBA	TBA
					2006/07	Implementation – NSI – TBA. Evaluation and review	TBA
					2007/08	Evaluation and review	TBA
					2008/09	Evaluation and review	TBA
<p>(5) Undertake, review and implement recommendations from Flood, Landslide/slip and Storm Surge studies, subject to appropriateness, funding and resource considerations (on a regional basis by the State Government or SEQROC as appropriate).</p> <p><i>(refer Part A Report page 197)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	Improved ability of Council to set priorities. A safer community. A safer environment for Council staff and emergency services during an emergency.	Council funds, subject to other priorities and funds availability	2004/05	Development of proposal by June 2005 Waterway Management Plans	Operational budget – minimal additional cost \$75,000
					2005/06	Subject to funding – review and recommendations from report to council by June 2006	Operational budget – minimal additional cost
					2006/07	Implementation of agreed actions – subject to funding	TBA
					2007/08	Implementation, monitoring and evaluation of program	TBA
					2008/09	Implementation, monitoring and evaluation of program	TBA
<p>(6) Review and implement change to road closure signage and signage management to better inform the local community and travelling public (incl. Coordination through Police).</p> <p><i>(refer Part A Report page 200)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	Improved ability of Council to set priorities. A safer community. A safer environment for Council staff and emergency services during an emergency.	Council funds, subject to other priorities and funds availability	2004/05	Review completed by December 2004	Operational budget – minimal additional cost
					2005/06	Consultation completed by end June 2005	Operational budget – minimal additional cost
					2006/07	Implementation 2005/06	TBA
					2007/08	Implementation, evaluation and review	TBA
					2008/09	Implementation, evaluation and review	TBA

ENDORSED TREATMENT	HAZARD	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTIONS	FUNDING SOURCE	YEAR	TIMEFRAME	ESTIMATED COST (\$)
<p>(7) Facilitate emergency management initiatives that are beyond the capacity of RSC to implement (eg. Cooperation between adjoining Councils, DMR, Emergency Services, BoM, Telstra and RACQ), through the sub-regional Council Coordination groups (see also 1).</p> <p><i>(refer Part A Report page 203)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	Improved ability of Council to set priorities. A safer community. A safer environment for Council staff and emergency services during an emergency.	Council funds, subject to other priorities and funds availability	2004/05	Consultation and development of proposal by June 2005	Operational budget – minimal additional cost
					2005/06	Implement and evaluate findings as they relate to RSC affairs	Operational budget – minimal additional cost
					2006/07	Implement and evaluate findings as they relate to RSC affairs	TBA
					2007/08	Implement and evaluate findings as they relate to RSC affairs	TBA
					2008/09	Implement and evaluate findings as they relate to RSC affairs	TBA
<p>(8) Develop a risk assessment based (Asset Management Plan), annual operational plan for road, bridge, culvert and drain maintenance/ replacement that is consistent with the longer term requirements of the Shire, including those assets that are the responsibility of DMR.</p> <p><i>(refer Part A Report page 206)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	Improved ability of Council to set priorities. A safer community. A safer environment for Council staff and emergency services during an emergency.	Council funds, subject to other priorities and funds availability	2004/05	Develop plan by December 2004 Implementation subject to Council and DMR priorities and available funds	Operational budget – minimal additional cost for planning phase
					2005/06	Implement priorities in accordance with Council and DMR approvals and funding	TBA
					2006/07	Implement priorities in accordance with Council and DMR approvals and funding	TBA
					2007/08	Implement priorities in accordance with Council and DMR approvals and funding	TBA
					2008/09	Implement priorities in accordance with Council approvals and funding	TBA
<p>(9) Establish a natural disaster history register of critical events (digital photographs, details of event, details of people, built and natural environment affected, responsive strategies) and use this data to inform future revisions of the Natural Disaster Risk Management Mitigation Plan (see also 1).</p> <p><i>(refer Part A Report page 209)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Cyclone Mainland (Category 1 – 5) • Flood (Mainland) and Urban Dam Break (Mainland) • Flood (Islands) • Earthquake/tremor (Shire) • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) • Severe Storm (Shire) • Storm Surge (Island) • Landslide/slip (Rural) 	Redland Shire Council	Improved ability of Council to set priorities. A safer community. A safer environment for Council staff and emergency services during an emergency.	Council funds, subject to other priorities and funds availability	2004/05	Development of system proposal by December 2004	Council operational funds
					2005/06	Evaluation of proposal and implementation subject to funding	\$50,000
					2006/07	Ongoing maintenance and evaluation of program	TBA
					2007/08	Ongoing maintenance and evaluation of program	TBA
					2008/09	Ongoing maintenance and evaluation of program	TBA

ENDORSED TREATMENT	HAZARD	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTIONS	FUNDING SOURCE	YEAR	TIMEFRAME	ESTIMATED COST (\$)
<p>(10) Develop and implement vegetation enhancement and maintenance programs to ensure that:</p> <ul style="list-style-type: none"> the hydrological capacity of stormwater infrastructure and flood mitigation measures are maintained; and bushfire hazard is appropriately managed (see also 4). <p><i>(refer Part A Report page 212)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Develop plan by December 2004	Operational budget – minimal additional cost for planning phase
					2005/06	Annual review and implementation of agreed actions	TBA
					2006/07	Annual review and implementation of agreed actions	TBA
					2007/08	Annual review and implementation of agreed actions	TBA
					2008/09	Annual review and implementation of agreed actions	TBA
<p>(11) Identify commercial and utility support agencies that may assist Council better manage a disaster through documenting the extent of equipment and personnel that may be able to be provided in emergency situations such as bushfires and flooding events etc (water carriers, transport – busses, dozers and graders) in the urban, rural and island parts of the Shire (see also 1).</p> <p><i>(refer Part A Report page 215)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Linked to Action plan 1 Appointment of Officer Development of plan	Minimal cost – see Action Plan 1
					2005/06	Implementation and evaluation	Subject to requirements of a natural disaster
					2006/07	Implementation and evaluation	Subject to requirements of a natural disaster
					2007/08	Implementation and evaluation	Subject to requirements of a natural disaster
					2008/09	Implementation and evaluation	Subject to requirements of a natural disaster
<p>(12) Ensure Redland Water and Waste develops and maintains a contingency plan for dam break scenarios and a risk based, responsive action plan within the context of the Local Counter Disaster Plan (see also 1).</p> <p><i>(refer Part A Report page 218)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> Cyclone Mainland (Category 1 – 5) Flood (Mainland) and Urban Dam Break (Mainland) Flood (Islands) Earthquake/tremor (Shire) Bushfire (Urban and Mainland) Bushfire (Rural Mainland) Bushfire (Island) Severe Storm (Shire) Storm Surge (Island) Landslide/slip (Rural) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Planning and review to be completed by June 2005	Minimal cost
					2005/06	Implementation, evaluation and review	TBA
					2006/07	Implementation, evaluation and review	TBA
					2007/08	Implementation, evaluation and review	TBA
					2008/09	Implementation, evaluation and review	TBA

ENDORSED TREATMENT	HAZARD	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTIONS	FUNDING SOURCE	YEAR	TIMEFRAME	ESTIMATED COST (\$)
<p>(13) Ensure through an annual exercise that key/lead agencies that contribute to the Shire disaster mitigation process, review their Disaster mitigation Plans to identify and address gaps to ensure integration and consistency through a coordinated response (see also 1).</p> <p><i>(refer Part A Report page 221)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Bushfire (Urban and Mainland) • Bushfire (Rural Mainland) • Bushfire (Island) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Review impacts and develop plan by March 2005	Operational funds
					2005/06	Implementation, evaluation and review	TBA
					2006/07	Implementation, evaluation and review	TBA
					2007/08	Implementation, evaluation and review	TBA
					2008/09	Implementation, evaluation and review	TBA
<p>(14) Review identified hazards (in the context of the <i>State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide</i>) and ensure they are incorporated in overlay maps and associated development control provisions in the IPA Planning Scheme to ensure that a development application is appropriately located, designed and structurally built to avoid effects of natural hazards.</p> <p><i>(refer Part A Report page 224)</i></p>	<p>URBAN, RURAL and ISLAND</p> <ul style="list-style-type: none"> • Flood (Islands) • Severe Storm (Shire) • Storm Surge (Island) 	Redland Shire Council	A better informed Council, Counter Disaster Committee, key agencies and community. Increased levels of community education and support available	Council funds, subject to other priorities and funds availability	2004/05	Review impacts and develop plan by December 2004	Operational funds
					2005/06	Implementation, by June 2005 Evaluation and review thereafter	TBA
					2006/07	Implementation, evaluation and review	TBA
					2007/08	Implementation, evaluation and review	TBA
					2008/09	Implementation, evaluation and review	TBA

4.8 Evaluation of Redlands Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 6

There is too much repetition between reports. A shorter report would have been just as useful, as the analysis is over-complicated. Examining hazards against a framework of geographical locations results in more to read. Comparison of risk treatments to a list that is supplied earlier in a manual is annoying.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 6

Overall the study stuck to the main guidelines of the NDRM manual, but by varying the risk analysis methodology to distinguish areas of risk and hazard impacts, and then prioritising the risks, the report is a mass of paper, tables, and numbers.

Relevance to aims and objectives of the scheme – 7 – Too complicated

5. Sarina and Broadsound Shire Councils

This a joint study for Sarina and Broadsound Shire councils. The study for both councils comprises two parts, which are distinguished by size and title. The first part is the full report titled 'Natural Hazards, Bushfire – Dam Break – Earthquake – Flooding – Storm Tide – Tsunami – Severe Wind – Thunderstorms and the Risks they Pose'. The second part is the executive summary titled 'Disaster Mitigation Plan', all of which is contained within the first part of they study.

5.1 Aims and Objectives

The reports represent a broad assessment of the hazards and risks they pose to the Sarina and Broadsound Shire Councils. It identifies, the risks associated with each natural hazard and proposes feasible mitigation strategies to minimise economic and social impacts on the Shires of Sarina and Broadsound and their communities. The stated focus is long-term preparedness and planning to minimise the impact of natural hazards and prevention of loss of life. The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. The Sarina and Broadsound Shire Councils hired a consultant, KTG Engineering, led by Ken Durham supported by J M W Ryan who undertook the earthquake and tsunami risk assessment.

Primary objectives of the study were to:

- Identify the natural disasters and community vulnerability
- Determine and analyse the risk
- Develop a comprehensive natural disaster risk register
- Determine appropriate treatment options
- Review the Shires' current Local Government Counter Disaster Plans (LGCDP's)
- Recommend any actions or changes required to the Shires' current Local Government Counter Disaster Plans LGCDP's.
- Review the Councils' corporate governance systems and make appropriate recommendations

5.2 The Risk Management Team

The report refers to a study advisory group (SAG). Membership was as follows:

- | | |
|------------------------------------|--|
| ▪ Mayor | Sarina Shire Council |
| ▪ Manager Corporate Services | Sarina Shire Council |
| ▪ Executive Officer | Sarina Shire Council |
| ▪ Deputy Chief Executive Officer | Broadsound Shire Council |
| ▪ Manager Planning and Development | Sarina Shire Council |
| ▪ Manager Works and Services | Sarina Shire Council |
| ▪ Manager Works and Services | Broadsound Shire |
| ▪ A/Dist. Manager | Counter Disaster and Rescue Services, Mackay |
| ▪ Study Consultant | KTG Engineering |

The majority of the representatives for this joint study were from the Sarina Shire council. There was one representative from the counter disaster and rescue services. Other local

government, community agencies, emergency services groups, business owners, and residents were identified as clients and stakeholders. None of these were represented on the SAG.

5.3 Meetings, attendance and Community involvement

There is no reference to numbers of meetings or attendance at SAG meetings. However, the community was consulted through public meetings, selected focus groups, walk and chat sessions and Council's newsletter. Circular letters were sent to residents in the major centres of population by the two Shire Councils seeking input into the study by attendance at public meetings, providing written submissions, email, phone and face-to-face discussions with the study consultant Ken Durham.

5.4 Hazards

The study identified six hazards: (Note that there is a difference between this and the list on the title page):

- Bushfire
- Earthquake including Landslide
- Flooding including Dam Break Flooding
- Cyclone
- Storm Surge
- Tsunami

Each hazard is extensively researched and written up in much detail and length from 20-50 pages. However it is very confusing because the report keeps listing different hazards and in different orders e.g Title page; Page 1 Executive Summary; Page 57 Risks Chapter; Page 364 Risk Register etc. There is an additional threat in the risk analysis section that was added without mention in any lists anywhere 'East Coast Lows'. Overall the study is confusing.

5.5 Community Vulnerability Profile

The CERA methodology for vulnerability assessment is used, thereby creating a vulnerability inventory (built and human environments), a vulnerability analysis (as vulnerability charts), an interdependence matrix, and a recovery service timetable. This approach is both confusing, is less effective and does not follow the Zamecka & Buchanan NDRM guidelines. The report uses the terminology of 'vulnerable elements'—people, buildings, environment, business, lifelines, and critical facilities.

Sarina Shire Council covers an area of 1,444 sq kms and houses approximately 9,617 people. The Shire has seven coastal communities along its coastal frontage – Armstrong Beach (501), Campwin Beach (359), Grasstree Beach (416), Half Tide & Hay Point (205), Louisa Creek (334), Salonika Beach (293) and Sarina Beach (411). Other population centres are Koumala (288), Sarina (3888) and the rural areas (2920). Note that figures in brackets are Council estimates of population. Approximately sixty five percent (65%) of the Shire is considered by the Rural Fire Service to be exposed to a medium risk from bushfire based on satellite photography relating to topography and aspect. Council owns and operates Middle Creek Dam as a water supply source for Sarina.

The topography of the area consists of rich coastal flood plains, heath and Walum lands supporting the growing of sugar cane, giving way to steep hilly country of the Connors Range and undulating grazing land where the main industry is beef and dairy cattle. The

major streams in the Shire are Alligator Creek, Louisa Creek, Middle Creek and Plane Creek all of which discharge into Sarina inlet. Elevations along the Connors Range are approximately 800 m (AHD), with the coastal plains being approximately 4 to 100 metres AHD.

- **Flooding**
 - People – some rural properties may be flooded but it is unlikely homesteads will be inundated although some may be isolated. Travellers on Bruce Highway may also be isolated.
 - Buildings – unlikely that buildings will be flooded, although in the past, flooding at Plane Creek has damaged the CSR Distillery located on the creek bank.
 - Environment – flooded septic tanks may pose an environmental problem.
 - Critical facilities – Water intake facility for St. Lawrence supply is subject to flooding. Overhead or buried communication cables may be subject to damage. There may be a necessity to cut power to protect the overall system
 - Infrastructure – Bridges culverts, causeways, and roads prone to damage. Rising water tables on the coastal floodplain causes road pavement saturation leading to the failure of the pavement under traffic.
- **Severe Weather**
 - People – Dysart and Middlemount have experienced severe winds unroofing buildings and uprooting trees.
 - Buildings – Structures built prior to the wind code are liable to wind damage.
 - Infrastructure – power and communications are liable to damage from flying debris. Fallen trees may cause temporary road closure.
- **Cyclone**
 - People – All people along the coastal plain are at risk from cyclone impact.
 - Buildings – 2,210 structures may be subject to cyclone damage having probably been built prior to wind code requirements.
 - Economy – Crop and infrastructure subject to damage and income loss.
 - Infrastructure – Power and communications are liable to damage from flying debris. Fallen trees may cause temporary road closure.
 - Lifelines – Same as infrastructure
- **Storm Surge and Tsunami**
 - People – the community at Louisa Beach, Half/Tide Salonika Beach, Grasstree Beach, Campwin Beach, Sarina Beach, Armstrong beach and Freshwater Point are vulnerable to storm tide.
 - Buildings – Homes caravans and cabins may be damaged or destroyed.
 - Environment – salt scalding may be an issue.
 - Lifelines – Road access is flooded at two causeways. It is vital that vulnerable communities are evacuated before these sections of road are flooded.
- **Bushfire**
 - People – rural fire fighters are at risk. People in rural hamlets who like to ‘commune with nature’ are at risk due to life style.
 - Buildings – Fire damage possible.
 - Environment – Vegetation will recover, fire is part of the ecological process.
 - Business – Rural activities, crops, cattle and fencing vulnerable to fire.
 - Lifelines – Temporary closure to roads due to fallen trees, branches and smoke. Powerline poles may be burnt.
- **Dam break** – The only significant and high hazard dam in the Shire is the Middle Creek dam located on Middle Creek in the Shinfield area. No dam break analysis

has been undertaken for this dam. Therefore until an analysis has been undertaken the population and properties etc at risk cannot be determined.

- People – no residential communities are at risk but some rural properties may be.
- Buildings – Rural infrastructure may be at risk.
- Environment – Some damage to the environment may occur such as creek bank scour and loss of riparian vegetation.
- Business – Loss of impounded water may have a temporary impact on the water supply to Sarina.
- Infrastructure - Low level creek crossings may be damaged.
- Lifelines - Loss of the impounded water may impact on the water supply to Sarina although alternative bore supplies are available.

Broadsound Shire Council covers an area of 18,546 sq kms and contains approximately 6,566 people. The shire consists of a number of communities – Carmila (77 pop), Clairview (150 pop), Dysart (3,445 pop.), Greenhill (100 pop), Middlemount (2,092 pop.), St Lawrence and Rural properties. Outside Dysart and Middlemount there is a lack of medical facilities in the Shire, which can pose a problem in times of disasters. Approximately thirty percent (30%) of the Shire is considered by the Rural Fire Service, Department of Emergency Services to be exposed to a medium risk from bushfire based on satellite photography relating to topography and aspect. Mining companies in the Dysart and Middlemount area are responsible for the operation of a number of dams classified by the Department of Natural Resources and Mines as being high and significant hazard dams.

The topography of the area consists of coastal heath and Walum lands adjacent to the Coral Sea, giving way to steep hilly country of the Connors Range and undulating grazing and timbered country west of the Connors Range. Rivers run through the centre of the shire. For the most part, elevations across the undulating western plains are approximately 400 m (AHD), with the foreshore areas along the Coral Sea being approximately 4 to 40 metres AHD. The Connors Range varies in height from approximately 400 metres to 800 metres AHD.

There is a lot of repetition in this section.

5.6 Risk Evaluation

The report provides a description of each hazard with each vulnerable element listed in a risk register format. Each hazard is then listed in the risk evaluation table and assessed for likelihood, consequence and the risk rating as per Zamecka & Buchanan. Form A10 below summarises the ratings under each hazard category, the extreme and high ratings have been identified with a star.

Sarina Shire Council Risk register – risk evaluation. (*) identifies Extreme and High ratings

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Bush and Grass Fires	People being burnt or injured. Rural buildings, rural infrastructure damaged and stock burnt Environment (trees, flora & fauna) being destroyed Business unlikely to be at risk from fire Power and communication lines, wooden bridges and roads damaged or affected by smoke	Unlikely Unlikely Unlikely Unlikely Unlikely	Insignificant Insignificant Insignificant Insignificant	Low Low Low Low Low
Flooding Using the 1.0% AEP Scenario	A small number of properties may be affected. No critical facilities are affected. People may be drowned at flooded causeways or injured wading in flood waters Rural buildings, rural infrastructure damaged & stock drowned Flooding may produce pollution and loss of soil Most business areas are not at risk Some roads may be cut and rail services may be affected No critical facilities at risk	Unlikely Unlikely Possible Possible Unlikely	Moderate Moderate Minor Minor Insignificant	Moderate Moderate Moderate Moderate Moderate
Earthquakes Based on damage scenario	People may be injured or killed due to age of structures and some types of construction Construction Environment at risk from secondary effects egg fire, pollution Business is at risk due to secondary affects – loss of power and communications Critical facilities – power, communication, road, rail hospitals, emergency services at risk due to structural damage	Unlikely Unlikely Unlikely Unlikely	Major Major Major Major	High High High High ★ ★ ★ ★
Tropical cyclones Based on the scenario of a severe Tropical cyclone	People may be injured or killed due to flying debris Buildings not designed to wind code, both residential, commercial & industrial may suffer structural damage Environment- flora & fauna may be damaged or lost Business at risk due to secondary affects – loss of power, communications etc Power and communication lines may be damaged – other services affected Critical facilities including schools, emergency service facilities etc may be damaged	Possible Possible Possible Possible Possible Possible	Moderate Moderate Minor Minor Minor Minor	High High Moderate Moderate Moderate Moderate
Severe Storms	People would may injured or killed Buildings, both residential, commercial and industrial suffer structural damage Environment – flora damaged Business is disrupted due to secondary effects loss of power communications Power and communication lines are at risk from flying debris– other services affected Critical facilities including schools, police stations etc damaged	Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely	Minor Minor Insignificant Minor Minor Minor	Low Low Low Low Low Low
Landslides	People may be injured Residential buildings may be damaged Environment is at risk Business would not be affected Local Power and communication lines and other services may be damaged. Roads in steep country, cuttings and on high fills may be damaged Critical facilities may be damaged	Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely	Minor Minor Minor Minor Insignificant Insignificant	Low Low Low Low Low Low

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Storm Surge	People may be injured or killed Structures destroyed or damaged Environment may be damaged Businesses may close Local power, communications, roads and other exposed lifelines may be damaged or destroyed. Critical facilities may be damaged or destroyed.	Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely	Major Major Major Major Major Major	High High High High High High ★ ★ ★ ★ ★



Tsunami				
Dam Break	People may be injured or killed Structures destroyed or damaged Environment may be damaged Businesses may close Local power, communications, roads and other exposed lifelines may be damaged or destroyed. Critical facilities may be damaged or destroyed.	Unlikely Unlikely Unlikely Unlikely Unlikely Unlikely	Moderate Moderate Moderate Insignificant Moderate Moderate	Moderate Moderate Moderate Low Moderate Moderate

Broadsound Shire Council Risk register – risk evaluation. (*) identifies Extreme and High ratings

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Bush and Grass Fires	People being burnt or injured.	Possible	Minor	Moderate
	Rural buildings, rural infrastructure damaged and stock burnt	Possible	Minor	Moderate
	Environment (trees, flora & fauna) being destroyed	Possible	Minor	Moderate
	Business unlikely to be at risk from fire			
	Power and communication lines, wooden bridges and roads damaged or affected by smoke	Possible	Minor	Moderate
Flooding Using the 1.0% AEP Scenario	A small number of rural properties may be affected. No critical facilities are affected.			
	People may be drowned at flooded causeways or injured wading in flood waters	Possible	Moderate	High ★
	Rural buildings, rural infrastructure damaged & stock drowned	Possible	Minor	Moderate
	Flooding may produce pollution and loss of soil	Possible	Minor	Moderate
	Most business areas are not at risk			
	Some roads and rail services may be affected by flooding	Possible	Minor	Moderate
	No critical facilities at risk	Unlikely	Insignificant	Low
Earthquakes Based on residential damage scenario	People may be injured or killed due to age of structures and some types of construction	Unlikely	Major	High ★
	Buildings destroyed or damaged due to age and type of construction	Unlikely	Major	High ★
	Environment at risk from secondary effects eg fire, pollution	Unlikely	Major	High ★
	Business is at risk due to secondary affects – loss of power and communications	Unlikely	Major	High ★
	Critical facilities – power, communication, road, rail hospitals, emergency services at risk due to structural damage	Unlikely	Major	High ★
Tropical cyclones Based on the scenario of a severe Tropical cyclone	People may be injured or killed due flying debris	Possible	Moderate	High ★
	Buildings not designed to wind code, both residential, commercial & industrial may suffer structural damage	Possible	Moderate	High ★
	Environment- flora & fauna may be damaged or lost	Possible	Minor	Moderate
	Business at risk due to secondary affects – loss of power, communications etc	Possible	Minor	Moderate
	Power and communication lines may be damaged – other services affected	Possible	Minor	Moderate
Critical facilities including schools, emergency service facilities etc may be damaged	Possible	Minor	Moderate	

HAZARD	RISK	LIKELIHOOD RATING	CONSEQUENCE	RISK RATING
Severe Storms	People would may injured or killed	Possible	Minor	Moderate
	Buildings, both residential, commercial and industrial suffer structural damage	Unlikely	Minor	Moderate
	Environment – flora damaged	Possible	Insignificant	Low
	Business is disrupted due to secondary effects loss of power communications	Possible	Minor	Moderate
	Power and communication lines are at risk from flying debris– other services affected	Possible	Minor	Moderate
	Critical facilities including schools, police stations etc damaged	Unlikely	Minor	Moderate
Landslides	There is very little available data to undertake the analysis. Landslide localities are remote and very localized in the shire where the population density is very low or non existent.			
	People may be injured	Unlikely	Minor	Low
	Residential buildings may be damaged	Unlikely	Minor	Low
	Environment is at risk	Unlikely	Insignificant	Low
	Business would not be affected			
	Local Power and communication lines and other services may be damaged.	Unlikely	Minor	Low
	Critical facilities including schools, police stations etc may be damaged	Unlikely	Minor	Low
Storm Surge and Tsunami	People in sea side communities who do not evacuate would be at risk of drowning	Possible	Major	High ★
	Sea side residential buildings are at risk from wave impact	Possible	Major	High ★
	Environment at risk from salt scalding	Possible	Major	High ★
	Sea side businesses at risk	Possible	Major	High ★
	Local power, communications and roads at risk	Possible	Major	High ★
	Critical facilities – roads damaged.	Possible	Major	High ★

5.7 Risk Treatment

The risk treatment plans for both Sarina and Broadsound shires (Form A11) and overall disaster mitigation plans (Form A14) have been scanned into this section as they are quite different to the risk evaluation form A10 in the above section. The risk evaluation in Form A10 determines most hazards and risks as low or moderate with insignificant consequences, yet Form A11 identifies most risks as a high treatment priority and an essential treatment evaluation. This is not congruent.

Form A11 lists each hazard and identifies the risk, treatment priority, treatment option and treatment evaluation. Note that the author has modified the table from Zamecka & Buchanan where the third column now reads 'Treatment Priority' rather than 'Risk Priority'. This means it is difficult to link Form A11 to the previous risk evaluation Form A10. The most serious risk in Form A10 was flooding at PMF scenario. However, bushfire, severe weather and floods were all identified as high treatment priorities in Form A11.

Forms A14 is the most effective and provides a complete list of treatment options and actions to be taken.

Sarina Shire Council Form A11. Risk Register Identification and Evaluation of Treatment Options

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
BUSH/GRASS FIRE	People may be killed or injured	High	Review town planning requirements	Essential
		High	Develop 'Natural Hazards Code as part of IPA town plan	Essential & feasible
		High	Undertake hazard reduction burns	Essential & feasible
		High	Encourage establishment of fire breaks	Essential & feasible
		High	Ground truth the Rural Fire Service risk mapping	Essential & feasible
		Moderate	Communicate risk to community & undertake education program	Essential & feasible
	Buildings may be damaged	Moderate	Include material on bushfire risk in a 'Natural Hazards Community Action Guide' for all hazards	Feasible
		Low	Review counter disaster plan arrangements addressing attendance of brigades and SES to neighbouring Shire incidents	Feasible & desirable
		High	Prepare a bushfire management strategy to assist in policy making and planning	Feasible
		High	Ensure buildings are constructed in accordance with relevant Australian Standard & Building Code of Australia	Essential & feasible
		Low	Arrange sign posting of rural fire fighting water sources	Feasible
		High	Future rural residential subdivisions to conform to best practice guidelines for fire management	Feasible
		Moderate	Review & promote the policy & guideline on desired tree species in fire prone areas.	Feasible and desirable
		High	Complete rural addressing	Feasible & essential
	Lifelines – power & communication lines and timber bridges may be damaged or destroyed	High	Establish coordinated Fire Management Practices in consultation with relevant agencies to reduce fuel loads and provide cleared area around facilities	Feasible
	Essential community structures may be damaged	High	Review practices and procedures with relevant authorities	Feasible
SEVERE WEATHER	People may be injured or killed	High	Include detail of severe weather risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide'	Essential and feasible
	Buildings may be damaged or destroyed	High	Maintain an annual rubbish clean-up campaign	Essential and feasible
	Lifelines may be damaged	High	Identify trees that need trimming from power lines	Essential and feasible
	Caravans & cabins may be damaged	High	Provide anchor points at sites	Essential & feasible
EARTHQUAKE	People may be injured or killed	High	Promote awareness in the community	Feasible
	Structures may be damaged or destroyed	High	Promote awareness in the building design and construction industry	Feasible
		High	Apply requirements of Building Code of Australia and Australian Standards	Feasible
		Moderate	Classify site conditions based geology mapping of the area and determine ground amplification factors	Feasible may need assistance of expert.
		Moderate	Develop map of 'natural period of vibration' based on Standard ANZS DR 00902	Feasible, may need expert assistance
		High	Expand vulnerability inventory for infrastructure and human environment to include detail of structure and sub elements of infrastructure	Feasible and essential
FLOODING	People may be injured or drowned	High	Include detail of flood risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide'	Feasible and essential
		High	Formulate development controls as part of IPA town plan	Essential, urgent and feasible
		High	Develop 'Natural Hazards Code' in IPA town plan addressing flooding	Essential, urgent & feasible
		High	Install flood depth markers on all causeways and floodways	Essential & feasible

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
	Building may be flooded and damaged	Moderate	Develop database of ground and floor level of all buildings in urban areas on the floodplain	Essential & feasible
		High	Identify flood prone properties in urban areas and record detail	Essential & feasible
		Moderate	Collect data on flood events	Essential & feasible
	Water supply system may be damaged	Low	Conduct risk assessment of water supply system in Broadsound for varying AEPs as part of 'Total Management Plan'	Feasible
DAM BREAK FLOOD	People may be injured or drowned	Moderate	Undertake a Failure Impact Study (FIS) and if it determines a population at risk then develop an Emergency Action Plan (EAP)	Feasible and essential
	Building may be flooded and damaged		Plan (EAP)	
	Environment will be damaged			
	Lifelines will be damaged			
	Critical facilities will be flooded and damaged			
LANDSLIDE	Road cuttings and high fills may fail	Low	Consider impact of landslide in design of cuttings or high fills & positioning of structures in hilly terrain	Feasible
STORM TIDE	People may be injured or drowned	High	Formulate development controls as part of IPA town plan	Essential, urgent and feasible
		High	Develop 'Natural Hazards Code' in IPA town plan addressing flooding	Essential, urgent & feasible
		High	Document storm tide evacuation plan for each sea side community	Essential & feasible
		High	Develop & adopt habitable floor level for DSTE	Essential & feasible
		High	Include detail of severe weather risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide'	Feasible and essential
		High	Improve storm tide inundation immunity of evacuation routes (roads)	
		High	Include detail of storm tide risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide'	
		High	Develop design guidelines for construction of homes in storm tide areas	Essential & feasible

Broadsound Shire Council Form A11. Risk Register Identification and Evaluation of Treatment Options

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
BUSH/GRASS FIRE	People may be killed or injured	High	Review town planning requirements	Essential
		High	Develop 'Natural Hazards Code' as part of IPA town plan	Essential & feasible
		High	Undertake hazard reduction burns	Essential & feasible
		High	Encourage establishment of fire breaks	Essential & feasible
		High	Ground truth the Rural Fire Service risk mapping	Essential & feasible
		Medium	Communicate risk to community & undertake education program	Essential & feasible
		Medium	Include material on bushfire risk in a 'Natural Hazards Community Action Guide' for all hazards	Feasible
		Low	Review counter disaster plan arrangements addressing attendance of brigades and SES to neighbouring Shire incidents	Feasible & desirable
		High	Prepare a bushfire management strategy to assist in policy making and planning	Feasible

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
	Buildings may be damaged	High	Ensure buildings are constructed in accordance with relevant Australian Standard & Building Code of Australia	Essential & feasible
		Low	Arrange sign posting of rural fire fighting water sources	Feasible
		High	Future rural residential subdivisions to conform to best practice guidelines for fire management	Feasible
		Medium	Review & promote the policy & guideline on desired tree species in fire prone areas.	Feasible and desirable
		High	Complete rural addressing	Feasible & essential
	Lifelines – power & communication lines and timber bridges may be damaged or destroyed	High	Establish coordinated Fire Management Practices in consultation with relevant agencies to reduce fuel loads and provide cleared area around facilities	Feasible
	Essential community structures may be damaged	High	Review practices and procedures with relevant authorities	Feasible
SEVERE WEATHER	People may be injured or killed	High	Include detail of risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide'	Essential and feasible
		Medium	Upgrade St Lawrence Centenary Hall as a cyclone shelter building	Essential and feasible
	Buildings may be damaged or destroyed	High	Institute an annual rubbish clean-up campaign	Essential and feasible
	Lifelines may be damaged	High	Identify trees that need trimming from power lines	Essential and feasible
	Caravans & cabins may be damaged	High	Provide anchor points at sites	Essential & feasible
EARTHQUAKE	People may be injured or killed	High	Promote awareness in the community	Feasible
	Structures may be damaged or destroyed	High	Promote awareness in the building design and construction industry	Feasible
		High	Apply requirements of Building Code of Australia and Australian Standards	Feasible
		High	Classify site conditions based geology mapping of the area and determine ground amplification factors	Feasible may need assistance of expert.
		High	Develop map of 'natural period of vibration' based on Standard ANZS DR 00902	Feasible, may need expert assistance
FLOODING	People may be injured or drowned	High	Formulate development controls as part of IPA town plan	Essential, urgent and feasible
		High	Develop 'Natural Hazards Code' in IPA town plan addressing flooding	Essential, urgent & feasible
		High	Install flood depth markers on all causeways and floodways	Essential & feasible
		High	Develop database of ground and floor level of all buildings in urban areas on the floodplain	Essential & feasible
	Building may be flooded and damaged	Medium	Develop database of ground and floor level of all buildings in urban areas on the floodplain	Essential & feasible
		High	Identify flood prone properties in urban areas and record detail	Essential & feasible
		Medium	Collect data on flood events	Essential & feasible
	Water supply system may be damaged	Low	Conduct risk assessment of water supply system in Broadsound for varying AEPs as part of 'Total Management Plan'	Feasible

HAZARD	RISK	RISK PRIORITY	TREATMENT OPTION	TREATMENT EVALUATION
DAM BREAK FLOOD	People may be injured or drowned	Following discussions with	Following discussions with the Mines: Not applicable.	Following discussions with the Mines:
	Building may be flooded and damaged	the Mines: Not applicable.	Any failure of the containment structures will be contained within the mine lease	Not applicable. Any failure of the containment structures will be contained within the mine lease
	Environment will be damaged	Any failure of the containment structures will be contained within the mine lease		
	Lifelines will be damaged			
	Critical facilities will be flooded and damaged			
LANDSLIDE	Road cuttings and high fills may fail	Low	Consider impact of landslide in design of cuttings or high fills & positioning of structures in hilly terrain	Feasible
STORM TIDE and TSUNAMI	People may be injured or drowned	High High High	Formulate development controls as part of IPA town plan Develop 'Natural Hazards Code' in IPA town plan addressing flooding Document evacuation plans for each sea side community including St Lawrence	Essential, urgent and feasible Essential, urgent & feasible Essential & feasible
			Develop & adopt habitable floor level for DSTE	Essential & feasible
	Building may be flooded and damaged	High	Develop design guidelines for construction of homes in storm tide areas	Essential & feasible

Sarina Shire Council Form A14 Risk Action Plan (Disaster Mitigation Plan)

This is a table of all treatments grouped by hazard, corporate plan, local disaster management plan and operational plan. The last three in this list are additional factors the author highlights as needing to be addressed and are complementary to the objectives of the study.

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
BUSHFIRE								
Review town planning requirements for bushfire	1	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Develop 'Natural Hazards Code for bushfire as part of IPA town plan	2	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Ground truth the Rural fires risk mapping	3	Sarina Shire Counter Disaster Committee	Sarina Shire Council & Rural Brigades	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	1 month	2003/2004
Future rural residential subdivisions to conform to best practice for fire management	4	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months for code, ongoing for implementation	2003/2004
Ensure buildings are constructed in accordance with relevant Australian Standard & Building Code of Australia	5	Sarina Shire Counter Disaster Committee	Sarina Shire Council or private certifier	Prepare handout notes for designers and builders	Within existing budget	Sarina Shire	ongoing	Each Year On Going
Undertake hazard reduction burns	9	Sarina Shire Counter Disaster Committee	Rural fire brigades	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each Year On Going
Encourage establishment of fire breaks	10	Sarina Shire Counter Disaster Committee	Rural fire brigades State Agencies & Sarina Shire Council	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each Year On Going
(a) Include material on bushfire risk in a 'Natural Hazards Community Action Guide' for all hazards. (b) Alternative: insert abridged material on natural hazard bushfire in community directory.	16	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) \$7K (5000 copies) less sponsorship (b) \$2K less sponsorship	Sarina Shire	12 months	2003/2004

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
Finalise implementation of rural addressing	24	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Develop submission to Council for consideration and erect new signs & property numbering	Within existing budgets	Sarina Shire	12 months	2003/2004
Review counter disaster plan arrangements addressing attendance of brigades and SES to neighbouring Shire incidents	27	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Document arrangements	Within existing budget	Sarina & Neighbouring Shires	6 month	2004/2005
Arrange sign posting of rural fire fighting water sources	37	Sarina Shire Counter Disaster Committee	Rural Fire Brigades	Prepare map, signs and erect	Within existing budgets	Rural Brigades	12 months	2004/2005
Review & promote a policy and guideline on desired tree species in fire prone areas	41	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Seek assistance District Inspector Rural Fire Service & Parks Curator & public utilities	Within existing budgets	Sarina Shire	12 months	2005/2006
Establish coordinated Fire Management Practices in consultation with relevant agencies to reduce fuel loads and provide cleared areas around facilities	42	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Seek assistance of District Inspector Rural Fires and discuss with agencies	Within existing budget	Agencies	12months	2005/2006
Ensure buildings are constructed for severe weather risk in accordance with relevant Australian Standard & Building Code of Australia	5	Sarina Shire Counter Disaster Committee	Sarina Shire Council or private certifier	Prepare handout notes for designers and builders	Within existing budget	Sarina Shire	ongoing	Each Year On Going
Continue annual rubbish clean-up campaign	7	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare campaign, advise residents, arrange pick-up. Apply Local Law Policy No 38	Within existing Budget	Sarina Shire	Annual event	Each Year On Going
Identify trees that need clearing from power lines	8	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Discuss with Ergon	Within Agencies Budget	Ergon	Ongoing	Each Year On Going
(a) Include detail of severe weather risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard severe weather in community directory.	16	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) See cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$2K less sponsorship	Sarina Shire	12 months	2003/2004
Develop & implement policy on tie-down provisions for caravans & demountable buildings in caravan parks & construction camps	26	Sarina Shire Counter Disaster Committee	Sarina Shire Council or private certifier	Prepare & adopt & promulgate policy	Within existing budget	Sarina Shire	12 months	2004/2005
EARTHQUAKE								
Apply requirements of Building Code of Australia and Australian Standards for earthquake risk	5	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare material	Within existing Budget	Sarina Shire	ongoing	Each Year On Going
Promote awareness in the building design and construction industry of earthquake risk	35	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare and distribute material	Within existing Budget	Sarina Shire	ongoing	2004/2005
Expand Vulnerability inventory charts for infrastructure & human environment to include building details & sub elements of infrastructure	43	Sarina Shire Counter Disaster Committee	Sarina Shire Council staff	Identify essential buildings & infrastructure & expand chart detail	Within existing budget	Sarina Shire	9 months	2005/2006
FLOOD								
Formulate development controls as part of IPA town plan	1	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Develop 'Natural Hazards Code' in IPA town plan addressing flooding	2	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Ensure buildings are constructed for flooding in accordance with relevant Australian Standard & Building Code of Australia	5	Sarina Shire Counter Disaster Committee	Sarina Shire Council or private certifier	Prepare handout notes for designers and builders	Within existing budget	Sarina Shire	ongoing	Each Year
Install & maintain flood depth markers on all causeways and floodways	6	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare instructions to works staff	Within existing budget	Sarina Shire	12 months	Each Year On Going
(a) Include detail of flood risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard flood in community directory.	16	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a)See cost for item in bushfire \$7K for 5000 copies less sponsorship (b) \$2K less sponsorship	Sarina Shire	12 months	2003/2004
Develop database of ground and floor level of all building in Sarina Shire on the floodplain	33	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare Brief, call quotes	\$5K	NDRMS program	Future NDRMS program	2004/2005
Conduct risk assessment of water system in Sarina for varying AEPs as part of 'Total Management Plan'	34	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare Brief	Within existing budget	Sarina Shire	24 months	2004/2005

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL YEAR
Develop joint flood monitoring capability with CSR Distillery	38	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Discuss with Distillery & BoM. Develop submission to Distillery for joint ownership/operation. Develop& submit funding submission to RFMP	16K/station	RFMP. Purchase & installation cost nil. (cost borne by State & Commonwealth). Ongoing operation & maintenance Council/Distillery	24 months	2004/2005
Collect data of flood events	39	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Develop data base Obtain GPS equipment if not already owned	Within existing programs	Council Budget	ongoing	2005/2006
Identify flood prone properties in urban areas and record detail	40	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Develop submission for future RFMP funding	Within existing budget	Sarina Shire	12 months	2005/2006
STORM TIDE								
Review town planning requirements for storm tide	1	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Develop 'Natural Hazards Code as part of IPA town plan	2	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	Within existing budget	Sarina Shire	3 months	2003/2004
Determine and adopt habitable floor level for DSTE	15	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Determine DSTE & determine & adopt habitable floor level	Within existing budget	Sarina Shire	12 months	2003/2004
(a) Include detail of storm tide risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard storm tide in community directory.	16	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a)Sec cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$2K less sponsorship	Sarina Shire	12 months	2003/2004
Prepare guidelines for design of structures to withstand horizontal, vertical and scour forces associated with DSTE	25	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Engage competent professional to prepare guidelines	\$5K	Sarina Shire	12 months	2004/2005
Improve storm tide immunity of sections of roads used as evacuation routes	30	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Engineering staff to design schemes, prepare budgets & construction schedules	To be determined after design	Sarina Shire	3 months each section	2004/2007
Develop submission to TCCC for EAP, BOM, DES to undertake joint State wide study of probability & risk of coincidental storm tide & riverine flood event	36	Sarina Shire Counter Disaster Committee	Sarina/Broadsound Shire Council to develop submission. EAP,BOM,DES to fund	Develop submission & submit to TCCC	\$80K	NDRMS EAP,BOM,DES to fund	12 months	2005/2006
LANDSLIDE								
Consider impact of landslide in design of cutting, high cuts & fills & positioning of structures in hilly terrain	11	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer to engineering section of Council	Within existing budget	Sarina Shire	ongoing	Each Year On Going
include 'safety & wellbeing of community' from impact of natural hazards		Disaster Committee		plan review				
COUNTER DISASTER PLAN								
Include copy of Q Plan in Counter Disaster Plan	13	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Sarina Shire Counter Disaster Committee	Within existing budget	Sarina Shire	1 month	2003/2004
Develop Evacuation plans for all seaside towns addressing storm tide risk	14	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Sarina Shire Counter Disaster Committee in consultation with Dist Manager CDRS	Within existing budget	Sarina Shire	12 months	2003/2004
Develop roster for long centre operations	17	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer Sarina Shire Counter Disaster Committee	Within existing budget	Sarina Shire	6 months	2003/2004
Review & upgrade plan, terminology & abbreviations. Develop roster for long centre operations.	18	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer Sarina Shire Counter Disaster Committee	Within existing budget	Sarina Shire	6 months	2003/2004
Draw up layout of operation of coordination centre	19	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Sarina Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Sarina Shire	6 months	2003/2004
Establish training program for staff involved in Counter Disaster operations & control centre staffing	20	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer Sarina Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Sarina Shire	6 months	2003/2004
Draw up duty statements for coordination centre staff	21	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Sarina Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Sarina Shire	6 months	2003/2004
Determine equipment list for coordination centre and put aside items for use in locked container	22	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Sarina Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Sarina Shire	6 months	2003/2004
Review counter disaster plan arrangements addressing attendance of brigades and SES to neighbouring Shire incidents	27	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Document arrangements	Within existing budget	Sarina & Neighbouring Shires	6 month	2004/2005

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
Identify & assess structural adequacy of shelter/evacuation centre/s (community halls, etc)	28	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Engage competent professional to assess structural adequacy & prepare estimates to upgrade evacuation/shelter buildings not covered by Q Build survey	\$5K/structure	Sarina Shire. Possible NDRMS grant	12 months	2004/2005
Alternative 240v power supply for selected area of Sarina CBD	44	Sarina Shire Counter Disaster Committee	Sarina Shire Council staff	Convene meeting of Council, Ergon Energy and Plane Creek Sugar mill to discuss feasibility, costs etc.	To be determined	To be determined	To be determined	2004/2005
OPERATIONAL PLAN								
Provide funding to implement adopted NDRMS options	1	Sarina Shire Counter Disaster Committee	Sarina Shire Council	It is anticipated this item will be considered along with other Department of Emergency Service's comments as a part of the State Interests review of Council's Planning scheme	See individual items	Sarina Shire	ongoing	Yearly
Develop performance criteria to measure success of NDRMS options	23	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer to Council senior executive management team. Part of Corporate planning process	Within existing budget	Sarina Shire	6 months	2003/2004
Develop procedures to capture all costs of counter disaster operation including call-out of SES by other agencies and consider cost recovery, where appropriate	31	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer to Council senior executive management team	Within existing budget	Sarina Shire	3 months	2004/2005
Expand risk management culture to all departments of Council	32	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Refer to Council senior executive management team	Within existing budget	Sarina Shire	12 months	2004/2005
DAM BREAK FLOOD MIDDLE CREEK DAM								
Undertake Failure Impact Study (FIS) and develop an Emergency Action Plan (EAP)	29	Sarina Shire Counter Disaster Committee	Sarina Shire Council	Scope task, prepare tender documents, invite tenders for a Failure Impact Study (FIS). If study reveals Population at Risk (PAR) develop Emergency Action plan (EAP)	FIS \$3K Mapping \$9K EAP \$3K	Sarina Shire	12 months	2004/2005

Broadsound Shire Council Form A14 Risk Action Plan (Disaster Mitigation Plan) This is a table of all treatments grouped by hazard, corporate plan, local disaster management plan and operational plan. The last three in this list are additional factors the author highlights as needing to be addressed and are complementary to the objectives of the study.

TREATMENT	PRIORITY	HAZARD PROJECT LEADER	RESPONSIBLE AGENCY	CONSEQUENTIAL ACTION	ESTIMATED COST	FUNDING SOURCE	TIME FRAME TO ACHIEVE	PROPOSED OPERATIONAL PLAN YEAR
BUSHFIRE								
Review town planning requirements for bushfire	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004
Develop 'Natural Hazards Code for bushfire as part of IPA town plan	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004
Ground truth the Rural fires risk mapping	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council & Rural Brigades	Seek assistance of Dist. Inspector Rural Fires	Within existing budget	Broadsound Shire	1 month	2003/2004
Ensure buildings are constructed for bushfire risk in accordance with relevant Australian Standard & Building Code of Australia	9	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council or private certifier	Prepare handout notes for designers and builders	\$2K	Broadsound Shire	ongoing	Each Year
Encourage establishment of fire breaks	11	Broadsound Shire Counter Disaster Committee	Rural fire brigades State Agencies & Broadsound Shire Council	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each Year
Undertake hazard reduction burns	12	Broadsound Shire Counter Disaster Committee	Rural fire brigades	Refer to appropriate agencies/owner	Within existing budget	Agency/owner funds	Ongoing	Each Year
Arrange sign posting of rural fire fighting water sources	13	Broadsound Shire Counter Disaster Committee	Rural Fire Brigades	Prepare map, signs and erect	\$2K	Rural Brigades	12 months	2003/2004
Continue implementation of rural addressing	14	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Develop submission to Council for consideration and erect new signs & property numbering	Within existing budgets	Broadsound Shire	12 months	2003/2004
(a) Include material on bushfire risk in a 'Natural Hazards Community Action Guide' for all hazards. (b) Alternative: insert abridged material on natural hazard bushfire in community directory.	17	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) \$4K (3000 copies) less sponsorship (b) \$2K less sponsorship	Broadsound Shire	12 months	2003/2004
Future construction camp & rural residential subdivisions to conform to best practice for fire management	18	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant planner Prepare code Rural Fire Service to provide advice	\$2K	Broadsound Shire	3 months for code, ongoing for implementation	2003/2004

Review counter disaster plan arrangements addressing attendance of brigades and SES to neighbouring Shire incidents	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Document arrangements	Within existing budget	Broadsound & Neighbouring Shires	6 month	2003/2004	
Promote & promote a policy and guideline on desired tree species in fire prone areas	26	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Seek assistance District Inspector Rural Fire Service & Parks Curator & public utilities	\$2K	Broadsound Shire	12 months	2004/2005	
Establish coordinated Fire Management Practices in consultation with relevant agencies to reduce fuel loads and provide cleared area around facilities	27	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Seek assistance of District Inspector Rural Fires and discuss with agencies	\$5K	Agencies	12months	2004/2005	
SEVERE WEATHER incl. CYCLONE									
Continue annual rubbish clean-up campaign	5	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare campaign, advise residents, arrange pick-up. Apply Local Law Policy No 38	Within existing Budget	Broadsound Shire	Annual event	Each Year	
Identify trees that need clearing from power lines serving Council infrastructure	6	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Discuss with Ergon Energy	Within Agencies Budget	Ergon Energy	Ongoing	Each Year	
Ensure buildings are constructed for severe weather risk in accordance with relevant Australian Standard & Building Code of Australia	10	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council or private certifier	Prepare handout notes for designers and builders	\$2K	Broadsound Shire	ongoing	Each Year	
Develop & implement policy on tie-down provisions for caravans & demountable buildings in caravan parks & construction camps	16	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council or private certifier	Prepare & adopt & promulgate policy	\$2K	Broadsound Shire	12 months	2004/2005	
(a) Include detail of risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard severe weather in community directory.	17	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) See cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$2K less sponsorship	Broadsound Shire	12 months	2003/2004	
Upgrade St Lawrence Centenary Hall to shelter building requirements	32	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council or private certifier	Prepare tender documents, call tenders, complete works	\$29 360 (1998 cost)	Broadsound Shire Possible RFMP funds or NDRMS funds (post COAG review)	12 months	2005/2006	
EARTHQUAKE									
Apply requirements of Building Code of Australia and Australian Standards for earthquake risk	12	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare material	\$2K	Broadsound Shire	ongoing	Each Year	
Promote awareness in the building design and construction industry of earthquake risk	28	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare and distribute material	Within existing Budget	Broadsound Shire	ongoing	2004/2005	
Expand vulnerability inventory for infrastructure & human environment to include building detail & sub elements of infrastructure	31	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Identify critical buildings and infrastructure & upgrade charts	Within existing budget	Broadsound Shire	9 months	2004/2005	
FLOOD									
Formulate development controls as part of IPA town plan for flooding	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004	
Develop 'Natural Hazards Code' in IPA town plan addressing flooding	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004	
Ensure buildings are constructed for flood in accordance with relevant Australian Standard & Building Code of Australia	11	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council or private certifier	Prepare handout notes for designers and builders	\$2K	Broadsound Shire	ongoing	Each Year	
(a) Include detail of risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards (b) Alternative: insert abridged material on natural hazard flood in community directory.	17	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	See cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$2K less sponsorship	Broadsound Shire	12 months	2003/2004	
Install & maintain flood depth markers on all causeways and floodways	19	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare instructions to works staff	Within existing budget	Broadsound Shire	12 months	Each Year	
Collect data of flood events	22	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Develop data base Obtain GPS equipment if not already owned	Within existing programs	Council Budget	ongoing	2004/2005	
Identify flood prone properties in urban areas and record detail	23	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Develop submission for future RFMP funding	Within existing budget'	Broadsound Shire	12 months	2004/2005	
Develop database of ground and floor level of all building in Broadsound Shire on the floodplain	24	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare Brief, call quotes. Alternative Council staff collect data using GPS equip.	\$5K	NDRMS program	Future NDRMS program	2004/2005	
Conduct risk assessment of water system in Broadsound for varying AEPs as part of 'Total Management Plan'	25	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare Brief	Within existing budget	Broadsound Shire	24 months	2004/2005	

STORM TIDE and TSUNAMI									
Develop 'Natural Hazards Code as part of IPA town plan for storm tide & Tsunami3	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004	
Review town planning requirements	1	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to consultant undertaking plan review	Within existing budget	Broadsound Shire	3 months	2003/2004	
Determine and adopt habitable floor level for DSTE	3	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Determine DSTE & determine & adopt habitable floor level	Within existing budget	Broadsound Shire	12 months	2003/2004	
Develop Evacuation plans for all seaside towns including St Lawrence for storm tide	14	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Broadsound Shire Counter Disaster Committee in consultation with Dist Manager CDRS	Within existing budget	Broadsound Shire	12 months	2003/2004	
(a) Include detail of storm tide & tsunami risks and the action that can be taken by individuals, in the 'Natural Hazards Community Action Guide' for all hazards. (b) Alternative: insert abridged material on natural hazard storm tide & tsunami in community directory.	17	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Prepare material obtain quotes, seek sponsorship. Prepare material and insert	(a) see cost for item in bushfire \$4K for 3000 copies less sponsorship (b) \$2K less sponsorship	Broadsound Shire	12 months	2003/2004	
Prepare guidelines for design of structures to withstand horizontal, vertical and scour forces associated with DSTE	21	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Engage competent professional to prepare guidelines	\$5K	Broadsound Shire	12 months	2004/2005	
Develop submission to TCCC for EPA, BOM, DES to undertake state wide study of probability & risk of coincidental storm tide & river flooding	30	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Develop submission & submit to TCCC in time for 2003/2004 funding round	\$80K	NDRMS Funding shared by EPA,BOM,DES	12 months	2004/2005	
LANDSLIDE									
Consider impact of landslide in design of cutting, high cuts & fills & positioning of structures in hilly terrain	27	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to engineering section of Council	Within existing budget	Broadsound Shire	ongoing	Each Year	
CORPORATE PLAN									
Review Vision, Mission, Strategies & Goals to include 'safety & wellbeing of community from impact of natural hazards	2	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Modify vision, mission, goals & strategies at next corporate plan review	Within existing budget	Broadsound Shire	6 months	2003/2004	
COUNTER DISASTER PLAN									
Identify & assess structural adequacy of evacuation centre/s (community halls, etc)	15	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Engage competent professional to assess structural adequacy & prepare estimates	\$5K/structure	Broadsound Shire. Possible NDRMS grant	12 months	2003/2004	
Review & upgrade plan, terminology & abbreviations.	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Following review by CDRS of CD Plan format refer Broadsound Shire Counter Disaster Committee	Within existing budget	Broadsound Shire	6 months	2003/2004	
Develop roster for long term manning of LGDCC	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer Broadsound Shire Counter Disaster Committee	Within existing budget	Broadsound Shire	6 months	2003/2004	
Establish training program for staff involved in Counter Disaster operations & LGDCC staffing	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer Broadsound Shire Counter Disaster Committee in liaison with Dist Manager CDRS. DES meets cost course & travel	Within existing budget	Broadsound Shire	6 months	2003/2004	
Draw up layout of operation of LGDCC	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Broadsound Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Broadsound Shire	6 months	2003/2004	
Draw up duty statements for LGDCC staff	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Broadsound Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Broadsound Shire	6 months	2003/2004	
Determine equipment list for LGDCC and put aside items for use in locked container	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Broadsound Shire Counter Disaster Committee in liaison with Dist Manager CDRS	Within existing budget	Broadsound Shire	6 months	2003/2004	
Include copy of Q Plan in Counter Disaster Plan	20	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Broadsound Shire Counter Disaster Committee	Within existing budget	Broadsound Shire	1 month	2003/2004	
OPERATIONAL PLAN									
Provide funding to implement adopted NDRMS options	4	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to appropriate department heads for budget planning	See individual items	Broadsound Shire	ongoing	Yearly	
Develop performance criteria to measure success of NDRMS options	6	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to Council senior executive management team. Part of Corporate planning process	Within existing budget	Broadsound Shire	6 months	2003/2004	
Develop procedures to capture all costs of counter disaster operation including call-out of SES by other agencies and consider cost recovery, where appropriate	7	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to Council senior executive management team	Within existing budget	Broadsound Shire	3 months	2003/2004	
Expand risk management culture to all departments of Council	8	Broadsound Shire Counter Disaster Committee	Broadsound Shire Council	Refer to Council senior executive management team	Within existing budget	Broadsound Shire	12 months	2003/2004	

This table below is a summary of the disaster mitigation plans for Sarina and Broadsound Shire Councils. It identifies the top priority treatments listed as 1 and 2 in the complete list of treatment options. These are categorised by treatment, agency, estimated cost, funding source and time frame. The report was submitted in December 2002, this implies that the time frame of 3 months for completion of each treatment is March 2003.

Treatment	Agency	Estimated Cost	Funding source	Timeframe
Review town planning requirements for bushfire	Broadsound & Sarina Shire Councils	Within Existing Budget	Broadsound & Sarina Shire Councils	3 months (Mar 2003)
Formulate development controls for flooding as part of IPA town plan	Broadsound & Sarina Shire Councils	Within Existing Budget	Broadsound & Sarina Shire Councils	3 months (Mar 2003)
Review town planning requirements for storm tide	Sarina Shire Council	Within Existing Budget	Sarina Shire Council	3 months (Mar 2003)
Review town planning requirements for storm tide and tsunami	Broadsound Shire Council	Within Existing Budget	Broadsound Shire Council	3 months (Mar 2003)
Develop 'Natural Hazards Code' for bushfire as part of IPA town plan	Broadsound & Sarina Shire Councils	Within Existing Budget	Broadsound & Sarina Shire Councils	3 months (Mar 2003)
Develop 'Natural Hazards Code' in IPA town plan addressing flooding	Broadsound & Sarina Shire Councils	Within Existing Budget	Murweh Shire Council	3 months (Mar 2003)
Develop 'Natural Hazards Code' for storm tide as part of IPA town plan	Sarina Shire Council	Within Existing Budget	Murweh Shire Council	3 months (Mar 2003)
Develop 'Natural Hazards Code' for storm tide and tsunami as part of IPA town plan	Broadsound Shire Council	Within Existing Budget	Broadsound Shire Council	3 months (Mar 2003)
Provide funding to implement adopted NDRMS options	Sarina Shire Council	See individual items	Murweh Shire Council	Ongoing Yearly
Review vision, mission, strategies & goals to include 'Safety and well-being of community' from impact of natural hazards	Broadsound Shire Council	Within Existing Budget	Broadsound Shire Council	6 months (Jun 2006)

5.8 Evaluation of Sarina & Broadsound Shire Councils Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 4

Reports are very convoluted especially with CERA methodology to assess vulnerability. Too much time is spent on issues of low importance. The study keeps changing order and types of hazards.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 5

CERA methodology is used to assess vulnerability – it could be argued that this is not needed or is superfluous (150 pages). Another vulnerability element appears, i.e. 'heritage' in the risk register section of report, but this was not explained.

Relevance to aims and objectives of the scheme – 5

The layout of the report is confusing and there is superfluous material. It is confusing that the author keeps changing the order of the list of hazards throughout the report. Most things could have been tabulated. Each hazard is listed with approximately 20-50 pages of written material. Earthquake was deemed as a low risk yet the description of this as a hazard was over 50 pages. Overall there is too much detail.

Section 9 – Report on Meetings with Case Study Councils and feedback

Identifying outcomes

- a) that relate directly to NDRM
- b) subsequent outcomes—not in NDRM
- c) antecedence—already planned or identified needs.

NDRM Case Study Councils: Cairns, Doomadgee, Murweh, Redlands, Sarina/Broadsound

One council was selected from each of the five types of Local Government Organisations.

The selection was done in consultation with QDES and resulted in a broad geographical spread. A visit was made to each council using the case study summaries as a basis for discussion that was structured by a series of open ended questions and areas for discussion.

The aim was to elicit details of process, community benefits/involvement and outcomes.

Questions for each council were as follows.

- Who were the local people on the SAG?
- Who is still here now?
- How did you identify risks?
- Who primarily identified the risks? Individuals, groups, departments
- Who decided the evaluation of the risks?
- Who decided the prioritization of risks? How was this done?
- Was there any community consultation? If so, what took place? Who carried it out and how was it done?
- Was this study done in conjunction with other councils/shires? If so describe the process.
- What disaster arrangements exist with other councils/shires?
- What joint or regional arrangements exist with other shires/councils? Describe arrangements, councils, departments involved etc.
- If a consultant facilitated the study describe the relationship and working arrangements with the consultant/team. What was the council's involvement with the consultancy team? How many departments were involved, councilors etc. How holistic was the process?
- What parts of the NDRM have been incorporated into other parts of council operations – which departments/sections.
- Have the results of the study been used to inform a disaster management plan, or town planning?
- Has the study been used to develop strategies to minimise the impact of natural disasters, and enhance a response capacity?
- Are there any further LG plans / projects that would be better informed due to this study?
- Who led the process from within council eg. risk manager, engineer, CEO.
- Go through each of the treatments and assess where each is at, who (department) is responsible), where funding has or will come from.

1. Cairns

All were local people on the SAG. Organisation members of the Cairns Counter Disaster Committee were invited to be part of the sub committee responsible for the NDRM. They were invited as stakeholders and required to commit finances for treatments that were identified as their responsibility as part of their involvement. They were not necessarily the same individuals who were on the counter disaster committee. All positions still exist in all the organisations, but there has been turnover of individuals. Attendance was generally good. There were 8 to 9 meetings of 2 to 3 hours each and a great deal of communication and work between meetings. Department of State Development and EPA were poor attendees, and police and health lost interest towards the end.

1.1 Identification of risks.

Using the AGSO multi hazard assessment and following Zamecka and Buchanan, it was a formalised process of examination and acceptance, followed by additions put and discussed by the sub committee. The committee thus evaluated, and determined the prioritization of risks.

Community consultation was minimal, consisting of availability of the report to the public with an invitation for comment. There was very little community response, but a community engagement officer was appointed in 2005, with general responsibilities which include hazard awareness.

This study was not done in conjunction with other councils/shires, but District Disaster committee meetings take place in Cairns and entail involvement with neighbouring shires. No formal disaster arrangements exist with other councils or shires, but there has been significant liaison with Townsville City Council.

The results of the study have been used to inform the disaster management plan, and significant involvement has occurred with the town planning section. Planners are much more involved in hazard mitigation planning than they were before, but there remain legislative weaknesses in this area. QBuild is carrying out an assessment of shelters. All city council disaster planning has been informed by the NDRM process.

The process was led within council by a project officer specifically recruited for the task and who remain with the council.

1.2 Treatments

Hazards were placed in spreadsheets that identified tasks that the council was already doing. To this were added new treatments to respond to the identified hazards and their prioritisation. The issue of what more could be done became the new treatments. The process was highly formalised and agreed to at all stages by all committee members. The process and method were entirely **consultation** driven.

Risk assessments were included in the original treatment forms, but were not included in the final treatment tables in the NDRM reports. However, treatments and risks are cross referenced to each other and to operational and corporate plans.

All projects have been actioned or are ongoing, except for the following

- CCC. Strategic Planning. 10 & 11. Extend Lake Street and GA to revise earthquake mapping have not been done.
- Cairns Local Counter Disaster Committee. 5. Economic response plan has been encouraged but not yet eventuated.
- Individual Organisations. 2 & 3. Relocation of a central services buildings and installation of cyclone shutters on essential buildings – there is a relocation issue and funds have not yet been made available at either Federal or State level.
- Cairns Port Authority. 1. Airport levees – not complete.
- Australian Defence Force. CCC has no influence on the ADF.
- Main roads department. 1 & 2. Investigation of road to be used for emergency aircraft landing and upgrade of inland highways not yet done.
- QBuild. 1. identify buildings to withstand category five cyclone, and upgrade of buildings – not complete.
- Cairns Base Hospital and Calvary Hospital. 1 & 2. Relocate hospital and identify backup emergency field hospital – the Base Hospital has just been extensively renovated and CCC has no control over Queensland Health plans. The council is only in a position to allocate future land use for a hospital. This issue illustrates the problem of council lack of influence over other State departments.

The informants, Cheryl-Lee Norris and Joan Crawford of CCC, stressed how they worked at keeping committee members away from specific hazard spots within the city. They saw it as a big picture view of mitigation and valued the process in driving that overview of the whole city.

2. Doomadgee

The meeting at Doomadgee was set up by Letitia Rainbow, but the primary informant was Doug Beaumont, the Works and Infrastructure Manager. He was the only original member of the Risk Management team who is still resident in Doomadgee.

Shortly after the NDRM study had been completed there was a major political and organisational crisis in the community, resulting in the resignation of many council staff and a changeover of local councillors. Unrelated to this there were also changes in SES personnel involved with the process. It is worth noting that this kind of governance crisis is not unique to Doomadgee, but has occurred in many of Queensland's aboriginal communities, as well as some of the smaller non-indigenous shires. With such instances of personnel turnover there is a loss of corporate memory and discontinuity in the planning process, despite management systems.

Maunsell Australia was selected for the consultancy because of their long standing experience and regularity of work with Doomadgee Shire. The council has been satisfied with the quality of the company's inputs, and has been able to deal with the consultants on a personal basis. Six meetings of the committee were held on a monthly basis' each for some hours.

Although the study does not clearly identify local indigenous involvement on the committee, the council CEO at that time, Troy Fraser, was from Doomadgee (now working with Century mine), and the committee included a prominent councillor, Jane Kakadoo. The broader community was consulted in interviews according to the study, but there was no obvious impact of community perceptions in the material that was handled by the risk management team. Risk identification and prioritisation' and identification of treatments was carried out in the risk management meetings by a consensus consultation process.

Involvement with other organisations is principally Burkeshire Council and Century Zinc Mine – in both cases not a lot. However, there is no animosity between Doomadgee and Burkeshire Councils, where once there had been rifts. They work together on road upgrades and maintenance and work together on flood damage. The primary connection with Century Zinc mine is environmental liaison' but they also provide help in the wet season and with the CDEP scheme. During emergencies, such as machinery breakdown in the wet, they have been very supportive.

Input into other planning processes has been minimal. There is some scheme involving the ADF in the provision of new housing, and this has paid attention to the hazard management process. Ergon have also responded to crisis mitigation by increasing fuel storage capacity – either 2 or 3 additional 55,000 litre storage tanks. This may have been prompted by the experience of other remote communities that have been isolated during the wet and required air resupply of fuel, presumably at enormous cost (ie Kowanyama).

The feeling is that the study has been done and completed. Most things identified as treatments are ongoing and probably would have been carried out anyway. There was a sense that not only was the treatment table not a wish list, but that long experience of isolation, resilience and self reliance prompted a mitigation strategy that was achievable for the community and within the realm of the community's experience. The residents are experienced and knowledgeable about the flooding risk, but some individuals (often under

the influence of alcohol) are careless where arson is concerned and add to the bushfire risk, even though there is community awareness of its danger. The CDEP workers carry out controlled fenceline burns and are thereby a part of the solution. There is also a full time SES manager now based on Doomadgee, Joe Green of QBuild.

2.1 Treatments

All treatments listed in form A14-1 can be ticked off as completed or ongoing, many on an annual basis, except for the following.

Several items identify the required action as the responsibility on the consultant, probably Maunsell, as additional tasks answerable to the council CEO. It is uncertain whether or not, in the changeover of council, these have been commenced.

Under flooding and bushfire risks they are in each the first 2 items, land and development controls, and an IPA Natural Hazards Code.

Under corporate plan and operational plan all items are referred to the town planning consultant – there was no knowledge of the status of these tasks.

Under both cyclones and severe thunderstorms, the first item in each is community awareness. There is scant evidence of this being carried out.

Under Bushfires the sixth item – ground truth the Queensland Rural Fire Service Bushfire Hazard map etc. – there was no evidence of completion.

Under the counter disaster plan the final two items are in some doubt. Outstations are the primary locations that may be vulnerable to flooding and this has probably not occurred. As far as the final item was concerned, the works manager was at a loss to understand the reference to floods in the Cloncurry area as they do not impact on the Gregory and Nicholson Rivers, both of which contain flood gauges.

3. Murweh Shire

Meeting held in Charleville with Alan Pemberton, SES controller and Technical Officer for Engineering with Murweh Shire and Neil Polglase, Director of Corporate Services. Most of the population of the Shire is concentrated in Charleville, with many of the rest in Augathella and Morven. The rural population is in a few tiny central places and on 600 farm properties.

All of the SAG who participated in the NDRM are still present in the shire and most work for the council. The process was led by the consultant and ostensibly the Mayor, although in practice it was primarily coordinated and led by Neil Polglase. The consultant came recommended by QDES, but had experience of Charleville during the floods of the 1990s. He was not based in Charleville, but flew in for meetings, of which there were about 4 or 5 lasting half a day each time. The shire felt that the consultant was very experienced, and they are extremely pleased with his work and the study's outcomes. The report contains all that they required and they have found it extremely useful. An incentive for carrying out the study was that it reduced the disaster relief trigger excess from \$75,000 to \$50,000. However, the recent flood experiences have made hazard mitigation a council priority. The consultant held some public meetings and visited many local business operators in the town. The perception of council is that the population is very flood aware.

3.1 Risks

Risks were identified through the QDES guidelines matrix. Floods dominate consciousness. The second ranked priority is severe storms and strong winds, including small tornadoes. Bushfire is not seen as an urban issue, but is rather a property problem where fires are left to burn out. As in Doomadgee, fire hazard maps are too extensive and ground truthing is needed to identify local hot spots (this is an issue also identified by the Bushfire CRC). It is worth noting that a council produced potted history of the Shire records severe bushfires that completely surrounded Charleville in 1951. There was a sense that they were underestimating the bushfire risk, because of the recency of major floods.

No other shires were involved in this mitigation study. However, Murweh has strong regional Disaster Management arrangements with surrounding shires combining two police districts to cover Murweh, Bulloo, Paroo, Quilpie, Tambo and Buringa (Roma). While each NDRM study may be carried out independently, hazard management and response is often a regional crisis. This NDRM study has contributed directly to the Disaster Management Plan and town plans, especially flood zones and development planning conditions. Established under the act, the Local Disaster Management Group meets monthly with representatives from all the emergency services, the hospital, Q Build, and Queensland Transport, while disaster response is also coordinated through welfare groups and government departments. Council Corporate and Operational plans have also been informed by the NDRM study. The council has obtained funds to build flood levees at Charleville and Augathella. It has enhanced SES strength and involvement by providing and annual budget. The local SES has 30 to 40 members.

3.2 Treatments

A flood study had already been carried out by consultants after the 1997 flood. Data from this report identified flood treatments and contributed to the NDRM study. Otherwise the mitigation treatments were determined by consultation within the SAG. Treatments listed in table 9 have all been completed or are ongoing except for the following that are listed below.

- Bushfire – ground truth rural fires risk mapping – not yet done.
- Severe weather – identify trees that need clearing from power lines – the council is in dispute with Ergon over the approach to be taken.
 - prepare policy on guidelines on undesirable tree species – not done.
- Flood – stage 1 levees – due to be completed on time, but costing \$9 million, not \$7m.
 - Enforce council's flood policy on floor levels – this is a major issue and a final policy is not in place. The habitable floor area must be above flood level. At the moment this is proposed as a 1 in 100 year event plus 300 mms. or in practice the 1997 flood event plus 300 mms as the levees are being built to the 1997 flood. The reality for new houses means that they will be high set. However, this creates accessibility problems for the elderly and disabled, and thus generates legal issues. Furthermore it is being argued by members of the community that if the levee is designed to protect the town, why must houses be constructed to a risk that will no longer exist. The council considers that it needs expert advice to either fix or modify the policy. The levee will give some protection but it is not being constructed to PMF.
 - Recalibrate URBS flood model – not done.
 - Develop procedures for levee flood gate operation – not yet. The problem is how to make the decision to open flood gates and release flood waters into the protected urban area, such as in a situation of levee safety being compromised. Also once the levees are complete the risk is altered and so will be both awareness and town plans.
 - Clarify riverine flood impact in shire as a result of levee construction – in process, particularly affecting new houses beyond the levee.
 - Develop community education package following levee construction – obviously this will take place once the levees are complete.
 - Install ALERT upgrade etc. – not fully in place.
 - Develop performance criteria to measure success of NDRM options – not done as this is a post levee task.
- Local Disaster Management Plan
 - develop procedures for disaster management operations in Augathella and Morven when cut off from Charleville – to be tested.
 - Rosters and duty statements – some completed.
 - Draw up operation plan for counter disaster centre – not complete.
 - Establish training program for staff – not done – needs QDES input.
 - Identify and assess structural adequacy of govt/community buildings as evacuation centres – only High School, racecourse and showground – done
 - Operational Plan
- Rural addressing and vulnerability inventory – not yet done.

3.3 Issues

Drought and water supplies are significant issues of risk, but are not covered by this program. Other concerns are security (anti terrorism) of the airport, and outbreak of a communicable disease.

The major issue, though, is the change to actual risk and perceived risk once the levees are completed. A thorough reassessment of hazard risk and re-education of the public will be needed at that time.

4 Redlands Shire

The meeting was with Alan Burgess, Acting Senior Consultant Emergency Management. The permanent officer, who led the NDRM process is on maternity leave, and the acting officer was not with the council at that time, so there were some areas where he expected to lack knowledge. However, he came to the meeting very well prepared, having reviewed the study for our meeting and he clearly uses it and is fully aware of its contents.

The SAG contained almost entirely local council membership, many of whom are still working for the council. In particular both the Deputy Mayor, who participated as the leading councillor on the SAG, and the SES controller who is Manager of Operations and Maintenance with the council, are still in the same positions (the SES has a membership of about 70).

The consultant had done some previous work with the council and was well regarded, but was not an especially preferred choice. The task was fully open to tender, although the field was thought to be relatively small. However, the consultant was clearly acquainted with the shire and the council and is perceived to have done good work that takes the council in the right direction. The informant felt that the study was a bit academic (his background was military), but that it fed directly into the ongoing Emergency Management process. He was less sure where it was going with land use planning etc., but as the permanent Senior Consultant for Emergency Management comes from a planning background it is assumed likely that this study has contributed directly to the planning and development process.

4.1 Risk

The council has an annual risk management and mitigation process. The identification and prioritisation of risks was done through following the guidelines. Particular issues are bushfire on North Stradbroke Island, storms, heatwave, with minor concern for flood, cyclones, storm surge or tsunami. The study was stand-alone, but Redlands council generally works with other councils. The disaster district consists of Brisbane, Logan, Redlands, Beenleigh, and Ipswich, but not Gold Coast. The storm surge threat is considered in conjunction with both the Gold Coast and Brisbane, and generally Redlands works with surrounding shires particularly Logan and Beenleigh. They also work with Caboolture and Pine Rivers, with whom they share characteristics.

4.2 Planning

The NDRM process has informed the disaster management plan and has been incorporated into town and land use planning. It is being used in mitigation, especially fire issues on North Stradbroke Island and the southern Moreton Bay Islands. Other plans that have been informed by this process are of evacuation, especially of island's, and social planning. Plans that are part of the planning scheme are currently in the process of being written. The business continuity and council corporate planning have absorbed NDRM. The informant was not sure about local businesses, but was involved with community recovery plans that are led by a committee headed by council and involving other support agencies and NGOs. A pandemic planning group also exists in the shire led by the Department of Health.

4.3 Communication strategy

The communication strategy is aimed at community education in respect of fire, heatwave and storms. The intent is to develop self-sufficiency for 72 hours. There is a specific

schools education program but otherwise communication is aimed at broad community education.

4.4 Treatments

Redlands council has developed a set of 14 groups of treatments.

- Group 1, planning processes, are all ongoing and provide a focus for emergency management.
- Group 2, evacuation, community and economic recovery plans, have been done fully for the mainland and have been started for the islands but are not yet complete.
- Group 3, education programs, are being finalised. Tourists have not yet been targeted. They are primarily associated with North Stradbroke Island where up to 30,000 visitors (mostly local in origin) are added to the 3500 resident population.
- Group 4, bushfire plans, - islands have been comprehensively completed.
- Group 5, flood landslip and storm surge studies - storm surge is ongoing and landslip is have been mapped.
- Group 6 road signage is ongoing.
- Group 7, relationships with regional, State and Commonwealth agencies - Southeast Queensland Disaster Management Advisory Group is a larger organisation than the disaster district.
- Group 8, asset management is ongoing.
- Groups 9 and 10, natural disaster history - land use planning has generated a database primarily of fire, and environmental impacts.
- Group 11, identification of commercial and utilities support agencies, is ongoing particularly in relation to ferries and heavy equipment.
- Group 12 water and waste contingency plans are in place but are not perceived as a high risk.
- Group 13, annual exercises - a program to carry out exercises has been developed with EMQ.
- Group 14, mapping for state planning policy mitigating adverse impacts of flood bushfire and landslide, is ongoing with the GIS mapping continuing to be developed.

5 Sarina and Broadsound Shire Councils

A meeting was held with the Mayor of Sarina, Kevin Morgan, and his Council Executive Officer, Tony De Brincet.

As Sarina is a fairly small shire just 30 km south of Mackay, the question was why it carried out its study in conjunction with Broadsound Shire. The reason was that the Mackay NDRM had already commenced and it was felt that Broadsound had many similar features and issues to those of Sarina. Two studies were conducted, one for each shire, but the meetings and advisory group were common to both, and the consultant was the same for each.

5.1 Consultant

The consultant won the tender on the basis of background and experience, but had no previous experience with either Shire. They found him easy to work with and are very pleased with the study that he produced. The consultant was based in Sarina during the meeting periods, about four to five visits, but otherwise came in and out as required. NDRM studies for both shires were conducted in Sarina, but the consultant spent equal time in each shire talking to stakeholders and community members.. The SAG was common to both studies and most members are still present within the shires. The process was perceived as being a total risk management plan.

5.2 Community consultation

There was extensive community consultation. This was a Council decision and is council choice and policy to consult widely with the community on all matters. The Mayor is a member of QTCCC where his particular interest is in communication, awareness, information and preparedness. Council meetings are held in various parts of the community in order to keep in touch with all groups.

5.3 Risks

The study followed the Zamecka & Buchanan NDRM Guidelines and Manual. As well as the consultant's knowledge and experience long-term residents of the community contributed to the identification of risks, but like many coastal communities there is a rapid turnover of population resulting in about a 30% change in residence since the NDRM process occurred. As far as council is concerned actions are clear and they are happy with the process and outcomes. They felt that it was highly structured and community-based. The Mayor noted that there are other risks not covered by this study. He noted that there was no mention of climate change, which he considers to be of great importance in relation to beachside residential development at sea level. The ethanol distillery situated in the centre of the town presents a very real hazard of explosion, which could be a secondary consequence of other natural hazards. There is also the risk of a Queensland Rail disaster, which could be the consequence of landslide. It was also pointed out that a large mobile population is in transit on the highway at any particular moment in time (estimated at 20,000). This is an issue for the whole Bruce Highway in all coastal shires. This adds very considerably to vulnerability during periods of hazard risk.

5.4 Regional involvement

The disaster district committee which meets monthly, consists of Whitundays, Mackay, Mirani, Broadsound, Nebo and Belyando Shires. Sarina co-shares services with Mirani, Nebo and Broadsound, while the Whitsunday and hinterland Shires includes Bowen and

also involves sharing of services. A pandemic planning exercise is being co-ordinated by Queensland Health, the SES shares resources and the NDRM process was led by the Mayor of Sarina.

5.5 Planning

The process and outcomes of the NDRM have been inserted into town plans and disaster plans. House heights have been raised – RL5 + 300 mms. Escape routes and beach evacuation routes have been identified, mapped and signed. The biggest single risk is identified as the lack of awareness on the part of many members of the public. Communication and education are therefore priority activities in planning. The NDRM process has also contributed to operational and corporate plans and to the IPA planning scheme. The Mayor stressed the need for a generic CD on hazard awareness aimed at the local government level, to which the council could add its own information. Hazard awareness information is included in rates booklets. There is a program of education for primary schoolchildren. Information is also placed on the Council web site which includes flood mapping. Information is also released to the media, but there is a perception that the Mackay based media is less than friendly towards Sarina.

5.6 Treatments

The task of converting prioritised hazard risks into treatments was achieved through consultation. While communication and planning outcomes are dominant a dike has been identified as a suitable treatment in one beach community and drains have been constructed as necessary. Erosion prone areas are no longer available for residential development.

All treatments identified in form A14 have been actioned or are ongoing, with the exception of the following observations.

- Ground truthing rural fire risk mapping is ongoing but it was queried whether rural residential areas need both fire breaks and buffer zones.
- Inclusion of material on bushfire risk in the community action guide has only progressed a bit.
- Application of requirements of building codes promoting awareness and expanding the parliamentary inventory for earthquake risks has not progressed much.
- Including details of flood risks in the community action guide has not progressed much.
- Developing joint flood monitoring capability with the distillery has not progressed much.
- Preparation of storm surge guidelines for structures to withstand horizontal, vertical and scour forces has not yet been done.
- The issue of shelters is of very great concern. The experience of cyclone Larry has thrown doubt on plans that were in progress for the identification of appropriate evacuation centres and the control centre. The shire and cultural hall have the capability to house 700 evacuees, as well as the control centre. The problem is whether these buildings are sufficiently strong or appropriate. QBuild's analysis has contributed to doubts in this area.
- In relation to the development of performance criteria to measure the success of NDRMS options it was felt that only a hazard event could enable this to be done effectively.
- The development of procedures to capture all costs of counter disaster operations is a very controversial and emotional issue for the four local SES groups.

Section 10 - Critique of all other studies in relation to NDRM guidelines – description and evaluation of each process,

Identifying key areas of

- a) divergence from NDRM guidelines**
- b) contribution of methods/best practice.**

Natural Disaster Risk Management Studies

All of the studies were summarised and evaluated on a standard profile. Sixteen of the 21 studies are presented in this chapter, while five were selected as case studies for fieldwork visits and interviews. These five are presented separately in the next chapter and the summary of the visits to those shires is presented in the chapter that follows. They are broken up in this way simply to aid accessibility.

The intention of the standard profile was to extract the key elements of each study with some comment on the effectiveness of the study. The format was as follows:

1. Structure of the reports
2. Aims and Objectives
3. Membership of the Study Advisory Group (SAG)
4. SAG Meetings, Attendance and Community Engagement
5. Community Vulnerability Profile
6. Hazard Identification
7. Risk Evaluation
8. Risk Treatments
9. Evaluation of the study

The key tables and outcomes of the study were considered to be the final risk evaluation table, and the risk treatment table. These two were scanned and are mostly appended to this report. The five case studies had their risk evaluation and treatment tables scanned and incorporated into each council summary report. This was useful in the field visits, but proved to be extremely time consuming and problematic in terms of insertion into the word document. Thus with most of the sixteen non case study councils the risk and treatment tables have been reproduced as appendices. However, it is these two tables in each study which are the primary outcomes. The aim of the fieldwork was to test the extent to which the treatment outcomes had eventuated and the incorporation of the risk evaluation into other council planning documents and processes.

These two chapters reduce each report to these key variables, with the appendix tables as outcomes. The best executive summaries virtually followed the same structure. Comments are made on the effectiveness of each study in presenting this information and a very simple evaluation has been made of each report. It is the report that is evaluated, not the quality of the overall study. Quite different fees were paid for these studies, the shires/councils themselves are very diverse, and ultimately it is the ownership of the study by the shire/council that is the most important outcome. The final evaluation is not intended to be a quantitative assessment so much as an indication of the ease with which information could be found and extracted.

City Councils

1 Calliope Shire Council/ Gladstone City Council

The study comprises three parts: 1) Calliope Shire Council NDRM executive summary report; 2) Gladstone City Council NDRM Report; and 3) Gladstone City Council Natural Disaster Mitigation Plan.

1.1 Aims and Objectives

The Calliope Shire Council and the Gladstone City Council disaster risk management studies aimed to provide an initial view of the risks within their Councils, identify the best treatment options to deal with those risks, and seek to identify how the accuracy of the outcomes can be beneficially improved during future cycles.

Neither the Gladstone report nor the Calliope state their aims or objectives, but instead the consultant Earth Tech Engineering Pty Ltd. divides the assessment into four phases for each Council. Here, they identify the natural hazards that affect the Calliope Shire and Gladstone City, as well as the risks associated with each natural hazard. It also recommends feasible mitigation strategies to minimise the economic and social impact on the local community. The four phases were:

1. Preparation and approval of Project Plan-completed
2. Establishment of the Context, identification and description of the risks, development of Risk Evaluation Criteria, and stakeholder consultation
3. Identification and description of community and environment, Community Vulnerability Profile, Risk Description Register, and Risk Evaluation Register
4. Identification and evaluation of treatment options, Risk Treatment Action and Monitoring Schedule, Treatment Strategy Development, GIS Data Sets, NDRM Report Plan

1.2 Study Advisory Group Members

Both reports, for the Gladstone City Council and the Calliope Shire Council, refer to the SAG as the Risk Management Team.

Calliope Shire Council

Position

Asset Manager NDRM Study Manager
Development Engineer
Director, Corporate & Community Services
Director of Planning
Director of Works
Manager of Infrastructure Development
District Manager
Principal Consultant

Organization

Calliope Shire Council
Department of Emergency Services
Earth Tech Engineering Pty Ltd

Gladstone City Council

Position

Design Manager NDRM Study Manager
GIS Officer Deputy Study Manger
Director, Technical Services

Organization

Gladstone City Council
Gladstone City Council
Gladstone City Council

Town Planner	Gladstone City Council
District Manger	Department of Emergency Services, Rockhampton
Principal Consultant	Earth Tech Engineering Pty Ltd

1.2.1 Members of the council and community present in the Study Advisory Group

Calliope Shire Council

Name	Position	Organization
Mr Marnivasagan Ratnam	Asset Manager	
	NDRM Study Manager	Calliope Shire Council
Mr Greg Penhaligon	Development Engineer	Calliope Shire Council
Mr Mark Larney	Director, Corporate & Community Services	Calliope Shire Council
Mr Russel Schuler	Director of Planning	Calliope Shire Council
Mr Martin Crow	Director of Works	Calliope Shire Council
Mr Kevin Mercer	Manager of Infrastructure Development	Calliope Shire Council

Gladstone City Council

Name	Position	Organization
Mr Ross Paroz	Design Manager NDRM Study Manager	Gladstone City Council
Mr Chris Kelso	GIS Officer Deputy Study Manger	Gladstone City Council
Mr Stuart Doak	Director, Technical Services	Gladstone City Council
Mr Doug Betts	Town Planner	Gladstone City Council

For both councils, most of the members of SAG committee were local. They included a representative for the Department of Emergency Services, as well as negotiations with various State and Commonwealth Agencies.

1.3 Meetings, attendance and community involvement

Both Gladstone City Council and Calliope Shire Council identified a list of key stakeholders, and a combined list developed. All of these stakeholders were contacted by telephone, email or mail and provided with background information on the study, and requested to complete and return a questionnaire. Of the 74 contacts, only 12 forms were returned. All those who expressed an interest were invited to attend a public meeting on 29th April 2003. The public meeting was advertised in the local newspaper. Only one person attended that meeting (other than SAG members), representing on of the agency stakeholders. Articles concerning the study and its progress were published in the local newspaper.

The entire Calliope Shire Council, the Gladstone City Council, State government agencies, community service agencies, community groups, both public and private sector infrastructure service providers, urban and rural business enterprises and the general public were considered as clients and stakeholders.

1.4 Community vulnerability profile:

1.4.1 Calliope Shire Council

The report uses the following terminology of vulnerability: people, buildings, business, lifelines, and critical facilities, which were a useful subdivision of categories of vulnerability.

The population of Calliope Shire in the 2001 census was 15,091 with a high dependence on farming. The median age of the population is 35 years and almost half the population recorded had changed address in the last five years. This great mobility suggests that if a cyclone were to occur in the area, the general knowledge as to how to respond may be relatively low. Additionally, 74% of the population relies on road transportation, and hence shows the vulnerability of the community to disruptions in the road lifelines during disaster events. Calliope is a community vulnerable to various natural hazards, such as cyclones, floods, severe storms, bushfires, earthquakes and landslides, which in turn may severely impact the community's economy.

1.4.2 Gladstone City Council

The report uses the terminology of vulnerability: people, buildings, business, lifelines, and critical facilities, - a useful subdivision of categories of vulnerability.

The population of Gladstone City in the 2001 census was 26,835, with the median age of the population being 32 years. The overall picture is of a diverse social and work environment, with income and unemployment levels close to the state average, and a strong local economy, and median age three years less than the state median. Gladstone is an important commercial and recreational fishing area, with high areas of fishery productivity that are critical for the long-term sustainability of fisheries inside and outside the harbour. Tourism is another important activity for the Gladstone economy.

1.5 Possible Hazards

As each hazard is identified, it is followed by a vulnerability profile under the headings of people, buildings, environment, business, lifelines, and critical facilities,. Details of specific vulnerability to that hazard are included under each of these broad subheadings, stating their risk and possible consequences.

1.5.1 Calliope Shire Council

The Calliope Shire report identifies and describes the possible natural hazards that might threaten the area. These are:

- Severe storms
- Storm tide inundation
- Floods
- Dam Break
- Bushfires
- Earthquakes including tsunami impacts
- Landslides

- Severe storms
 - People: injuries and fatalities.
 - Buildings: structural and contents damage as well as temporal loss of services
 - Business: structural damage and cessation of activities.
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed.
- Storm tide inundation
 - People: residents may be injured or killed.

- Buildings: structural and contents damage, as well as increased maintenance requirement.
- Environment: pollution of waterways and biodiversity impacts
- Business: structural damage and cessation of activities.
- Lifelines and critical facilities: systems disrupted, damaged or destroyed.
- Flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings: structural and contents damage, temporary loss of services
 - Environment: riverbank erosion and pollution of waterways
 - Business: structural damage, cessation of activities and temporary/permanent job losses
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed.
- Dam Break flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings: structural and contents damage, temporary loss of services
 - Environment: riverbank erosion and pollution of waterways
 - Business: structural damage, cessation of activities and temporary/permanent job losses
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed; fire risk.
- Bush Fires
 - People: residents in fire prone areas may be injured or killed; health risk from smoke.
 - Buildings and business: structural and contents damage with cessation of activities.
 - Environment: loss of wildlife.
 - Lifelines: systems damaged or affected.
- Earthquakes
 - People: injury, entrapment, fatality, panic, distress, post-traumatic shock.
 - Business: injury or fatality to occupants, damage, destruction and cessation of activities.
 - Environment: air and water pollution.
 - Lifelines, buildings and critical facilities: damage, disruption or cessation.
- Landslides
 - People: injury or fatality
 - Buildings: structural and contents damage, temporary loss of services
 - Environment: air and water pollution
 - Business: structural damage and cessation of activities
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed.

1.5.2 Gladstone City Council

The Gladstone City Council report identifies and describes the possible natural hazards that might threaten the area. These are:

- Cyclones (wind, flood and storm surge)
- Storm tide inundation
- Floods
- Dam Break
- Bushfires
- Earthquakes including tsunami impacts
- Landslides

Details are the same as above.

1.6 Risk Evaluation

The report provides a clear risk evaluation for each of the hazards identified in each Council. This risk evaluation form takes the same vulnerability categories and assesses their risk, likelihood rating, consequence rating and the risk rating. The following table shows with a star symbol (I) those risks classified as extreme or high priority.

1.7 Risk Treatment

The Identification and Evaluation of Treatment Options form identifies each hazard, and its vulnerable element, describing its risk, risk priority, treatment option and treatment evaluation. Nevertheless, this register does not link to the risk evaluation form, since the latter lacks a risk priority value. The following table identifies the treatments classified as top or number one priority with a star.

1.8 Evaluation of Calliope Shire Council/Gladstone City Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 7

(since the report was clear but not perfectly organized; it could also trim down on the maps and additional info that is not really necessary)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 8 (due to its lack of aims or clearly stated objectives)

Relevance to aims and objectives of the scheme: 4 (since it lacked both)

2 Ipswich City Council

The study consists of four parts: the Risk Evaluation and Treatment, Natural Disaster Mitigation Plan; Preliminary Natural Disaster Risk Management Report; and a Final Report.

2.1 Aims and Objectives

The present report only states aims, and not objectives. The aims of the Ipswich Study were to prepare a Natural Disaster Risk Management Plan and a Natural Disaster Mitigation Plan for Ipswich City. This may, in turn require amendments to Council's planning Scheme, and its Counter Disaster Plan. The study was divided into three stages: 1) Report on risk assessment identifying impact of potential hazards and evaluation of whether risks are acceptable to the community; 2) report on hydrological and hydraulic studies for the non-urban areas of Ipswich and report on detailed flood vulnerability analysis for the whole city; 3) Report on further risk treatment studies as required and report on development of options to reduce unacceptable risks.

2.2 Study Advisory Group Members

The report refers to the SAGM as the Community Reference Group, which is not clearly stated. They provide a list with the community consultation contacts, which includes:

Position	Organization
Area Manager and Chair	Dept. Families Youth & Community Care
Director of Counselling	Lifeline Ipswich & West Moreton
Director	West Moreton Community Health Housing Qld
Senior Personnel Officer	Education Queensland
Coordinator	Leichhardt Community Centre
Coordinator	Ipswich Community Aid
Coordinator	West Moreton Housing Resource Service
Regional Disaster Officer	Ipswich City Mission Australian Red Cross St John's Ambulance
President	Ipswich Ministers Fellowship
Coordinator	Booval Community Service
Coordinator	Riverview Neighbourhood House
Coordinator	Goodna Neighbourhood Centre
Volunteer Coordinator	Rosewood Community Centre
Coordinator	Peace Centre
Regional Director	Disability Services Qld
Regional Coordinator	Home & Community Care
Community Development Worker	Ipswich City Council
Coordinator	Ipswich City Council
Community Operations Manager	Ipswich City Council
President	Ipswich Region Chamber of Commerce & Industry Inc
CBD Liaison Officer	CBD Revitalisation Working Party
President Ipswich	Real Estate Institute of Qld Urban Development Institute of Australia

2.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Lin Reilly	Director of Counselling	Lifeline Ipswich & West Moreton
Christine Ryan	Director	West Moreton Community Health
Steven Dunbar		Housing Qld
Michael Middis	Senior Personnel Officer	Education Queensland
Phil Ormsey	Coordinator	Leichhardt Community Centre
Erik Jansink	Coordinator	Ipswich Community Aid
Tania Sheppard	Coordinator	West Moreton Housing Resource Service
John Fletcher		Ipswich City Mission
John Hunt	President	Ipswich Ministers Fellowship
Pat King	Community Development Worker	Ipswich City Council
Ari Van Den Ende	Coordinator	Ipswich City Council
Robyn Hargreaves	Community Operations Manager	Ipswich City Council
Neil Harding	President	Ipswich Region Chamber of Commerce & Industry Inc
Barry Thorne	CBD Liaison Officer	CBD Revitalisation Working Party
Denis Harrold	President Ipswich	Real Estate Institute of Qld

Most of the members of the council and community were local. The participation of various organizations was sought, such as the Ipswich City Council, the various community Centres, Education Queensland, Australian Red Cross, and other social institutions. This broad community representation allowed natural disaster risk management to be addressed from a whole of Shire approach.

2.2.2 Meetings, attendance and community involvement

Instructions from the Project Steering Committee and the Study Advisory Group were to undertake a comprehensive consultation process involving a series of informal meetings, formal workshops and one-on-one communication with selected landowners throughout the City. The consultation included questions regarding the 1974 flood and other previous events, and workshops with invited representation from relevant industry, environment and community groups and council, with this group being known as the Community Reference Group (CRG). Two CRG workshops were held during the first stage of the report and notes from these workshops were taken. The workshop recorded 21 attendees, although there is no information regarding the number of attendees to the CRG meetings.

2.3 Community vulnerability profile

Ipswich is located in the southeast corner of Queensland, about 40km west of Brisbane. Ipswich City borders six other local government areas and it covers an area of 1775km², lying largely in the Bremer River sub-catchment of the Brisbane River Catchment. The population of Ipswich City Local Government Area, as given by the 1996 census, was 126,853. There have been recent changes to the boundaries of the local government area.

The report determined from the risk analysis and evaluation that risks were acceptable in relation to: earthquakes, landslides and extreme temperatures, and that the only treatment required in respect of these hazards is to raise community awareness of both the risks and procedures to minimise the risks.

In regards to the remaining hazards, it was determined that the risks are currently unacceptable, and that prevention/mitigation measures are warranted as well as measures to raise the community awareness. Of the risks posed by these hazards, the greatest risks are posed by flooding, where studies determined that a high number of people would be flooded.

2.4 Possible Hazards

The presents report identifies and describes the possible natural hazards that might threaten Ipswich City. These are:

- Flooding
- Storms (wind, hail and lightning)
- Extreme temperature
- Bush Fires
- Earthquake
- Landslide

- Flooding
 - People: residents may be injured or killed.
 - Buildings: structural and contents damage; increased maintenance requirement.
 - Environment: river bank erosion and pollution of waterways
 - Business: structural and infrastructure damage; cessation of activities; jobs losses.
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed.
- Destructive winds, hail and lightning
 - People: injuries and fatalities, evacuation and emergency accommodation.
 - Buildings: structural and contents damage.
 - Environment: exotic flora and fauna impacted most.
 - Business: structural and infrastructure damage; livestock and crop losses.
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed; inability to warn/advise the community.
- Extreme temperatures
 - People: temporary incapacity, injury or fatality.
 - Buildings: minor and temporary damage.
 - Environment: bushfire ignition; temporary loss of flora and fauna.
 - Business: inconvenience, loss of income and crops.
 - Lifelines and critical facilities: systems disrupted, damaged or destroyed.
- Bush Fires
 - People and buildings: injuries and fatalities, evacuation and emergency accommodation
 - Business: structural and contents damage with cessation of activities.
 - Environment: exotic flora and fauna impacted the most.
 - Lifelines and critical facilities: systems damaged or affected; road access may be cut off, inability to warn/advise the community.
- Earthquake
 - People: injury, being trapped, fatality, panic, distress, post-traumatic shock.
 - Buildings: high cleanup cost and reconstruction.
 - Environment: air and water pollution; flood; widespread erosion.

- Business: significant business disruption; structural and stock damage; loss of income and jobs.
- Lifelines, buildings and critical facilities: damage, disruption or cessation.
- Landslide
 - People: injury, being trapped, fatality.
 - Buildings: high cleanup cost and reconstruction.
 - Environment: air and water pollution; flood.
 - Business: significant business disruption; structural and stock damage; loss of income and jobs.
 - Lifelines, buildings and critical facilities: damage, disruption or cessation.

As each hazard is identified, it is followed by a vulnerability profile under the headings of people, buildings, environment, business, lifelines, and critical facilities. Details of specific vulnerability to that hazard are included under each of these broad subheadings, stating their risk and possible consequences.

2.5 Risk Evaluation

The report provides a clear risk evaluation for each of the hazards identified. This risk evaluation form takes the same vulnerability categories and assesses their risk, likelihood rating, consequence rating and the risk rating. The table shows with a star symbol those risks classified as extreme or high priority.

2.6 Risk Treatment

The Identification and Evaluation of Treatment Options form identifies each hazard, and its vulnerable element, describing its risks, risk treatment priority, preparedness, response and recovery. This register does link to the risk evaluation form through a risk priority value. The following table identifies the treatments classified as top or number one priority with a star.

2.7 Evaluation of Ipswich City Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 6 (since the report was extensive with information scattered in 4 different documents)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 8 (due to its lack of objectives and clear description of the members of the SAG committee)

Relevance to aims and objectives of the scheme: 6
(study did not state clearly its objectives)

3 Pine Rivers Shire Council

The study comprises one part, including the full report and the executive summary.

3.1 Aims and Objectives

Although this report does not clearly state its aims, it states its terms of reference, goals and objectives. The objective of the study was to apply the approved disaster risk management methodology to the Pine Rivers Shire utilising the work completed by AGSO which includes: the identification of natural disaster hazards and community vulnerability; and determination and analysis of risk. This information was used to develop a comprehensive natural disaster risk register and to determine the appropriate treatment options. A review of the Shire's current Counter Disaster Plan was carried out and recommendations on required actions, changes and upgrades were given. This helped to develop a natural disaster mitigation plan, along with a list of future study requirements to support the mitigation plan.

The Shire aimed to establish protocols for the coordination of the natural disaster mitigation plan with those of neighbouring Shires and other Government agencies within the Shire; to increase community awareness of the risks posed within the Shire by natural disasters, and the strategies for mitigating risks, as well as promoting appropriate response to natural disaster; and finally to help establish procedures for monitoring and reviewing of those issues relevant to the NDRM process within the council

3.2 Study Advisory Group Members

The report refers to the SAGM as the Pine Rivers Shire Council's Counter Disaster Management Team (PRSCCDMT), which includes:

Position	Organization
Chairman Pine Rivers Counter Disaster Committee	Pine Rivers Shire Council's Counter Disaster Management Team
Executive Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Mayor	Pine Rivers Shire Council
Deputy Chair	Pine Rivers Shire Council's Counter Disaster Management Team
Deputy Exec. Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Media Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Environmental Health Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Committee Secretary	Pine Rivers Shire Council's Counter Disaster Management Team

3.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Cr Brian Battersby	Chairman Pine Rivers Counter Disaster Committee	Pine Rivers Shire Council's Counter Disaster Management Team
Alan Sheridan	Executive Officer	Pine Rivers Shire Council's Counter Disaster Management Team

Cr Yvonne Chapman	Mayor	Pine Rivers Shire Council
Cr Bob Millar	Deputy Chair	Pine Rivers Shire Council's Counter Disaster Management Team
Simon Wakefield	Deputy Exec. Officer	Pine Rivers Shire Council's Counter Disaster Management Team
John Shears	Media Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Robyn Edwards	Environmental Health Officer	Pine Rivers Shire Council's Counter Disaster Management Team
Gwen Russell	Committee Secretary	Pine Rivers Shire Council's Counter Disaster Management Team

Most of the members of the council and community were local. The participation of various organizations was sought, such as the Pine Rivers Shire Council, Queensland Police Service and the Brisbane Disaster District Control Group, the Queensland Fire and Rescue Authority and Rural Fire Brigades, Counter Disaster and Rescue Service and DES, community members, the Queensland Ambulance Services, and other Government and Community Agencies. This broad community representation allowed natural disaster risk management to be addressed from a whole of Shire approach.

3.3 Meetings, attendance and community involvement

The need to obtain significant stakeholder and community feedback for this study encouraged the consultant agency to interview the key stakeholders and PRSC staff, through a questionnaire or part of a discussion panel. Approximately 12 key PRSC staff were interviewed, sat on various discussion panels and replied to the questionnaire. Approximately another 8 support staff assisted with information and data for the study. A strategic list of key stakeholders was prepared by the SAG committee to be interviewed on a one-on-one basis to ensure that the study team properly canvassed the salient issues. Approximately 16 highly interested personnel from PRSC, DNRM, BoM, DES, Police, and SES were interviewed and their issues included in the present report.

The most obvious key stakeholders in the Shire are: PRS Council, the communities within the Sire area, local businesses and rural producers, neighbouring Shires, Brisbane Forest Park and Bunya Forest Park, SEQWC and DNRM who operate the dams and manage the state forests, all emergency services groups, state and federal government agencies, services providers (Ergon, Telstra, QR, etc), and Insurance Council.

To ensure that all the community groups and interested parties could be canvassed for this study, 39 questionnaires were sent out to community groups such as: Progress Associations, Chambers of Commerce, Residents Associations, the Rural Fire Brigades, other adjoining Shires, Aged Care Homes, Hospitals, etc. The response of 18 questionnaires was acceptable at about 40%, which is above average for this type of study, which would be between 20 to 30%.

3.4 Community vulnerability profile

The report uses the following terminology of vulnerability: people, buildings, business, lifelines, and critical facilities, which were a useful subdivision of categories of vulnerability.

The Pine Rivers Shire Council is located in southeast Queensland and forms one of the outer suburban areas of Brisbane. The Pine Rivers Shire houses approximately 120,000 people. Seventy-five per cent of the workforce outside the Shire works elsewhere in the Greater Brisbane Urban Area. In the east, the Shire is urbanised and is a base for a significant number of general and service industries that service Brisbane and its surrounds. In the west, acreage residential, grazing, dairy and mixed crop farming exist, centred on small rural towns. Major risks to the Shire include severe storms, fire, flood (three times since 1987), landslide and earthquake at the North Pine, Bracalba and Normanby fault lines which all run through the Shire. Approximately 30% of the Shire is considered by the Rural Fire Authority to be exposed to a high to extreme risk from fire. Pine Rivers Shire Council is responsible for the operation of the Sideling Creek Dam, which forms the storage known as Lake Kurwongbah.

3.5 Possible Hazards

The presents report identifies and describes the possible natural hazards that might threaten Pine Rivers. These are:

- Bushfires
- Cyclones
- Earthquakes
- Severe storms
- Flooding
- Landslips

- Bush Fires
 - People: residents may be injured, evacuated or killed.
 - Buildings and business: medium damage with cessation of activities.
 - Environment: burnt livestock, loss of topsoil, runoff from fire and loss of wildlife.
 - Lifelines and critical facilities: systems damaged or affected, cessation of activities.
- Cyclones
 - People: residents may be injured or killed.
 - Buildings: general damage
 - Business: cessation of activities.
 - Lifelines, and critical facilities: damage, disruption or cessation.
 - Environment: some fauna and flora may be lost.
- Earthquakes
 - People: residents may be injured, evacuated or killed.
 - Buildings: moderate damage
 - Business: economic damage, jobs lost, cessation of activities
 - Lifelines and critical facilities: damage, disruption or cessation.
 - Environment: pollution, fragmentation and landslips
- Flooding
 - People: people may be injured or killed.
 - Buildings: general damage
 - Business: medium damage and cessation of activities.
 - Lifelines: damage, or disruption.
 - Environment: erosion and drainage systems damaged.
- Landslides
 - People: residents may be injured or killed, though not very likely.

- Buildings: damage.
- Lifelines and critical facilities: systems disrupted, and damaged or destroyed.

As each hazard is identified, it is followed by a vulnerability profile under the headings of people, buildings, environment, business, lifelines, and critical facilities. Details of specific vulnerability to that hazard are included under each of these broad subheadings, stating their risk and possible consequences.

3.6 Risk Evaluation

The report provides a clear risk evaluation for each of the hazards identified. This risk evaluation form takes each hazard and assesses their risk, likelihood rating, consequence and the risk rating. The table shows with a star symbol those risks classified as extreme or high priority.

3.7 Risk Treatment

The Identification and Evaluation of Treatment Options form identifies each hazard, and its vulnerable element, describing its risk, risk priority, treatment option and treatment evaluation. Nevertheless, this register does not link to the risk evaluation form, since the latter lacks a risk priority value. The following table identifies the treatments classified as top or number one priority with a star.

NOTE:The Pine Rivers Shire Council has a huge gap, since it lacks a form A14 or Treatment Strategy Development.

3.8 Evaluation of Pine Rivers Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 6

(since the report was somewhat clear, but included huge amounts of information that could have been left out; it lacked the form A14 and a clear table or list of the SAG members)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 6 (due to its lack of aims or clearly stated objectives, lack of clearly stated SAG members and their agency or organization, it also lacks a form A14)

Relevance to aims and objectives of the scheme: 7

(study somewhat mentions its objectives, but lacked aims)

4 Cooloola Shire Council

The study consists of one part, including the executive summary and treatment strategy developments.

4.1 Aims and Objectives

The aim of the Study is to increase community safety through identification, analysis, evaluation and treatment of certain natural hazards/risks, defined below, within the area of Cooloola Shire. The document also seeks to review the key natural disasters affecting the Shire in recognition of the opportunity it offers to examine current and improved methods of managing the physical environment in which natural disaster risks occur. They identify proactive strategies to mitigate against those risks, based on best practice emergency management concepts of prevention, preparedness, response and recovery.

4.2 Study Advisory Group Members

The report states that the Council formed a Natural Disaster Risk Management Study Committee (Study Advisory Group) with the committee membership provided in Attachment 1 (part A of the report). The SAG decided that the Study would examine the identified natural hazards of Flood, Cyclone (including severe storm and east coast low), bushfire, earthquake, landslide and storm surge against a framework that differentiates the hazards in terms of location across the Shire. The key areas, consistent with the Shire Planning Scheme, were determined to be Gympie (urban), Rural Residential (small land holdings near Gympie), Cooloola Coast and Rural (remainder of the Shire, including the Mary Valley).

Position	Organization
Study Manager Chairman, Works and Services Committee	Cooloola Shire Council
Mayor	Cooloola Shire Council
Dep. Mayor	Cooloola Shire Council and SES Local Controller
Chief Executive Officer	Cooloola Shire Council
Director of Planning and Development	Cooloola Shire Council
Deputy Study Manager and Management Systems Officer	Cooloola Shire Council
Senior Consultant	SES, CDRS and DES, Gympie QRMC Risk Management

4.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Cr. Larry Friske	Chairman, Works and Services Committee	Cooloola Shire Council
Cr. Mick Venardos	Mayor	Cooloola Shire Council
Cr. Col Chapman	Dep. Mayor	Cooloola Shire Council and SES Local Controller
Russell Faulkner	Chief Executive Officer	Cooloola Shire Council
Mike Ball	Director of Planning and Development	Cooloola Shire Council
Will Bauer	Deputy Study Manager and Management Systems Officer	Cooloola Shire Council

4.3 Meetings, attendance and community involvement

The SAG agreed the general public would be invited to contribute when all the information about the current position and possible new mitigation strategies was collected. The Council, minute G28/08/03, adopted a recommendation in relation to the Consultation Plan for the IPA Planning Scheme Public Display Period that commenced 30 August 2003 and was to end 26 November 2003. The Consultation Plan included provision for static displays at various Shire centres, advertising and workshops over this period. The SAG considered and endorsed an action that the key outcomes of this study be incorporated into the consultation process. No comment or concern of note was raised that would impact outcomes to date or the drafting the final report.

The SAG also agreed that following endorsement of the draft final report by the SAG, a copy of the draft report would be provided to members of the LCDC on CD for their review, followed by a public notice to be placed in the community newspaper indicating that the draft report will be available to peruse on the Council web site, Council offices and Library. A four week time period was made available for input before the SAG will reconvene (if necessary) and adopt final recommendations for consideration by Council. The final date for receipt of submissions for the Cooloola Shire Natural Disaster Risk Study passed and no submissions were received.

4.4 Community vulnerability profile

The estimated population of Cooloola Shire was 33,223 (2001 Census), up from 31,862 (1996 Census), an annual increase of 0.854%. Mobility/immobility are seen as crucial factors in describing the ability of the community to deal with the immediate impact of a natural disaster. The presence of aged members of the community and Schools requires consideration. The high volume of traffic through the Shire from visitors and commercial transport also requires some consideration. This is an issue in all coastal shires through which the Bruce Highway runs.

The SAG recognised that higher risk levels occur during special gatherings or events such as the Gympie Muster, Bay to Bay Yacht Race, Dingo Creek Jazz Festival, Imbil Car Rally, Imbil Horse Ride, and mass gatherings during holiday periods at key locations such as Inskip Point. In addition, the presence of loose projectiles affected by high winds (such as

those associated with trailer based camping and water activities), increase the exposure of those in the area to adverse outcomes from severe storms and cyclones.

The Shire has significant State forests, conservation areas and National Parks of major economic, cultural and community interest. These areas represent major State assets and their management is a crucial issue for the State agencies, charged with their safe custody. Bushfire hazard is a very real concern with the risk being rated from 'Low to High'. The Shire includes the renowned Cooloola Coast (Rainbow Beach, Tin Can Bay and Cooloola Cove, together with the adjacent Cooloola National Park and gateway to Fraser Island through Inskip Point).

4.5 Possible Hazards

The presents report identifies and describes the possible natural hazards that might threaten the Cooloola Shire:

- Bushfire
- Cyclone/severe storm/east coast low
- Earthquake
- Localised flooding
- Landslide
- Storm surge

- Cyclone/Severe storms/east coast low
 - People: residents in prone areas may be injured.
 - Buildings and business: damage and cessation of activities.
 - Lifelines and critical facilities: damage, disruption or cessation.
 - Environment: inundation and wind damage.
- Flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings and business: damage and cessation of activities.
 - Lifelines and critical facilities: systems disrupted, and damaged or destroyed.
- Bush Fires
 - People: residents in fire prone areas may be injured or killed.
 - Buildings and business: damage with cessation of activities.
 - Environment: loss of wildlife.
 - Lifelines and critical facilities: systems damaged or affected.
- Earthquake
 - People: residents in prone areas may be injured or killed.
 - Buildings and business: damage or destroyed.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Storm surge
 - People: residents in flood prone areas may be injured or killed.
 - Buildings and business: damage, destruction and cessation of activities.
 - Lifelines and critical facilities: systems disrupted, and damaged or destroyed.
 - Environment: loss of wildlife.

As each hazard is identified, it is followed by its risks, residual risk rating, risk evaluation, assessment and risk priority.

4.6 Risk Evaluation

The report provides a risk identification and evaluation of treatment table organized for each of the identified risks. This risk evaluation form takes the same vulnerability categories and assesses their risks, residual risk rating, risk evaluation, assessment and risk priority. The risk evaluation table shows with a star symbol those risks classified as extreme or high priority.

4.7 Risk Treatment

The treatment options form takes each vulnerability category (i.e. people) and assesses their risk according to each hazard, risk priority, treatment options and treatment evaluation. This register links to the risk evaluation form through a risk priority value. The Treatment Options table identifies the treatments classified as top or number one priority with a star.

4.8 Evaluation of Cooloola Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8 (the report was clear but imperfectly organized)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 8 (due to its lack of aims or clearly stated objectives)

Relevance to aims and objectives of the scheme: 6
(study did not state clearly its objectives, and lacked aims)

5 Monto Shire Council

Note:

1. Monto Shire is inland from the coast on the coastal ranges. As only Emerald and Monto were in this area, the typology separated those on the coastal side into broadly coastal and those on the Dividing Range side into the inland, rather than create a separate category.
2. Several sections of the Monto study were not available.

5.1 Aims and Objectives

The present report does not present any aims or objectives. The report only includes an executive summary of the hazards to the Shire, a brief community vulnerability profile and the risk and treatment tables.

5.2 Study Advisory Group Members

N/A

5.2.1 Members of the council and community present in the Study Advisory Group

N/A

5.2.2 Meetings, attendance and community involvement

N/A

5.3 Community vulnerability profile

The report uses the terminology of vulnerability that was employed in the AGSO Cities Project—people, social structures, buildings, lifelines, critical facilities, and local economy and employment. This is a useful and standardised subdivision of categories of vulnerability.

The economic position of many people in the Shire is such that the resilience of the community is impaired. Social structures are strong, but all buildings are vulnerable to severe damage by fire, earthquake, storm and tempest. There is a possibility that the town water supplies and sewage will be interrupted by flood or earthquake. An important issue is the fact that the isolation of the area for longer than two days could cause some malnutrition and life threatening situations.

5.4 Possible Hazards

The Monto Shire lists five major hazards:

- Fire
 - Forestry/scrub fire
 - Cania National Parks
 - Grass fire
- Earthquakes
 - General
 - Cania Dam Break
- Flood
- Tempest

- Bushfire (Forestry/scrub fire; Cania National Parks; grass fire)
 - People: residents in fire prone areas may be injured or killed.

- Buildings, business and industry: damage, destroyed or/and inconvenience to every day life.
- Environment: environmental damage.
- Lifelines and critical facilities: damage, disruption or cessation.
- Earthquakes General
 - People: residents may be injured or killed.
 - Buildings and environment: damage or destruction.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Earthquakes Dam break
 - People: residents in flood prone areas may be injured, trapped or killed.
 - Buildings, business, lifelines, and critical facilities: the damage, destruction or cessation of activities.
 - Environments: environmental damage
 - Lifelines: transport systems disrupted, and damaged or destroyed.
 - Cultural: caves may collapse or be sealed
- Flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings and business: the damage or destruction.
 - Environments: environmental damage
 - Lifelines: transport systems disrupted, and damaged or destroyed.
- Tempest
 - People: residents may be injured or killed.
 - Buildings: damage or disruption.
 - Business, lifelines, and critical facilities: the damage, destruction or cessation of activities.

As each hazard is identified in the risk register, it is followed by a community vulnerability profile under the headings of people, buildings, environment, business, lifelines, and critical facilities. Details of specific vulnerability to that hazard are included under each of these broad subheadings. The register details the consequence for each of these vulnerable elements. Thus community vulnerability is linked directly to hazard and risk, thereby leading to specific places, buildings, people, lifelines and critical facilities etc.

5.5 Risk Evaluation

The report provides a risk evaluation that takes the same vulnerability categories, but lists them according to their priority. The table assesses likelihood, consequence, the risk rating, risk evaluation, risk priority and overall rank within the priority. The Risk Evaluation Register summarises all the hazards, allowing the decision-making authorities to take the appropriate measures according to the relevance of the risk. The risks classified as extreme or high are marked in the tables with a star.

5.6 Risk Treatment

The implemented treatment strategies are presented in tables going from past years, to the year 2008 and future years. This table shows the endorsed treatment, risk rank, responsible agency, consequential actions and the year implemented, at the same time it identifies the treatments classified as top or number one priority with a star.

5.7 Evaluation of Monto Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 6

(It does not have an index to guide the reader, and its missing significant amounts of information. Also, it presents a few hazards in a way that might have been easier, e.g. bushfires)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 5 (lacks aims, objectives, members of the SAG, members names and contact details, record of meetings and community consultations)

Relevance to aims and objectives of the scheme: 4

(although they determine the hazards for that particular shire, they were not clearly stated in the report)

6 Cloncurry Shire Council

The study comprises two parts; the full report, and the executive summary.

6.1 Aims and Objectives

The study identified the natural hazards that afflict Cloncurry Shire and the elements that are vulnerable to the impact of these natural hazards. It also assesses the risk due to these natural hazards and develops risk mitigation strategies, or risk treatment options, that control the risk. Additionally, the study reviews various existing Cloncurry Shire Council corporate governance plans and systems (i.e. Corporate Plan, Operational Plan, Town Plan and Counter Disaster Plan) and recommends any actions or changes required.

The objectives of the study are to decrease the Cloncurry Shire's vulnerability to natural disasters; ensure eligibility for full Commonwealth Natural Disaster Relief Arrangement funding, discharge the Council's duty of care obligation to provide for the well-being and safety of the community; and improve community safety, autonomy and well-being in times of natural disasters.

The study establishes the context as political, economic and social circumstances; corporate governance plans and systems, legislation and other guidelines, and risk analysis and evaluation criteria. The clients, stakeholders and external agencies include the Commonwealth, State and local government, the general public, non-government organizations, the business community, tourists and animals.

6.2 Study Advisory Group Members

Position	Organization
Study Manager/Chief Executive Office	Cloncurry Shire Council
Resident Engineer	Cloncurry Shire Council
Consulting Engineer	Maunsell Australia Pty Limited
Consulting Engineer	Maunsell Australia Pty Limited
Financial Officer	Cloncurry Shire Council
Local Controller-Cloncurry Unit State Emergency Service	Cloncurry Shire Council
District Manager	Mount Isa District Office Counter Disaster and Rescue Services- Department of Emergency Services
Operations and Training Officer	Mount Isa District Office Counter Disaster and Rescue Services- Department of Emergency Services
Senior Constable	Queensland Police Service- Cloncurry
Director of Nursing	Cloncurry Hospital
Planning Consultant	Brazier Motti

6.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Ken Timms	Study Manager/Chief Executive Office	Cloncurry Shire Council
James Jentz	Resident Engineer	Cloncurry Shire Council

James Gauvin
Kerri-Lea Nicholas

Financial Officer
Local Controller-Cloncurry
Unit State Emergency
Service

Cloncurry Shire Council
Cloncurry Shire Council

Communities, businesses, industry, Local Council consultants, Local Council Management and Technical Officers, and State Government Departments, Agencies and Corporations were consulted. All representatives were local, from Cloncurry or Mount Isa, with the exception of the Brazier Motti Pty Ltd. planning consultant, who resides in Townsville. Nevertheless, the majority of the contact telephone numbers were local.

6.3 Meetings, attendance and community involvement

The Study Advisory Group had two meetings, one on the 16 April 2002 and the second one on 22 August 2002, with 8 attendees from the SAG committee in each one. The first meeting focused on identifying the risks the Shire faces, as well as an introduction to NDRM and its elements. The second meeting focused on an overview of the context in which the Shire is situated, as well as an analysis, evaluation and treatment of the risks previously identified.

Additionally, two community consultation meetings were undertaken at the end of May 2002. These were designed to include the stakeholders, external agencies and community in general and help identify and describe the natural hazards, identify and describe the community and environment, scope and analyse community and environmental vulnerability to natural disasters, and recommend measures to reduce the risks of natural hazards to the community and environment. A member from Maunsell Pty and a member from the Cloncurry Shire Council helped to facilitate the meeting. Approximately twelve people attended community consultation meetings in Kajabbi, three people attended in Cloncurry (including two SAGM), and none in Dajarra.

6.4 Community vulnerability profile

The report classifies their vulnerability groups into: people, buildings, business, lifelines, and critical facilities. This is a useful subdivision of categories of vulnerability.

The Cloncurry Shire is situated in northwest Queensland with almost 1,201 occupied residences. Of these residences 43% were built prior to 1970 and 19% built prior to 1940. The Shire's primary economic bases are the pastoral and mining industries, making the local economy particularly vulnerable to seasonal conditions.

The young and the elderly are generally considered to be a vulnerable group within the community (approximately 15% of the community), due to health and mobility factors. The Shire comprises 16.9% people of indigenous origin, making language and ethnicity additional difficulties when facing natural disasters, due to problems of communication. The Shire suffers from a relatively high frequency of localised flooding, severe thunderstorms and bush and grass fires, such that a significant percentage of long term residents possess the knowledge and experience to cope with one or more of these events.

6.5 Possible Hazards

The Cloncurry Shire lists five major hazards:

- Flooding
- Dam break flooding

- Bushfire
- Severe thunderstorms
- Earthquakes

- Flooding and Dam break flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings, business, lifelines, and critical facilities: the damage, destruction or cessation of activities.
 - Environments: environmental damage
 - Lifelines: transport systems disrupted, and damaged or destroyed.
- Bushfire
 - People: residents in fire prone areas may be injured or killed.
 - Buildings, business and industry: medium damage and inconvenience to every day life.
 - Environment: environmental damage.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Severe Thunderstorms
 - People: residents may be injured or killed.
 - Business: disruption or cessation.
 - Business, lifelines, and critical facilities: the damage, destruction or cessation of activities.
- Earthquakes
 - People: residents may be injured or killed.
 - Buildings: damage or destruction.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.

As each hazard is identified, it is followed by a community vulnerability profile under the headings of people, social structures, buildings, lifelines, and critical facilities. Details of specific vulnerability to that hazard are included under each of these broad subheadings. A risk register for that specific hazard, in which environment and the business are added, follows this. The register details the consequence for each of these vulnerabilities while the risk evaluation that follows takes the same vulnerability categories (listing them under the risk category) and assesses likelihood, consequence and the risk rating. Thus community vulnerability is linked directly to hazard and risk, thereby leading to specific places, buildings, people, lifelines and critical facilities etc.

6.6 Risk Evaluation

The report provides a very effective risk evaluation summary under each of the hazards identified. It examines and evaluates each hazard, explaining its causes and possible consequences. In the Risk Evaluation Register (Form A10) none of the hazards are classified as high or extreme risk. Most of them are moderate, as seen in the next table. The Risk Evaluation Register does not relate to the Risk Treatment Register (form A11), since the former does not link with the later in regards to risk priority.

6.7 Risk Treatment

Risk Treatment Register (form A11), as mentioned above, does not link to the form A10. The table identifies the treatments classified as top or number one priority with a star.

6.8 Evaluation of Cloncurry Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8
(easy to read through, although not perfectly clear)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 8 (good adherence, but with a few modifications made by the consultants)

Relevance to aims and objectives of the scheme: 9
(they achieve what they stated in their aims and objectives they were going to do)

There is a flaw in the Guidelines and Manual where the risk evaluations are not repeated or identified in the risk treatments. Since the Cloncurry Shire Council used these guidelines as a model, they have this flaw as well, meaning that their Treatment Strategy Development (Form A14) in the Executive Summary does not link the treatments with their priority.

7 Croydon Shire Council

The study is in one volume titled 'Croydon Natural Disaster Risk Management Report'. The report is short and contains all relevant information in a concise and accessible manner.

7.1 Aims and Objectives

The study identifies the natural hazards that affect the Croydon Shire area. Risks have been identified for each natural hazard and mitigation strategies have been recommended to minimise both economic and social impact to the local community. The study followed the Australia/New Zealand standard for Risk Management, the Queensland Department of Emergency Services Natural Disaster Risk Management Guidelines and the Queensland Department of Emergency services Disaster Risk Management Guide: How to for Local Government, both by Zamekca & Buchanan. Croydon Shire Council hired a consultant, Ganza Consulting Services, led by Michael Ganza, to conduct the study.

7.2 The Risk Management Team

The report refers to a risk management team that was assembled for the purposes of this study. Membership was as follows:

- Study Manager – Ganza Consulting Services
- Mayor – Croydon Shire Council
- Chief Executive Officer – Croydon Shire Council
- District Operation Officer Disaster Operations – Department of Emergency Services
- SES Controller – SES

The Risk Management Team was fairly small and the majority of the representatives were from the Croydon Shire council. There was one representative from the Department of emergency Services. Other local government, community agencies, emergency services groups, business owners, and residents were identified as stakeholders. None of these were represented on the RMT.

7.3 Meetings, attendance and Community involvement

There is reference to meetings occurring on a monthly basis or more frequently if required. However there is no reference dates or attendance of RMT meetings. However there is reference to time frames in which various sections of the study are completed. This may refer to RMT meetings. There are two days where Risks were identified and analysed and a second day where risks were evaluated and their treatments determined. There is also a public consultation period of 1 month where a copy of the draft Disaster Risk Management study was made available for public use. Articles appeared in the local newspaper and contact made with all community groups in the shire inviting input into NDRM study. Questionnaires were distributed throughout the Shire and a public meeting will be held to gather suggestions and recommendation with other Stakeholders.

7.4 Hazards

The study identified four hazards:

- Cyclone/ Severe storm
- Flooding
- Earthquake
- Fire (rural)

7.5 Community Vulnerability Profile

The Shire of Croydon is situated approximately 565kms west of Cairns and approximately 150kms east of Normanton with a total population of 420 persons. The township of Croydon accounts for the majority of the population with approximately 320 persons.

The Shire has many older residences constructed prior to building code provisions for wind. Wastewater is treated on-site by individual dwellings and consists of septic tanks and aerated wastewater treatment plants which could be flooded and cause major hygiene problems. Highways are often cut off by floodwaters during the wet season.

Flooding in the wake of a cyclone is a constant threat and is experienced on a wide-ranging scale throughout the shire. Although generally not life threatening, the loss of essential roads has economic consequences for the shire. Flooding may also affect the quality of the township's water supply. This is not a self-sufficient community and depends on external sources to provide basic requirements.

The report uses the terminology of 'vulnerable elements' and these are—people, buildings, environment, business, lifelines, and critical facilities. These are sometimes further subdivided, listing all possible vulnerable elements e.g. power, communication, water etc.

- Cyclone/Storms/Severe Winds
 - People – loss of life, severe injury.
 - Buildings – large amount of dwellings constructed prior to 1975 when building codes were upgraded for greater wind loads both commercial and residential buildings may be destroyed.
 - Environment – Heavy rain results in ground saturation increasing impact of cyclonic winds on trees, crops and vegetation. Washouts, landslips, pasture damage and land degradation can occur.
 - Lifelines – flooding across roads and power lines will be cut.
 - Critical facilities – Hospital may be damaged or destroyed.
- Flood (Including Dam Break)
 - Buildings – most buildings in the shire are not in known flood paths.
 - Environment – washouts landslips, pasture damage and land degradation can occur.
 - Lifelines – road and air transport services may be disrupted or destroyed. Communication facilities, and power may be disrupted damaged or destroyed.
 - Critical facilities – quality and quantity of water supply is affected by flooding resulting in health and hygiene issues. Effluent disposal systems throughout shire may fail due to flooding. Lake Belmore Dam may fail.
- Earthquake
 - People – people may be killed or seriously injured.
 - Buildings – destroyed or severely damaged. Lake Belmore Dam may break.
 - Lifelines – Water supply, wastewater treatments systems, fuel supplies, and air and road transport services by disrupted or destroyed. Fallen debris and trees may damage roads
- Fire
 - People – may be killed or injured.

- Buildings – significant damage to buildings
- Business – significant loss of stock.

The report is very short and succinct, and could perhaps have a little more detail on vulnerabilities for each hazard.

7.6 Risk Evaluation

The report provides a description of each hazard. Separate to this it provides a description of each vulnerable element. Each hazard is then listed in the risk evaluation table and assessed for likelihood, consequence and the risk rating as per Zamecka & Buchanan. Form A9. below summarises the ratings under each hazard category, the extreme and high ratings have been identified with a star.

Table A10 Risk register – risk evaluation. (*) identifies Extreme and High ratings

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk
Cyclone / Severe Storm	People	There is a risk that residents living in older dwellings and caravan occupants may be exposed to risk of death or injury.	D	2	L
	Buildings Essential Services	There is risk that essential service buildings may have a reduced capacity, be damaged or destroyed.	D	2	L
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	B	3	H
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	B	3	H

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed	B	3	H
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	C	1	L
	Commercial	There is a risk that commercial buildings may be damaged or destroyed.	D	2	L
	Residential	There is a risk that residential buildings may be damaged or destroyed.	D	2	L
		There is a risk that Caravans and temporary structures may be damaged or destroyed.	C	2	M
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	C	1	L
	Food	There is a risk that food storage areas may be damaged or destroyed.	C	1	L
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	C	1	L
	Hospital	There is a risk that the Hospital may be damaged or destroyed.	C	1	L
Flooding (Up to Q₁₀₀ event)	People	There is a risk that residents in flood prone areas may be directly affected.	C	1	L
	Dam Break	There is a risk that the Lake Belmore Dam will fail in the event of a probable maximum flood.	E	4	H
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	B	3	H
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	B	3	H
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed	B	3	H
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	B	3	H

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	B	3	H
	Food	There is a risk that food storage areas may be damaged or destroyed.	B	3	H
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	B	3	H
Earthquake	People	There is a risk that residents may be directly affected.	E	1	L
	Dam Break	There is a risk that the Lake Belmore Dam will fail in the event of an earthquake.	E	4	H
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	E	1	L
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	E	1	L
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed	E	1	L
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	E	1	L
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	E	1	L
	Food	There is a risk that food storage areas may be damaged or destroyed.	E	1	L
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	E	1	L
Fire (Rural)	People	Residents in fire prone areas may be injured or killed	E	1	L
	Buildings	There is a risk that fire will cause significant damage to buildings.	C	1	L
		There is a risk that fires will cause significant loss of stock.	C	2	M

7.7 Risk Treatment

The identification and evaluation of treatment options (Form A11) and overall mitigation action and monitoring schedule (Form A15) have been scanned into this section. This report links the risk evaluation form (A10) to the identification of treatment options form (A11) very well. It does this by re-tabling the likelihood, consequence and level of risk in Form A11 and determining the risk priority from that.

Form A11 – Identification and Evaluation of Treatment Options. This table lists each hazard and identifies the vulnerable elements, the risks, the risk priority, treatment option and treatment evaluations.

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk	Risk Priority	Risk Treatment Options	Risk Treatment Evaluations
Cyclone Severe Storm	People	There is a risk that residents living in older dwellings and caravan occupants may be exposed to risk of death or injury.	D	2	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current. <input type="checkbox"/> Conduct Public Awareness Campaign to ensure Community is aware of the risks and steps to be taken in such an event.	<input type="checkbox"/> Practical and effective measure for risk reduction. <input type="checkbox"/> Effective and low cost to run promotion.
	Buildings Essential Services	There is risk that essential service buildings may have a reduced capacity, be damaged or destroyed.	D	2	L	4	<input type="checkbox"/> Identify essential service buildings that are required to withstand Category 3 cyclones. <input type="checkbox"/> Prioritise the upgrade or relocation of identified essential service buildings. <input type="checkbox"/> Consider the installation of cyclone shutters on essential service buildings. <input type="checkbox"/> On issue of cyclone warning ensure water tankers are available.	<input type="checkbox"/> Practical and effective measure for risk reduction. <input type="checkbox"/> High costs but would enable the continual delivery of essential services. <input type="checkbox"/> High costs but would enable the continual delivery of essential services. <input type="checkbox"/> Cost Effective method.
							<input type="checkbox"/> Ensure generators are available. <input type="checkbox"/> Ensure availability of satellite phones, UHF and CB radios.	<input type="checkbox"/> Cost effective method. <input type="checkbox"/> Cost effective method.
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current. <input type="checkbox"/> Purchase backup electrical generator for raw water supply pumps.	<input type="checkbox"/> Practical and effective measure for risk reduction. <input type="checkbox"/> High costs but would enable the continual delivery of essential services.
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Commercial	There is a risk that commercial buildings may be damaged or destroyed.	D	2	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk	Risk Priority	Risk Treatment Options	Risk Treatment Evaluations
	Residential	There is a risk that residential buildings may be damaged or destroyed.	D	2	L	4	<input type="checkbox"/> Conduct Public Awareness Campaign to ensure Community is aware of the risks and steps to be taken in such an event. <input type="checkbox"/> Ensure that all new buildings conform to the Australian Building code.	<input type="checkbox"/> Effective and low cost to run promotion. <input type="checkbox"/> Effective and low cost to run promotion.
		There is a risk that Caravans and temporary structures may be damaged or destroyed.	C	2	M	3	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Food	There is a risk that food storage areas may be damaged or destroyed.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Hospital	There is a risk that the Hospital may be damaged or destroyed.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
Flooding (Up to Q ₁₀₀ event)	People	There is a risk that residents in flood prone areas may be directly affected.	C	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current. <input type="checkbox"/> Conduct a public awareness campaign to ensure residents living in flood prone areas are aware of the risks and the steps needed to be undertaken in such an event. <input type="checkbox"/> Identify flood risk areas. <input type="checkbox"/> Upgrade and maintain MapInfo planning maps to display flooding risk areas. <input type="checkbox"/> Use Town Planning Criteria to use flood data to ensure that buildings are constructed above Q ₁₀₀ flood line.	<input type="checkbox"/> Practical and effective measure for risk reduction. <input type="checkbox"/> Effective and low cost to run promotion. <input type="checkbox"/> Costs of study need to be determined.
	Dam Break	There is a risk that the Lake Belmore Dam will fail in the event of a probable maximum flood.	E	4	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current. <input type="checkbox"/> Complete a Dam Impact Assessment.	<input type="checkbox"/> Practical and effective measure for risk reduction. <input type="checkbox"/> This is essential to determine residents who may be at risk.
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk	Risk Priority	Risk Treatment Options	Risk Treatment Evaluations
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Food	There is a risk that food storage areas may be damaged or destroyed.	B	3	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	B	3	H	2	<input type="checkbox"/> Investigate the Lake Belmore Dam road for inundation levels. <input type="checkbox"/> Upgrade creek crossings on the Gulf Developmental Road to a Q ₅₀ flood immunity. <input type="checkbox"/> Conduct an investigation of which station roads are inundated causing access restrictions. <input type="checkbox"/> Ensure effective and safe road closure system	<input type="checkbox"/> This is essential to minimise risk of loss of water supply. <input type="checkbox"/> This will need to be discussed with the Department of Main Roads. <input type="checkbox"/> Effective measure provided funding available. <input type="checkbox"/> Cost effective and already implemented.
Earthquake	People	There is a risk that residents may be directly affected.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Dam Break	There is a risk that the Lake Belmore Dam will fail in the event of an earthquake.	E	4	H	2	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Power	There is a risk that power supplies may be disrupted, damaged or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Communication	There is a risk that communication facilities / transmitters may be damaged, disrupted or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Water	There is a risk that water supply infrastructure may be damaged, disrupted or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Wastewater	There is a risk that on-site wastewater treatment systems may be disrupted, damaged or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Fuel	There is a risk that fuel supplies may be damaged or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.
	Food	There is a risk that food storage areas may be damaged or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.

Hazard	Vulnerable Element	Risk Statements	Likelihood	Consequence	Level of Risk	Risk Priority	Risk Treatment Options	Risk Treatment Evaluations
	Transport	There is a risk that transport services (road and air) may be disrupted or destroyed.	E	1	L	4	<input type="checkbox"/> Ensure Counter Disaster Plan is current.	<input type="checkbox"/> Practical and effective measure for risk reduction.

Form A14 Treatment Strategy Development and Operational Plan 2002.

This is a table of all endorsed treatments. It lists the responsible agency, consequential actions, estimate cost, funding source and timeframe to complete.

Endorsed Treatment	Responsible Agency	Consequential Actions	Estimated Cost	Funding Source	Time Frame
In the event of a cyclone warning, Council to ensure that all Council reservoirs are filled	Council	Reservoirs to be filled			On issue of cyclone warning
Council to ensure that water treatment agents are stockpiled prior to cyclone season	Council	Order additional water treatment agents for stockpiling			Annually – pre-cyclone season
In the event of a cyclone warning, Council will ensure sufficient fuel supplies & ability to pump fuel in the event of power failure & ensure Council generators are operational	Council	Stockpile fuel & ensure Council generators are available & operational			On issue of cyclone warning
Ensure the ongoing availability of satellite telephone, UHF & CB radios & solar/battery & generator power for emergency communications	Council	Maintain satellite telephone, UHF & CB radios & ensure solar & generator power available to operate			Ongoing
Ensure that key bridges & road corridors are constructed & maintained so as to sustain minimum damage from inundation & saturation	Council	Maintenance & upgrade of key bridges & road corridors	Road & bridge maintenance upgrade		Ongoing
Community Recovery Plan, including counselling & support measures, to be formulated as part of the Counter Disaster Plan	Counter Disaster Committee	Formulate Community Recovery Plan	\$2,000		ASAP after the adoption of the Disaster Mitigation Plan
Evacuation plan, including current comprehensive list of emergency centres, to be formulated as part of the Counter Disaster Plan	Counter Disaster Committee	Formulate evacuation plan	\$2,000		ASAP after the adoption of the Disaster Mitigation Plan
In the event of a cyclone or other disaster in the area, initiate a positive tourism advertising campaign to counter negative effect on the tourism industry	Council, Tourism Bureau & Chamber of Commerce				If required
Staff training in above mitigation procedures	Council	Organise for provision of appropriate staff training measures	\$5,000		Ongoing

7.8 Evaluation of Croydon Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 8
Easy to use and clearly laid out.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 8
A little more detail in some places would have been useful. The modification in Form A11 makes the treatment options easy to link to the risk evaluation table Form A10.

Relevance to aims and objectives of the scheme – 7
No real aims and objectives were laid out for the study.

8 Emerald Shire Council

The study consists of two parts, which are distinguished by size and title. The first part is the full report titled 'Natural Hazards, Bushfire – Earthquake – Flooding – Severe Wind and the Risks they Pose' and is over 500 pages long. The second part is the executive summary titled 'Disaster Mitigation Plan', (a total of 100 pages) all of which is contained within the first part of the study.

8.1 Aims and Objectives

The report represents a broad assessment of the hazards and risks they pose to the Emerald Shire Council. It identifies, the risks posed by these hazards and feasible mitigation strategies to minimise economic and social impacts on Emerald Shire and its communities. The stated focus is long-term preparedness and planning to minimise the impact of natural hazards and prevention of loss of life. The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. Emerald Shire Council hired a consultant, KTG Engineering, lead by Ken Durham and Dr J M W Ryan.

Primary objectives of the study were to:

- 1) Identify the natural disasters and community vulnerability
- 2) Determine and analyse the risk
- 3) Develop a comprehensive natural disaster risk register
- 4) Determine appropriate treatment options
- 5) Review the Shires' current Local Counter Disaster Plan(s) (LGCDP's)
- 6) Recommend any actions or changes required to the Shires' current Local Counter Disaster Plan(s) (LGCDP's)
- 7) Review Council's corporate governance systems and make appropriate recommendations

8.2 The Risk Management Team

The report refers to a study advisory group (SAG) whose membership was as follows:

- Chair Emerald Shire Counter Disaster Committee Emerald Shire Council
- Chief Executive Officer Emerald Shire Council
- Director Engineering Services Emerald Shire Council
- SES Controller Emerald Shire Council
- District Inspector Rural Fire Service QFRS
- Senior Sergeant Queensland Police Service
- Works Overseer and SES Controller Emerald Shire Council
- District Manager SES/VMR CDRS Rockhampton

The majority of the representatives were from the Emerald Shire council. There was one representative from the counter disaster and rescue services from Rockhampton. Other local government, community agencies, emergency services groups, business owners, and residents were identified as stakeholders. None of these were represented on the SAG.

8.3 Meetings, attendance and Community involvement

There is no reference to numbers of meetings or attendance at SAG meetings. However, the community was consulted throughout the study through public meetings, selected focus groups, walk and chat sessions and Council's newsletter 'The Shire Wire'. Newspaper

advertisements and approaches to progress associations were instituted by ESC seeking input into the study by attendance at public meetings, providing written submissions, email, 'phone and face to face' discussions with the study consultant, Ken Durham. These responses are recorded in the report.

8.4 Hazards

The study identified five hazards: (however one is repeated i.e landslips under earthquakes and landslips. This list is also different to that on the title page and then the actual hazards that are identified and analysed throughout the study – this is both inconsistent and confusing)

- Bushfires
- Earthquakes including Landslides
- Severe weather (including thunderstorms, hail and lightning)
- Flood—including Dam Break
- Landslips

8.5 Community Vulnerability Profile

Each hazard is extensively researched and written up in much detail and length from 20-50 pages. The CERA methodology for vulnerability assessment is used thereby creating – a vulnerability inventory (built and human environments); a vulnerability analysis (as vulnerability charts); an interdependence matrix; and a recovery service timetable. This approach is confusing and ineffective and does not follow the Zamecka & Buchanan NDRM guidelines.

Emerald Shire Council covers an area of 10,230 sq kms and houses approximately 13,312 people (ABS, 1996) of which 3853 people (30.8%) are in the vulnerable age groups, the young and the aged. The residents of the shire are engaged principally in the rural economy, coal mining and the various industries that support rural activities resulting in a very low unemployment rate. Grazing, dairy, beef, mixed crop farming, horticulture, fruit growing, cotton, gem mining, and aquaculture are the other main industries. Growing tourism is associated with the gemfields at Willows, Rubyvale and Sapphire.

Elevations across the undulating plain are 178m above Australian Height Datum (AHD), progressing westward and southward the elevations rise to 900m at Mt Pisgah and Mt. Table Top in the Drummond Range and 1330m at the Blackalley Range within the Carnarvon Range. Cyclones can affect the area in the form of heavy rain and depressions as well as troughs. The area experiences many thunderstorms resulting in the region being classed as having the highest number of storms in the State.

Major risks to the shire are severe storms, flooding and dam break flooding. SunWater is responsible for the operation of the Fairbairn Dam. Earthquake risk is assessed as low. Bushfire risk is low in most of shire as a result of Brigalow vegetation but Drummond Range has a high risk due to clearing of Brigalow scrub for farming.

The report uses the terminology of 'vulnerable elements'—people, buildings, environment, business, lifelines, and critical facilities.

- Bushfire
 - People – people may be killed, injured or need to be evacuated. May need to be fed and accommodated, and may be affected with breathing problems from smoke.

- Buildings – rural structures and infrastructure may be destroyed or damaged, especially those adjacent to timbered areas.
- Environment – Live stock may be lost or burnt and need to be disposed of safely. Flora and Fauna destroyed in short-term, topsoil subject to scouring.
- Business – short term loss or reduction of income and jobs may be lost.
- Lifelines – some rural water supply may be lost, electric power may fail, telecommunications may fail, road access will be affected.
- Critical Facilities – Aged people may have to be evacuated, food and water supplies brought into isolated communities.
- Severe weather (wind, hail, lightning)
 - People – people may be killed or seriously injured
 - Buildings – homes may be damaged
 - Environment – flora and fauna may be lost
 - Business – temporary loss of normal services including access to food and fuel.
 - Lifelines – Electric power, telecommunications may be lost, water and sewerage systems may fail due to power outage
 - Critical facilities – emergency services may be disrupted due to loss of power, roads may be closed.
- Earthquake
 - People – people may be killed or seriously injured and may need to be evacuated and housed.
 - Buildings – destroyed or severely damaged.
 - Environment – water courses may be contaminated, farmland damaged, landslips may be triggered.
 - Business – all businesses will be affected, jobs lost, economic damage to shire.
 - Lifelines – Electric power, telecommunications may be lost, water and sewerage systems may fail due to power outage. Roads may be cut and railway damaged.
 - Critical facilities – emergency services could be rendered inoperative, fuel and bulk food storage damaged, aged homes, hospitals, communication towers, water storages, road and rail bridges may all be damaged.
- Flood
 - People – may be killed or injured, food drops and emergency evacuations required.
 - Buildings – water may enter some buildings and dwellings above floor level.
 - Environment – Erosion may alter watercourses and drainage systems, stock may drown, crops waterlogged.
 - Business – water damage to some businesses, stock damaged.
 - Lifelines – Roads will be damaged and cut, bridges washed out, rail system cut.
 - Critical facilities – Water and sewerage at risk due to location, power may need to be cut rendering facility inoperable.
- Dam Break Flood
 - People – may be killed or injured, made homeless, evacuation to safe ground, and to house and feed. Fixed wing aircraft unable to land.
 - Buildings – very large numbers of homes and structures may be damaged or destroyed.

- Environment – Scouring, loss of topsoil, spillage of chemicals, flooding of sewerage treatment plants, loss of flora and fauna.
- Business – damaged, loss of stock and profits, crops, livestock, rural infrastructure damaged or destroyed.
- Lifelines – Communities isolated, power and communication may fail, road and rail links damaged, airport flooded, hospital flooded, emergency service inoperable.
- Critical Facilities – Power, communications and dependent services may be lost. Medical evacuations and airlifts may be necessary. Hospital will be flooded. Emergency services facilities disrupted. Security of town and evacuated farm buildings at risk.
- Landslides
 - There is no known risk of landslides in Emerald Shire.

There is a lot of repetition in this section.

8.6 Risk Evaluation

Form A10 has been scanned to show the risk evaluation. This includes the hazard, the identified risks, likelihood rating, consequence and risk rating.

8.7 Risk Treatment

The consultant included a summary of the treatment options at the beginning of the report. Each Treatment option is listed under a hazard in terms of priority. The estimated cost, funding agency and timeframe is also indicated.

8.8 Evaluation of Emerald Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 5

It should have been tabulated in the format of Zamecka & Buchanan. However the fact that in this report the consultant includes a summary table at the beginning, giving a list of the treatment options in order of priority under each hazard and then identifies, estimated cost, funding agency and time frame makes the study slightly more accessible than other studies done by the same consultant. (Sarina/Broadsound and Murweh). There is too much detail in the assessment of hazards.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 5
CERA methodology used to assess vulnerability – not needed/superfluous (150 pages).

Relevance to aims and objectives of the scheme – 5

The study addresses it's aims and objectives but fails to simplify the report making it very difficult to read.

9 Winton Shire Council

The study comprises one part, including the full report and the executive summary.

9.1 Aims and Objectives

Although this report does not clearly state its aims, it identifies the natural hazards that affect the Winton Shire, as well as the risks associated with each natural hazard. It also recommends feasible mitigation strategies to minimise the economic and social impact on the Winton Shire community.

The Winton Shire disaster risk management study establishes determined objectives. It will aim to provide an initial view of the risks within the Shire and identify what treatment options are necessary to deal with those risks, as well as seek to identify how the accuracy of the outcomes can be beneficially improved during future cycles. A significant element of the process will be consideration of how reduction in disaster risk can protect the communities against economic failures brought about by disasters. It is important to note that the study states a limited budget available for the conduct of this risk management cycle.

The study defines the context firstly by defining the problem, stating who the clients and stakeholders are, and finally the factors that affect the risk management process. The clients, stakeholders include the Winton Shire Council, all residents, business holders, primary/rural producers, landholders and other stakeholders within the shire, DNR and DPI, Queensland Rail, Department of Main Roads, EPA, Ergon, Telstra, Police, SES, Hospital and Doctor.

9.2 Study Advisory Group Members

The report refers to the SAGM as the Risk Management Team, which includes:

Position	Organization
Councillor	Winton Shire Council
Councillor	Winton Shire Council
Representative	Agforce/Community
Representative	Departmental Representative
Chief Executive Officer	Winton Shire Council
Representative	Community Representative
Councillor	Winton Shire Council
Consulting Engineer	George Bourne & Associates
Consulting Engineer	Consultant to GBA

9.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Cr Toni Willmott	Councillor	Winton Shire Council
Cr Butch Lenton	Councillor	Winton Shire Council
Mr Chris Eagles		Agforce/Community
Mr Bob Hoogland	Chief Executive Officer	Winton Shire Council
Mr Richie Searle		Community Representative
Cr BarbHoward	Councillor	Winton Shire Council

Most of the members of the council and community were local. The participation of various organizations was sought, such as the Winton Shire Council, the Queensland Rural fire Service, Counter Disaster and Rescue Service, community members, the Queensland Ambulance Services, Queensland Police Service and Agforce. This broad community representation allowed natural disaster risk management to be addressed from a whole of Shire approach.

9.3 Meetings, attendance and community involvement

The Natural Disaster Risk Management Committee (Study Advisory Group) had three public meetings, between the months of December 2001 and July 2002. There is no record of attendance in either one of them, but the results and outcomes were printed on the Community Bulletin. The meetings focused on identifying, classifying and prioritising each of the natural disaster risks that threaten the Shire. Additionally, the meetings developed a series of treatment options and prepared a draft for the Disaster Risk Management Report.

9.4 Community vulnerability profile

The report uses the terminology of vulnerability that was employed in the AGSO Cities Project—people, buildings, business, lifelines, and critical facilities. This is a useful subdivision of categories of vulnerability.

Winton is a pastoral and rail town 190m above sea level located 178km northwest of Longreach on the National Highway. It comprises two main types of 'semi-arid' grazing country and is situated in the Lake Eyre catchment with the Diamantina River forming the main drainage system. The rural economy and hence the employment it creates, relies on rain for its sustainability. Population of the shire is 1956 permanent residents. Of this population, 1100 reside in the township of Winton.

Natural disasters in Winton Shire that are of concern are flooding, severe winds and bushfires. The main clients and stakeholders are the Winton Shire Council, all residents, business holders, primary/rural producers, landholders and other stakeholders within the shire, DNR and DPI, Queensland Rail, Department of Main Roads, EPA, Ergon, Telstra, Police, SES, Hospital and Doctor.

Some urban areas south of Elderslie Street might be threatened in case of a flood, and major floods affect all the people within the shire. Fire is a high-risk hazard, but all residents are considered vulnerable to serious injury or even loss of life in a severe windstorm. This is because residential dwellings, which are the primary places in which people take shelter during such events, are not built to withstand the wind forces associated with these storms. Council Roads are the most vulnerable lifelines during flooding because of their low cost of construction and corresponding low flood immunity. This results in whole or part of the shire being isolated for some days and even weeks and extensive damage to infrastructure.

9.5 Possible Hazards

The presents report identifies and describes the possible natural hazards that might threaten Winton. These are:

1. Flooding
2. Bush Fires
3. Severe storms
4. Drought

- Flooding
 - People: residents in flood prone areas may be injured.
 - Buildings, business and critical facilities: cessation of activities.
 - Lifelines: transport systems disrupted, and damaged or destroyed.
- Bush Fires
 - People: residents in fire prone areas may be injured or killed.
 - Buildings, business and industry: medium damage.
 - Environment: loss of wildlife habitat and tourist amenities.
- Severe storms (dust storms)
 - People: residents in prone areas may be injured or killed.
 - Business: disruption or cessation.
 - Lifelines, buildings and critical facilities: damage, disruption or cessation.
 - Environment: loss of livestock.
- Earthquakes
 - People: people may be killed.
 - Lifelines: certain damage.

As each hazard is identified, it is followed by a vulnerability profile under the headings of people, buildings, environment, rural and urban business, lifelines, and critical facilities. Details of specific vulnerability to that hazard are included under each of these broad subheadings, stating their risk and possible consequences.

9.6 Risk Evaluation

The report provides a clear risk evaluation for each of the hazards identified. This risk evaluation form takes the same vulnerability categories and assesses their risk, likelihood rating, consequence rating and the risk rating. The following table shows with a star symbol those risks classified as extreme or high priority.

9.7 Risk Treatment

The Identification and Evaluation of Treatment Options register identifies each hazard, and its vulnerable element, describing its risk, risk priority, treatment option and treatment evaluation. Nevertheless, this register does not link to the risk evaluation form, since the latter lacks a risk priority value. The table identifies the treatments classified as top or number one priority with a star.

9.8 Evaluation of Winton Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8
(the report was clear but imperfectly organized)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 7 (due to its lack of aims, contact details or clearly stated objectives)

Relevance to aims and objectives of the scheme: 6
(study did not state clearly its objectives, and lacked aims)

Since in the Guidelines and Manual the risk evaluations are not repeated or identified in the risk treatments, the Winton Shire Council follows this model, meaning that their Treatment Strategy Development does not link the treatments with their priority.

10 Ilfracombe Shire Council

The study consists of one part, including the full report and the executive summary.

10.1 Aims and Objectives

Although this report does not clearly state its aims, it identifies the natural hazards that affect the shire, as well as the risks associated with each natural hazard. It also recommends feasible mitigation strategies to minimise the economic and social impact on the local community.

The Ilfracombe Shire Disaster Risk Management Study aimed to provide an initial view of the risks within the Shire and identify what treatment options are necessary to deal with those risks, as well as seek to identify how the outcomes can be improved during future cycles. A significant element of the process will be consideration of how reduction in disaster risk can protect the communities against economic failures brought about by disasters. The report states a limited budget available for the conduct of this risk management cycle.

The report starts by giving a definition of the problem, it then moves to state who the clients and stakeholders are, and finally the factors that affect the risk management process. The clients and stakeholders include the Ilfracombe Shire Council, all residents, business operators, primary/rural producers, landholders and other stakeholders including Govt. Agencies such as DNRM and DPI, Queensland Rail, Department of Main Roads, EPA, Ergon, Telstra, Police and Emergency Services

10.2 Study Advisory Group Members

The report refers to the SAGM as the Risk Management Team, which includes:

Position	Organization
District Manager	CDRSC/West
Mayor Ilfracombe Shire Council	Ilfracombe Shire Council
CEO Ilfracombe Shire Council	Ilfracombe Shire Council
Councillor	Ilfracombe Shire Council
Overseer	
Secretary	SES Rural Fire Brigade
Police Officer	
Gardener	
Training and employment officer	Competitive employment
Volunteer	SES Rural Fire Brigade
Stockroutes Supervisor	SES Ilfracombe Shire
Truck Driver	SES Rural Fire Brigade
Consulting Engineer	George Bourne & Associates
Consulting Engineer	Consultant to GBA

10.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Martin Forrest	Mayor Ilfracombe Shire Council	Ilfracombe Shire Council
Vaughn Becker	CEO Ilfracombe Shire Council	Ilfracombe Shire Council
John Back	Councillor	Ilfracombe Shire Council
Barbara Harris	Secretary	SES Rural Fire Brigade
Kevin McDonald	Police Officer	
Nick Amiquet	Gardener	
Bunny Irvine	Training and employment officer	Competitive employment
Mick Wheeler	Volunteer	SES Rural Fire Brigade
Jason Dolgner	Stockroutes Supervisor	SES Ilfracombe Shire
Allan McLachlan	Truck Driver	SES Rural Fire Brigade

Most of the members of the council and community were local. The participation of various organizations included Ilfracombe Shire Council, the Queensland Rural Fire Service, Counter Disaster and Rescue Service, community members, the Queensland Ambulance Services, and Queensland Police Service. This broad community representation allowed natural disaster risk management to be addressed from a whole of shire approach.

10.3 Meetings, attendance and community involvement

The Natural Disaster Risk Management Committee (Study Advisory Group) had three public meetings, between the months of December 2001 and July 2002. There is no record of attendance in either one of them, but the results and outcomes were printed on the Community Bulletin. The meetings focused on: developing the risk evaluation criteria for a variety of factors; identifying and describing the major hazards for the shire; describing the community's vulnerability in different areas; evaluating the different possible risks; identifying and evaluating the treatment options; and developing treatment strategies.

10.4 Community vulnerability profile

The report uses the standard terminology of vulnerability: people, buildings, business, lifelines, and critical facilities,.

Ilfracombe is a pastoral and rail town 200m above sea level located 1200km from Brisbane and 27 km east of Longreach at a similar latitude to Rockhampton. Due to the nature of its rural economy, the shire is directly affected by changes in rainfall. The population of the shire is 360 permanent residents, with 185 residing in the township of Ilfracombe. The main clients and stakeholders are the Ilfracombe Shire Council, all residents, business holders, primary/rural producers, landholders and other stakeholders within the shire, Govt. Agencies including DNRM and DPI, Queensland Rail, Department of Main Roads, EPA, Ergon, Telstra, Police and Emergency Services.

Three main natural disasters impinge on Ilfracombe Shire: flooding, severe winds and bushfires. Flooding poses a relatively limited threat to the urban area, although everybody would be affected by it. Bush fires pose a significant risk at times when fuel levels are high, and although the town is relatively well protected, all the buildings are considered vulnerable. All residents are considered vulnerable to serious injury or even loss of life in severe storms due to the unreliability of their residential dwellings, which are not built to

withstand the wind forces associated with these storms. Council Roads are the most vulnerable lifeline during flooding as a consequence of their low cost of construction and corresponding low flood immunity, resulting in the whole or part of the shire being isolated for some days and even weeks and extensive damage to the infrastructure. Additionally, Ilfracombe Shire has no medical capacity and in a flood access may be cut to the nearest facility located in Longreach.

10.5 Possible Hazards

The presents report identifies and describes the possible natural hazards that might threaten Ilfracombe. These are:

1. Flooding
 2. Bush Fires
 3. Severe storms
- Flooding
 - People: residents in flood prone areas may be injured or killed.
 - Buildings and business: cessation of activities.
 - Lifelines and critical facilities: systems disrupted, and damaged or destroyed.
 - Bush Fires
 - People: residents in fire prone areas may be injured or killed.
 - Buildings and business: medium damage with cessation of activities.
 - Environment: loss of wildlife.
 - Lifelines and critical facilities: systems damaged or affected.
 - Severe storms (dust storms)
 - People: residents in prone areas may be injured or killed.
 - Business: cessation of activities.
 - Lifelines, buildings and critical facilities: damage, disruption or cessation.
 - Environment: loss of topsoil and reduction of pasture production.

As each hazard is identified, it is followed by a vulnerability profile under the headings of people, buildings, environment, business, lifelines, and critical facilities,. Details of specific vulnerability to that hazard are included under each of these broad subheadings, stating their risk and possible consequences.

10.6 Risk Evaluation

The report provides a clear risk evaluation for each of the hazards identified. This risk evaluation form takes the same vulnerability categories and assesses their risk, likelihood rating, consequence rating and the risk rating. The table shows with a star symbol those risks classified as extreme or high priority.

10.7 Risk Treatment

The identification and evaluation of treatment options form identifies each hazard, and its vulnerable element, describing its risk, risk priority, treatment option and treatment evaluation. Nevertheless, this register does not link to the risk evaluation form, since the later lacks a risk priority value. The table identifies the treatments classified as top or number one priority with a star.

10.8 Evaluation of Ilfracombe Shire Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8
(the report was clear but imperfectly organized)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 8 (It lacks aims or clearly stated objectives. In the SAG committee, various positions do not state an agency or organization).

Relevance to aims and objectives of the scheme: 6
(The study did not state clearly its objectives, and lacked aims)

Note that there is a flaw in the Guidelines and Manual whereby the risk evaluations are not repeated or identified in the risk treatments. The Ilfracombe Shire Council has this flaw as well, meaning that their Treatment Strategy Development does not link the treatments with their priority.

11 Pormpuraaw Community Council

The study was conducted in 3 phases. An overall summary of these phases was provided in the form of one report.

11.1 Aims and Objectives

The report identifies the wet and dry season natural hazards faced by the people who live in the Pormpuraaw community and on the Strathgordon pastoral property. The objectives were to identify natural disaster risks, create an analysis and evaluation of risks and thereby an emergency risk mitigation plan which looks at ways in which the Pormpuraaw community can reduce their vulnerability.

The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. Pormpuraaw Community Council used internal consultants, James Monaghan John Taylor, to complete the study.

11.2 The Risk Management Team

The report refers to a study advisory group (SAG). Membership was as follows:

- Chair Pormpuraaw Aboriginal Council
- Chief Executive Officer Pormpuraaw Aboriginal Council
- Project Manager Consulting Anthropologist, Townsville
- Project Consultant James Monaghan and Associates, Townsville
- SES Manager SES Cairns

There were only two Pormpuraaw community members present. Other local government, community agencies, emergency services groups, business owners, and residents were identified as stakeholders. None of these were represented on the SAG.

11.3 Meetings, attendance and Community involvement

Six SAG meetings were conducted over the course of the study. Interim reports were also presented to the local representative of external agencies including the hospital, the community store, police and Women's centre. The plan was discussed in five SES meetings and notified to the wider community in a household vulnerability survey and in presentation to the community council. Residents of Strathgordon were contacted individually. The consultant was resident in Pormpuraaw for the entire course of the study and had frequent contact with local people.

11.4 Hazards

Four natural hazards are identified in this study. These include:

- Fire (in the dry season)
- Floods (in the wet season)
- Cyclones (in the wet season)
- Tidal surges (in the wet season)

11.5 Community Vulnerability Profile

The population of Pormpuraaw Community is approximately 650 people, 90% of whom are Aboriginal. People aged 65 years or more comprised 4.4% of the residential population. There is a heavy skew toward the young adult age cohorts. It covers an area of approximately 4500sq kms and the community has 147 buildings. Pormpuraaw is an aboriginal reserve that is administered by a locally elected Council. The elected Councillors are trustees of the land within the Community and the land tenure is a 'Deed of Grant in Trust (DOGIT).'

Pormpuraaw is located approximately 500kms north east of Cairns, which is the closest city. As well as its remoteness, Pormpuraaw is characterised by extreme seasonality. The wet and dry seasons provide a distinct suite of natural hazards that may affect local people and their property.

Pormpuraaw has a crocodile farm which is run as an independent commercial enterprise and which has been in existence for 30 years. The value for the 4,369 animals that it farms was assessed at \$580,000 in 2001. There are also two commercial fishing operations, and the community has a herd of about 6,000 cattle.

Pormpuraaw has a welfare economy and local people have a low material standard of living by mainstream Australian standards. They are poorly equipped to deal with the kind of investment in supplies and household preparation that are normally undertaken by a family to prepare for a natural disaster and have a great reliance on the Community Council and Federal and State Government agencies for sustaining daily life.

The report uses the terminology of 'vulnerable elements' – people, social structures, buildings, lifelines, critical facilities, local economy. However, the report does not analyse each hazard against each vulnerable element. Below is a summary version of the hazards from various sections in the report.

- Fire
 - People – loss of feed for community, outstation and Strathgordon cattle herds. Tourists may be vulnerable as there is no supervised campground.
 - Lifelines – Power and communications are vulnerable.
- Flood
 - People – feel that flood damage might occur to fencing in crocodile farm with possible release of animals.
 - Social Structure – Reduced morale due to power, radio, TV and communication 'black outs.'
 - Buildings – worst affected areas are between the Community hall and the workshop area and the airfield and the crocodile farm and the coast.

- Lifelines – Sewage effluent can rise to the surface around some houses. Breach of the dam wall may lead to severe shortages in fresh water later on in the dry season.
- Critical facilities – rising water table caused the airstrip bitumen surface to crack and bubble in places.
- Economy – Ground area available to cattle if prolonged can lead to loss of stock as available pastures deplete.
- Cyclone
 - People – potential injury and loss of life
 - Buildings – roofs may be removed and damage may result from that and other flying debris. The whole landscape is very exposed - a low relief rises to 20m ASL inland.
 - Lifelines – Collapse of powerlines can lead to the failure of the power supply and the sewerage system. Radio TV and telephone communication can also fail in a moderate cyclone. Collapse of the water tower is possible.
 - Critical facilities – Wind-blown debris may force the closure of the airfield and totally isolate the community from the outside world.
 - Economy – crocodile farm is vulnerable. Loss of cattle.
- Tidal surge
 - Buildings – given the low elevation of Pormpuraaw and many of the outstations there would be widespread destruction of property.
 - Critical facilities – Airfield would be destroyed.
 - Economy – possible undermining of areas of the Crocodile farm fence.

11.6 Risk Evaluation

This process was a major consultative process with personal interviews with 15 people from the outstations and Strathgordon. Mostly local opinions were taken, especially those that had been living in the community for quite some time, to assess the likelihood of the hazards occurring. Although this section is clearly written it has modified the AS/NZS and NDRM guidelines and therefore the tables are not as clear as they could be. The report includes tables on hazard consequence and risk ratings. These tables have been scanned. The report does not clarify what the numbers in the 'score' section of the table mean, making it a little hard identify the exact meaning of the table.

11.7 Risk Treatment

Again the report uses words rather than tables to identify treatment options. The tables that are used are completely modified from those suggested in the NDRM guidelines. Yet it is clearly stated what the proposed action plans are for each proposed risk. There is no reference to estimated costs, timeframes etc. to undertake these activities. Refer to the scanned table.

11.8 Evaluation of Pormpuraaw Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 8

Was easy to access and read but it did not stick to the NDRM Guidelines. Too much detail on every building, person, property, and many photographs of random buildings with no obvious relevance to the report.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 5

The report followed a general method but ignored the specifics of the NDRM guidelines, especially the table formats, which make it easier to identify what are the hazards and vulnerabilities, what are the risk, treatments, and mitigation strategies.

Relevance to aims and objectives of the scheme – 9

The divergence from the Zamecka & Buchanan NDRM Guidelines and Manual raises the question as to whether indigenous communities should be approached in a slightly different manner, and NDRM studies structured in an alternate manner. This assessment is comparative to other non indigenous studies, but clearly the consultants have incorporated such detailed local knowledge as to enhance the intrinsic value of the study. This stands in strong contrast to the later group of five communities analysed by Ganza, which technically follow the process but, in a sense, lack some of the culture.

12 Hopevale Community Council

The study was conducted in 3 phases. Only Phase 2 and 3 were available. However, the Phase 2 report clearly states that the scope and aims of the study are determined in Phase 1. These are therefore not presented here. It would have been useful to have all three phases attached together and presented as the final report.

12.1 Aims and Objectives

In Phases 1 and 2 of the NDRM study for the Hopevale Community Council the following was undertaken:

- A project plan was developed to guide the study advisory group and risk management teams through the risk management process.
- The context of the study was determined to develop a shared understanding of issues that affected the community in regards to a natural disaster.
- An understanding was developed of potential hazards that may impact the community.
- The vulnerability for the community was investigated.
- The risks that the community was facing were identified.
- Levels of risk were assigned.

Phase 3 developed the Disaster Mitigation Plan by:

- Ranking each of the identified risks.
- Prioritising the risks from the greatest to least priority.
- Selecting appropriate strategies that will minimise the potential risk to the community.
- Putting in place monitoring and reviewing processes to ensure that the disaster risk management process remains current and valid.

The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. Hopevale Community Council hired an external consultant, Ganza Consulting services, to complete the study.

12.2 The Risk Management Team

The report refers to a study advisory group (SAG). Membership was as follows:

- Executive Officer Aboriginal Coordinating Council,
- Infrastructure Policy and Development Manager – Aboriginal Coordinating Council,
- Representative Aboriginal and Torres Strait Islander Services (ATSIS), Cairns
- District Manager Counter Disaster and Rescue, Cairns
- District Operations Officer Counter Disaster and Rescue, Cairns
- Study Manager Ganza Consulting Services

The report also refers to a Risk Management Team (RMT) for Hopevale. Membership was as follows:

- Chairperson Hopevale Community Council, Hopevale
- Council Clerk Hopevale Community Council, Hopevale
- Infrastructure Policy and Development Mgr Aboriginal Coordinating Council, Cairns

- District Operations Officer Counter Disaster and Rescue, Cairns
- Study Manager Ganza Consulting Services

It is clear there were only two Hopevale community members present. Other local government, community agencies, emergency services groups, business owners, and residents were identified as stakeholders. None of these were represented on the SAG.

12.3 Meetings, attendance and Community involvement

The report states there were regular meetings of the SAG and RMT but there is no reference to numbers of meetings or attendance at SAG and RMT meetings. It is also stated later that there was difficulty in getting people to attend meetings due to time constraints and other commitments. This infers that the significance of performing a risk assessment study for the Hopevale community was not of a priority to the SAG or RMT. The study was discussed in two meetings held with Hopevale Community Council and SES members.

12.4 Hazards

The study identified six hazards and further categorised cyclones into cyclones of category 1 to 3 and category 4 to 5. Flood and storm surge were evaluated for events with a less than and greater than 100 year recurrence.

- Cyclones Category 1 to 3
- Cyclones Category 4 to 5
- Floods up to Q100
- Floods greater than Q100
- Storm Surge up to Q100
- Storm Surge greater than Q100
- Earthquakes
- Landslides
- Fire (rural)

12.5 Community Vulnerability Profile

The population of Hopevale Community is approximately 1,500 people. Hopevale is an aboriginal reserve that is administered by a locally elected Council. The elected Councillors are trustees of the land within the Community and the land tenure is a 'Deed of Grant in Trust (DOGIT).'

Hopevale is located approximately 25kms north north west of the township of Cooktown and approximately 195kms from the city of Cairns. The community is considered a remote locality due to its distance from the major centre of Cairns which is approximately 4 hours drive by car, or a 40 minute plane ride to Cooktown and an additional 40 minute vehicle trip from the Cooktown Aerodrome.

Hopevale has approximately 190 houses within the township area and has many older residences of timber construction as well as modern dwellings. Approximately 70% of dwellings predate 1985 and may not comply with suitable loading provisions as required by the current Building Code of Australia.

The Hopevale community has two distinct seasons, which are a definite wet (December to March) and a dry season (April to November). Most of the natural disasters are likely to happen during the wet season with bushfires (and earthquakes) being the only hazard likely to happen during the dry season

Flooding in the wake of a cyclone is a constant threat and is experienced on a wide-ranging scale throughout Cape York Peninsula. Although generally not life threatening, the loss of essential roads has economic consequences for the Community. Flooding may also affect the quality of the township's water supply. Aerodromes may be affected if built in low-lying areas. Therefore overall access can become both an economic and social dilemma.

The report uses the terminology of 'vulnerable elements' and these are – population, essential service infrastructure, power, communications, water, wastewater, commercial buildings, residential buildings, fuel supplies, food supplies, transport, medical services and the environment.

- Cyclone Category 1-3
 - People – people may be killed, injured especially residents living in older dwellings.
 - Essential Services Buildings –reduced capacity, damaged or destroyed.
 - Power – disrupted, damaged or destroyed.
 - Telecommunications – transmitters may be disrupted, damaged or destroyed.
 - Water – infrastructure may be damaged, disrupted or destroyed.
 - Wastewater – system disrupted, damaged or destroyed.
 - Council/Commercial buildings – may be damaged or destroyed.
 - Residential - may be damaged or destroyed
 - Fuel – supplies may be damaged or destroyed
 - Food – storage areas may be damaged or destroyed
 - Transport – road and air services may be disrupted or destroyed
 - Hospital – Cooktown Hospital or Health clinics may be damaged or destroyed
 - Environment – Damaged or destroyed
 - Sites of Cultural Significance – damaged or destroyed.
- Cyclone Category 4-5
 - As above
- Storm surge area up to Q100
 - People – residents may be at risk of injury or death
 - Fuel – damaged or destroyed by a storm surge
 - Environment – may be damaged or destroyed by a storm surge up to Q100
 - No other vulnerable elements are within the storm surge area.
- Storm surge area greater than Q100
 - As above
- Flooding up to Q100
 - People – may be directly affected by a flooding event.
 - Essential Services Buildings – may be directly affected by a flooding event.
 - Power – disrupted, damaged or destroyed.
 - Telecommunications – transmitters may be disrupted, damaged or destroyed.
 - Water – infrastructure may be damaged, disrupted or destroyed.
 - Wastewater – system disrupted, damaged or destroyed.
 - Council/Commercial buildings – may be damaged or destroyed.
 - Residential – may be damaged or destroyed
 - Fuel – supplies may be damaged or destroyed

- Food – storage areas may be damaged or destroyed
- Transport – road and air services may be disrupted or destroyed
- Hospital – Cooktown Hospital or Health clinics may be damaged or destroyed
- Environment – Damaged or destroyed
- Sites of Cultural Significance – damaged or destroyed.
- Flooding greater than to Q100
 - As above
- Earthquake
 - See above
- Fire (rural)
 - People – residents in fire prone area may be injured or killed.
 - Essential Services Buildings – may have a reduced capacity, be damaged or destroyed by a rural fire.
 - See above for other vulnerable elements.
- Landslides
 - People – residents in steep areas may be injured or killed.
 - See above for other vulnerable elements.

12.6 Risk Evaluation & Risk Treatment

The final report summarises the risk evaluation and risk treatment in one table, which is modified from the NDRM guidelines. Forms A10 (risk evaluation), A11 (treatment options) and A14(mitigation plan), have all been combined. The scanned section includes only those identified as risk priority 1 and 2. The table details action priorities determined from the derived level of risk, risk treatment options, risk treatment option evaluation, recommended risk treatment, endorsed risk treatment option, responsible agency/person, consequential action, and implementation timeframe/frequency. This report also includes a detailed risk action plan for each of the risks identified. Each plan includes: a risk statement; recommended response and expected outcomes; proposed actions; responsible agency; timetable, estimated cost and possible funding sources; reporting and monitoring.

12.7 Evaluation of Hopevale Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 8

Was extremely easy to access. Maybe too much detail on vulnerable elements.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 6

The study uses it as a guide but tabulates the risk evaluation, risk treatments and mitigation planning all into one table. This works but does not adhere to the Guidelines. It may have been better to group all priority 1 and 2 treatments together. The study also uses a long list of vulnerable elements, and although this is useful to identify it would have been simpler to stick to the vulnerable elements as suggested in the guidelines.

Relevance to aims and objectives of the scheme – 5

There were no aims and objective provided as these were in the phase 1 report.

13 Injinoo Community Council

The study was conducted in 3 phases. Only phase 3 was made available. However, since the same consultant conducted 5 studies of the aboriginal areas, a similar section on aims and objectives is provided below. It would have been useful to have all three phases attached together and presented as the final report.

13.1 Aims and Objectives

In Phases 1 and 2 of the NDRM study for the Injinoo Community Council the following was undertaken:

- A project plan was developed to guide the study advisory group and risk management teams through the risk management process.
- The context of the study was determined to develop a shared understanding of issues that affected the community in regards to a natural disaster.
- An understanding of potential hazards that may impact the community was developed.
- The vulnerability for the community was investigated.
- The risks that the community was facing were identified.
- Levels of risk were assigned.

Phase 3 developed the Disaster Mitigation Plan by:

- Ranking each of the identified risks.
- Prioritising the risks from the greatest to least priority.
- Selecting appropriate strategies that will minimise the potential to the community.
- Putting in place monitoring and reviewing processes to ensure that the disaster risk management process remains current and valid.

The study followed the Australia/New Zealand standard, the Department of Emergency Services Guidelines and the Zamecka & Buchanan NDRM Guidelines and Manual. Injinoo Community Council hired an external consultant, Ganza Consulting services, to complete the study.

13.2 The Risk Management Team

The SAG for each of the 5 studies was the same. However, the Risk Management Team (RMT) changed for each study area to include community members and local council members. As phase 2 for Injinoo was not made available it was not possible to identify the local RMT.

The study advisory group (SAG) membership was as follows:

- Executive Officer Aboriginal Coordinating Council, Cairns
- Infrastructure Policy and Aboriginal Coordinating Council, Cairns
- Development Manager
- Representative Aboriginal and Torres Strait Islander Services (ATSIS) Cairns
- District Manager Counter Disaster and Rescue, Cairns
- District Operations Officer Counter Disaster and Rescue, Cairns
- Study Manager Ganza Consulting Services

13.3 Meetings, attendance and Community involvement

Not available – No Phase 2 report available to summarise.

13.4 Hazards

The study identified six hazards and further categorised cyclones into cyclones of category 1 to 3 and category 4 to 5. Flood and storm surge were evaluated for events with a less than and greater than 100 year events.

- Cyclones Category 1 to 3
- Cyclones Category 4 to 5
- Floods up to Q100
- Floods greater than Q100
- Storm Surge up to Q100
- Storm Surge greater than Q100
- Earthquakes
- Landslides
- Fire (rural)

13.5 Community Vulnerability Profile

Not available – No Phase 2 report available to summarise.

The report uses the terminology of 'vulnerable elements' and these are – population, essential service infrastructure, power, communications, water, wastewater, commercial buildings, residential buildings, fuel supplies, food supplies, transport, medical services and the environment.

- Cyclone Category 1-3
 - People – people may be killed, injured especially residents living in older dwellings.
 - Essential Services Buildings –reduced capacity, damaged or destroyed.
 - Power – disrupted, damaged or destroyed.
 - Telecommunications – transmitters may be disrupted, damaged or destroyed.
 - Water – infrastructure may be damaged, disrupted or destroyed.
 - Wastewater – system disrupted, damaged or destroyed.
 - Council/Commercial buildings – may be damaged or destroyed.
 - Residential - may be damaged or destroyed
 - Fuel – supplies may be damaged or destroyed
 - Food – storage areas may be damaged or destroyed
 - Transport – road and air services may be disrupted or destroyed
 - Hospital – Cooktown Hospital or Health clinics may be damaged or destroyed
 - Environment – Damaged or destroyed
 - Sites of Cultural Significance – damaged or destroyed.
- Cyclone Category 4-5
 - As above
- Storm surge area up to Q100
 - As above
- Storm surge area greater than Q100
 - See above
- Flooding up to Q100
 - People – may be directly affected by a flooding event.
 - Essential Services Buildings – may be directly affected by a flooding event.
 - Power – disrupted, damaged or destroyed.
 - Telecommunications – transmitters may be disrupted, damaged or destroyed.

- Water – infrastructure may be damaged, disrupted or destroyed.
- Wastewater – system disrupted, damaged or destroyed.
- Council/Commercial buildings – may be damaged or destroyed.
- Residential – may be damaged or destroyed
- Fuel – supplies may be damaged or destroyed
- Food – storage areas may be damaged or destroyed
- Transport – road and air services may be disrupted or destroyed
- Hospital – Cooktown Hospital or Health clinics may be damaged or destroyed
- Environment – Damaged or destroyed
- Sites of Cultural Significance – damaged or destroyed.
- Flooding greater than to Q100
 - See above
- Earthquake
 - See above
- Fire (rural)
 - People – residents in fire prone area may be injured or killed.
 - Essential Services Buildings – may have a reduced capacity, be damaged or destroyed by a rural fire.
 - See above for other vulnerable elements.
- Landslides
 - People – residents in steep areas may be injured or killed.
 - Essential Services Buildings – may have a reduced capacity, be damaged or destroyed by a landslide.
 - See above for other vulnerable elements.

13.6 Risk Evaluation & Risk Treatment

The final report summarises the risk evaluation and risk treatment in one table, which is modified from the NDRM guidelines. Forms A10 (risk evaluation), A11 (treatment options) and A14 (mitigation plan), have all been combined. The scanned section includes only those identified as risk priority 1 and 2. The table details: action priorities determined from the derived level of risk, risk treatment options, risk treatment option evaluation, recommended risk treatment, endorsed risk treatment option, responsible agency/person, consequential action, and implementation timeframe/frequency. This report also includes a detailed risk action plan for each of the risk identified. Each plan includes: a risk statement, recommended response and expected outcomes, proposed actions, responsible agency, timetable, estimated cost and possible funding sources, and reporting and monitoring.

13.7 Evaluation of Injinoo Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility – 8

The study was easy to access, but there was too much detail on vulnerable elements.

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual – 6

The study uses it as a guide but tabulates the risk evaluation, risk treatments and mitigation planning all into one table. This works but does not adhere to the Guidelines. It may have been better to group all priority 1 and 2 treatments together. The study also uses a long list of vulnerable elements, and although this is useful to identify it would have been simpler to stick to the vulnerable elements as suggested in the guidelines.

Relevance to aims and objectives of the scheme – 5

There were no aims and objective provided as these were in the phase 1 report.

14 New Mapoon Community Council

The report was divided into three phases, with one final report.

14.1 Aims and Objectives

The purpose or aim of this plan was to identify what needs to be done to implement the outcomes of the natural disaster risk management study. The report does not state any objectives, but organizes the steps as phases, where different tasks were undertaken.

The phases 1 and 2 of the report included the following tasks: developing a plan to guide the SAG and risk management teams through the risk management process; the context of the study was determined; an understanding of the potential hazards that may impact the community was developed; the vulnerability of the community was investigated; the risks that the community was facing were identified; and the levels of risk were assigned. The next phase developed the Disaster Mitigation Plan, which included ranking each of the identified risks, prioritising the risks from the greatest to least priority, selecting appropriate strategies that would minimise the potential to the community, and put in place monitoring and reviewing processes to ensure the validity and feasibility.

14.2 Study Advisory Group Members

N/A. The report did not make available a list or a portion of the document that stated the names, position and organization of the Study Advisory Group.

14.2.1 Members of the council and community present in the Study Advisory Group

N/A. The report did not make available a list or a portion of the document that stated the names, position and organization of the Study Advisory Group.

14.3 Meetings, attendance and community involvement

N/A. The consulting agency (Ganza Consulting Services) does not state anywhere if they had any contact with the community, although they mention in the reports for other councils the number of meetings, dates and agenda.

14.4 Community vulnerability profile

N/A. The report does not state the community vulnerability profile anywhere.

14.5 Possible Hazards

The New Mapoon Community Council lists seven major hazards, dividing them according to their strength:

1. Cyclone/ Severe storms (category 1-3)
 2. Cyclone/ Severe storms (category 4 and over)
 3. Flooding (up to Q100)
 4. Flooding (Greater than Q100)
 5. Earthquake
 6. Fire
 7. Landslide
- Cyclone/ Severe storms (category 1-3)
 - Potential injury to community residents
 - Damage to telecommunications facilities/transmitters
 - Damage to the potable water supply system

- Cyclone/Severe Storm (Category 4 and over)
 - Damage to telecommunications facilities/transmitters
 - Damage to essential service buildings
- Flooding (Up to Q100)
 - Damage to telecommunications facilities/transmitters
- Flooding (Greater than Q100)
 - Damage to telecommunications facilities/transmitters
- Earthquakes
 - People: residents may be injured or killed.
 - Buildings: damage.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Fire
 - People: residents in fire prone areas may be injured or killed.
 - Buildings: damage, destroyed or disrupted.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Landslide
 - People: residents in steep areas may be injured or killed.
 - Buildings, business, lifelines and critical facilities: damage, disruption or cessation.

14.6 Risk Evaluation and Risk Treatment

The final report summarises the risk evaluation and risk treatment in one table, which is modified from the NDRM guidelines. As each hazard is identified, it is followed by a community vulnerability profile under the headings of people, essential services buildings, power, telecommunications, potable water, wastewater, fuel, food, transport, hospital, environment, and sites of cultural significance. This extreme specialization of the categories suggested by the NDRM make the analysis of the report more exhaustive and detailed. Fine points of specific vulnerability to that hazard are included under each of these broad subheadings. A risk statement for that specific hazard, detailing the likelihood, consequence and level of risk, follows this. Therefore, the resulting table presents information including the risk evaluation, risk treatment, agency, funding source and timeframe. This makes the final table very lengthy, but detailed.

14.7 Evaluation of New Mapoon Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8
(It is easy to access and clear to use.)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 3 (Since they merge all the tables into one, use different categories to those suggested in the guidelines, it lacks SAG members, a community vulnerability profile, meeting attendance and community involvement, and it lacks aims/objectives)

Relevance to aims and objectives of the scheme: 5
(It lacks clearly stated aims and objectives.)

15 Umagico Community Council

The report was divided into three phases, with one final report.

15.1 Aims and Objectives

The purpose or aim of this plan was to identify what needs to be done to implement the outcomes of the natural disaster risk management study. The report does not state any objectives, but organizes the steps as phases, where different tasks were undertaken.

The phases 1 and 2 of the report included the following tasks: developing a plan to guide the SAG and risk management teams through the risk management process; the context of the study was determined; an understanding of the potential hazards that may impact the community was developed; the vulnerability of the community was investigated; the risks that the community was facing were identified; and the levels of risk were assigned. The next phase developed the Disaster Mitigation Plan, which included ranking each of the identified risks, prioritising the risks from the greatest to least priority, selecting appropriate strategies that would minimise the potential to the community, and put in place monitoring and reviewing processes to ensure the validity and feasibility.

15.1 Study Advisory Group Members & Members of the council and community present in the Study Advisory Group

N/A. The report did not make available a list or a portion of the document that stated the names, position and organization of the Study Advisory Group.

15.2 Meetings, attendance and community involvement

N/A. The consulting agency (Ganza Consulting Services) does not state anywhere if they had any contact with the community, although they mention in the reports for other councils the number of meetings, dates and agenda.

15.3 Community vulnerability profile

N/A. The report does not state the community vulnerability profile anywhere.

15.4 Possible Hazards

The New Mapoon Community Council lists seven major hazards, dividing them according to their strength:

1. Cyclone/ Severe storms (category 1-3)
 2. Cyclone/ Severe storms (category 4 and over)
 3. Flooding (up to Q100)
 4. Flooding (Greater than Q100)
 5. Earthquake
 6. Fire Rural)
 7. Landslide
- Cyclone/ Severe storms (category 1-3)
 - Potential injury to community residents
 - Damage to telecommunications facilities/transmitters
 - Damage to the potable water supply system
 - Sites of cultural significance: damage
 - Cyclone/Severe Storm (Category 4 and over)

- Damage to telecommunications facilities/transmitters
- Damage to essential service buildings
- Sites of cultural significance: damage
- Flooding (Up to Q100)
 - Damage to telecommunications facilities/transmitters
 - Sites of cultural significance: damage
- Flooding (Greater than Q100)
 - Damage to telecommunications facilities/transmitters
 - Sites of cultural significance: damage
- Earthquakes
 - People: residents may be injured or killed.
 - Buildings: damage.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
 - Sacred sites
- Fire
 - People: residents in fire prone areas may be injured or killed.
 - Buildings: damage, destroyed or disrupted.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
- Landslide
 - People: residents in steep areas may be injured or killed.
 - Buildings, business, lifelines and critical facilities: damage, disruption or cessation.
 - Sacred sites

15.5 Risk Evaluation and Risk Treatment

The final report summarises the risk evaluation and risk treatment in one table, which is modified from the NDRM guidelines. As each hazard is identified, it is followed by vulnerability elements under the headings of people, essential services buildings, power, telecommunications, potable water, wastewater, fuel, food, transport, hospital, environment, and sites of cultural significance. This extreme specialization of the categories suggested by the NDRM make the analysis of the report more exhaustive and detailed. Fine points of specific vulnerability to that hazard are included under each of these broad subheadings. A risk statement for that specific hazard, detailing the likelihood, consequence and level of risk, follows this. Therefore, the resulting table presents information including the risk evaluation, risk treatment, agency, funding source and timeframe. This makes the final table very lengthy, but detailed.

15.6 Evaluation of Umagico Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8
(It is easy to access and clear to use.)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 3
(It merges all the tables into one, uses different categories to those suggested in the guidelines, it lacks SAG members, a community vulnerability profile, meeting attendance and community involvement, and it lacks aims/objectives)

Relevance to aims and objectives of the scheme: 5
(It lacks clearly stated aims and objectives.)

16 Wujal Wujal Community Council

The report was divided into three phases, with one final report.

16.1 Aims and Objectives

The purpose or aim of this plan was to identify what needs to be done to implement the outcomes of the natural disaster risk management study. The report does not state any objectives, but organizes the steps as phases, where different tasks were undertaken.

Phases 1 and 2 of the report included the following tasks: developing a plan to guide the SAG and risk management teams through the risk management process; determining the context of the study; development of an understanding of the potential hazards that may impact the community; the vulnerability of the community was investigated; the risks that the community was facing were identified; and the levels of risk were assigned. The next phase developed the Disaster Mitigation Plan, which included ranking each of the identified risks, prioritising the risks from the greatest to least priority, selecting appropriate strategies that would minimise the potential to the community, and put in place monitoring and reviewing processes to ensure the validity and feasibility.

16.2 Study Advisory Group Members

Position

Executive Office
Infrastructure Policy and Development
Manager

District Manager
District Operations Officer
Study Manager
Acting Chairperson
Acting Chief Executive Officer
Infrastructure Policy and Development
Manager
Training Officer
Works Manager
Manager
Councillor
Controller
District Operations Officer
Study Manager

Organization

Aboriginal Coordinating Council
Aboriginal Coordinating Council

ATSIS
Counter Disaster and Rescue
Counter Disaster and Rescue
Ganza Consulting Services
Wujal Wujal Community Council
Wujal Wujal Community Council
Aboriginal Coordinating Council

Counter Disaster and Rescue
Wujal Wujal Community Council
Wujal Wujal Health Centre
Wujal Wujal Community Council
SES
Counter Disaster and Rescue
Ganza Consulting Services

16.2.1 Members of the council and community present in the Study Advisory Group

Name	Position	Organization
Norman Tayley	Acting Chairperson	Wujal Wujal Community Council
Bhan Prafof	Acting Chief Executive Officer	Wujal Wujal Community Council
Peter Sciberras	Works Manager	Wujal Wujal Community Council
Anna Cleary	Manager	Wujal Wujal Health Centre
George Kukla	Councillor	Wujal Wujal Community Council

Of the sixteen members of the SAG committee, five live in the community. The remaining eleven live mostly in Cairns. The Aboriginal Coordinating Council was the lead agency for the Wujal Wujal Community council Natural Disaster Risk Management study.

16.3 Meetings, attendance and community involvement

The consulting agency (Ganza Consulting Services) met twice with the community during the months of May and August of 2003, as stated in the reports to the community councils. No minutes or records of the meetings were included in the report, nor record of attendees. After these meetings, the agency decided to place the project information on their web site, but there is no follow up to this matter.

Groups were established to have a special interest in the process. These include the Aboriginal Coordinating Council, Wujal Wujal Community Council, Study Advisory Group, Natural Disaster Risk Management team, Commonwealth Government, State Emergency Service, Queensland Police, Queensland Ambulance Service, Queensland Fire and Rescue Authority, Department of Emergency Services, Multi Purpose Health Service, Ergon Energy, Telstra, royal Flying Doctor Service, Q-Build, Queensland National Parks and Wildlife Service, and Aboriginal and Torres Strait Islander Service.

16.4 Community vulnerability profile

The report classifies their vulnerable elements in 14 categories for each hazard: people, essential services/buildings, power, telecommunications, potable water, wastewater, council/commercial buildings, residential buildings, fuel, food, transport, hospital, environment, and sites of cultural significance.

The Wujal Wujal community is located in the Far North of Queensland. The area has a distinct wet and dry season, with an annual mean rainfall of almost 2m per year. The estimated population in 2001 was 281 people, with the majority aged between 25 and 44 years (actual figures are much higher). The community derives most of its income from CDEP activities and welfare. Except for the store and petrol station, there are no businesses within the community that deliver revenue to its residents. Welfare dependency often leads to inactivity which impacts/affects preparedness and response to natural disasters.

Due to their age, 70% of the residential buildings in the area are vulnerable to cyclones, flooding and earthquakes. There is no SES shed located within the community and the roads connecting to Wujal Wujal are considered at risk due to flooding and damage caused by flooding and landslides. If the community were isolated due to a natural hazard, food

would last from one week to a month, while the bulk fuel would only be available for the first week. This is aggravated by the fact that the community does not have a hospital, but a Primary Health Care Centre, and relies in the hospital located in Cooktown or the Royal Flying Doctor Service.

16.5 Possible Hazards

The Wujal Wujal Community Council lists six major hazards, dividing them according to the wet and dry season:

1. Cyclone/ Severe storms (category 1-3)
 2. Cyclone/ Severe storms (category 4 and over)
 3. Storm surge (up to Q100)
 4. Flooding (up to Q100)
 5. Flooding (Greater than Q100)
 6. Earthquake
 7. Fire
 8. Landslide
- Cyclone/ Severe storms (category 1-3)
 - Potential injury to community residents
 - Damage to telecommunications facilities/transmitters
 - Damage to the potable water supply system
 - Cyclone/Severe Storm (Category 4 and over)
 - Damage to telecommunications facilities/transmitters
 - Damage to essential service buildings
 - Storm Surge (up to Q100)
 - Damage to telecommunications facilities/transmitters
 - Flooding (Up to Q100)
 - Damage to telecommunications facilities/transmitters
 - Flooding (Greater than Q100)
 - Damage to telecommunications facilities/transmitters
 - Earthquakes
 - People: residents may be injured or killed.
 - Buildings: damage.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
 - Fire
 - People: residents in fire prone areas may be injured or killed.
 - Buildings: damage, destroyed or disrupted.
 - Business: disruption or cessation.
 - Lifelines and critical facilities: damage, disruption or cessation.
 - Landslide
 - People: residents in steep areas may be injured or killed.
 - Buildings, business, lifelines and critical facilities: damage, disruption or cessation.

16.6 Risk Evaluation and Risk Treatment

The final report summarises the risk evaluation and risk treatment in one table, which is modified from the NDRM guidelines. As each hazard is identified, it is followed by a community vulnerability profile under the headings of people, essential services buildings, power, telecommunications, potable water, wastewater, fuel, food, transport, hospital,

environment, and sites of cultural significance. This extreme specialization of the categories suggested by the NDRM make the analysis of the report more exhaustive and detailed. Points of specific vulnerability to that hazard are included under each of these broad subheadings. A risk statement for that specific hazard, detailing the likelihood, consequence and level of risk, follows this. Therefore, the resulting table presents information including the risk evaluation, risk treatment, agency, funding source and timeframe. This makes the report very lengthy, but detailed.

This report also includes an additional detailed risk action plan for each of the risks in the study report identified as extreme. Each plan includes: a risk statement; recommended response and expected outcomes; proposed actions; responsible agency; timetable, estimated cost and possible funding sources; reporting and monitoring.

16.7 Evaluation of Wujal Wujal Community Council Natural Disaster Risk Management Study

Evaluation of the study in terms of ease of use and accessibility: 8

(Clear to use)

Evaluation of adherence to Zamecka & Buchanan NDRM Guidelines and Manual: 6 (They merge all the tables into one, and use different categories to those suggested in the guidelines. Also, it suddenly introduces the landslide hazard in the risk evaluation.)

Relevance to aims and objectives of the scheme: 5

(There is a lack of clearly stated aims and objectives)

The evaluation of the study is based on what is presented and is comparative to the other studies. However, it must be noted that there are some errors of understanding of the community that are a significant flaw to the usefulness of this document.

Section 11 Best Practice: the way ahead

“Best Practice is a management idea which asserts that there is a technique, method, process, activity, incentive or reward that is more effective at delivering a particular outcome than any other technique, method, process, etc. The idea is that with proper processes, checks, and testing, a project can be rolled out and completed with fewer problems and unforeseen complications. The notion of ‘best practices’ does not commit people or companies to one inflexible, unchanging practice. Instead, Best Practices is a philosophical approach based around continuous learning and continual improvement.” (Wikipedia 2006)

The strength of Wikipedia's definitions lies in their immediacy and in the process of consensus that develops its entries. A great deal more explanation follows the basic quotation that is reproduced above, including extensive definitions and explanations of risk management that are in total accord with the concepts and structures used in Queensland, especially as these relate to the Australia/New Zealand standard.

Best practice is a particularly intangible concept in that it is both context and place specific, and completely fluid and flexible. Part of Wikipedia's definitions go on to discuss the Incorporation of the Japanese concept, kaizen, that requires an effort to improve constantly, and views best practice as a prize, or award in a competitive sense. Recognising a practice as best is tantamount to setting it up as a state to which others should aspire. In this respect it may be an ideal state, which in being context specific and subject to continual change, is unreachable and unachievable. The instant an organisation achieves best practice, it ceases to be an example or icon because of the need to move on to the next stage in evolving best practice.

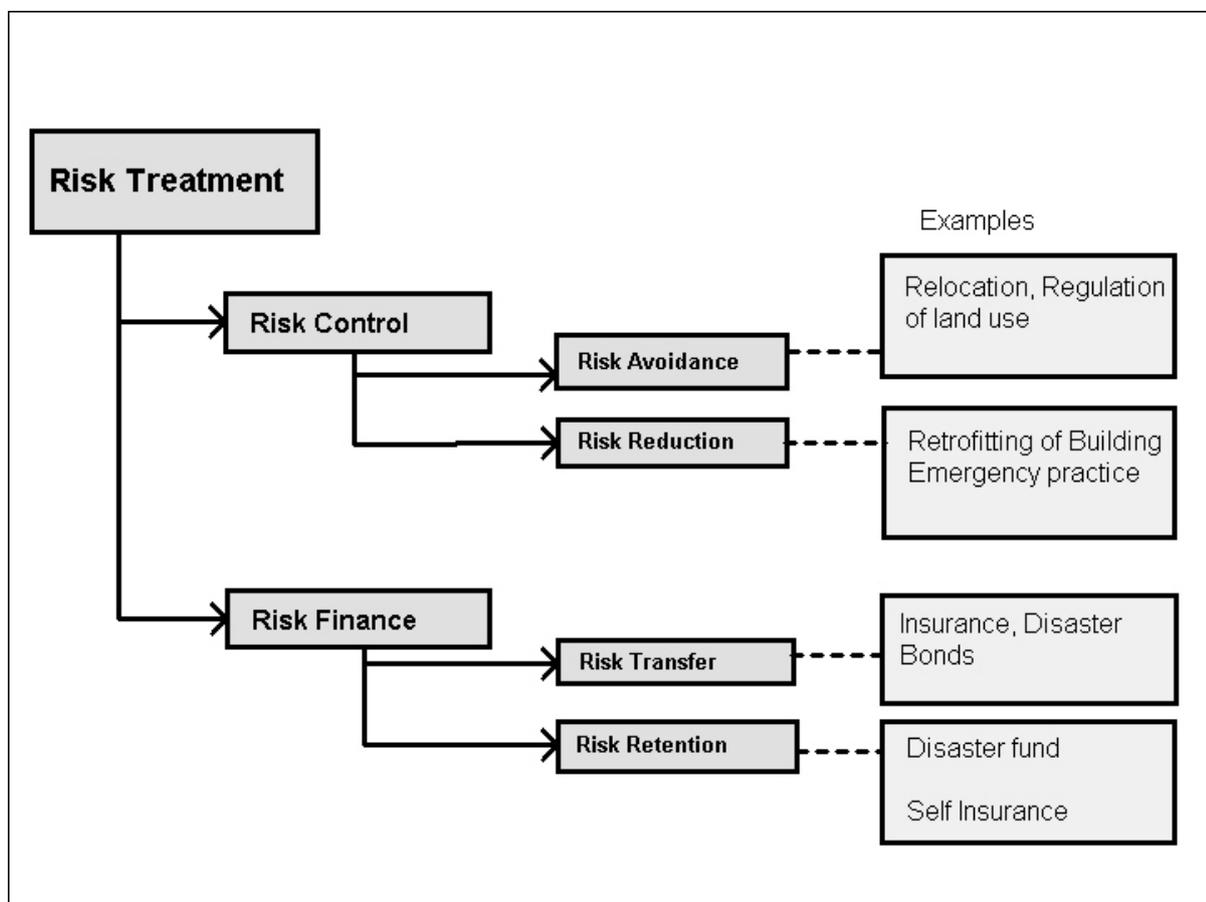
Some organisations will never catch up to best practice as identified in the experience of others, and may intentionally choose to achieve a lesser level of practice that is relevant to their capacity and needs. This may be what we mean by good practice, although Wikipedia only provides specific definitions, such as good agricultural practice. EMA's (2000) good practice guide for community engagement is a practical set of guidelines that mirrors Queensland's risk management guidelines in its aims and intentions. Organisations, and especially local government councils, are extremely diverse in terms of capacity, governance and resources. It would be unreasonable to expect Murweh Shire to achieve the same level of practice as Cairns City Council, simply on the grounds of resources available. Furthermore, when considering the differing capacities of two such councils, there is not only a gulf in available numbers of personnel, but also a gulf in world views, attitudes and conservatism. Thus in identifying examples of best practice below, these are both good practice, which may be what is really needed, and the best that a specific shire was able to achieve.

Minimum standards exist in the form of legislation, including bye laws and planning conditions that may be imposed by local councils. The state planning policy on natural hazards tightened the requirements on local government by introducing the first wedge of mitigation legislation. Other minimum standard controls may also be exercised through financial and budgetary arrangements – an incentive that lay behind the NDRM studies. The incentive to achieve good practice, and a widespread desire to bring about best practice is preferable to compulsion. At this point of review of a planning process, best

practice is clearly the next step forward, but further legislation will make the facilitation role of local government much easier.

A further problem of identifying best practice from these NDRM studies is that the studies themselves did not end in a measurable practice, apart from the process of conducting the study itself. The documents are planning documents that identify primary outcomes in the form of a hazard inventory and identification of planned mitigation treatments. The interviews with case study councils suggested that most plans had been actioned or were ongoing. It is in the quality of the actioned treatments that we may most easily identify best practice.

However there are clear markers of best practice risk management and mitigation that can be identified: multi hazard, whole of community, sustainability, mitigation works, management processes, education and awareness, information sharing, multi stakeholder partnerships, citizen participation, local control and flexibility in LGC working relationships that enables regional groups to form according to specific events, mapping and GIS.



Source: ADRC

A final qualification on best practice is acknowledgement of layers of approach that exist within the concept of mitigation and risk management treatments. This is illustrated by the diagram above, taken from the ADRC's document on risk management good practices (ADRC 2005). There is a considerable diversity of approaches to treatments, many of which are quite outside the control of local government.

Having pointed out some of the problems of defining and identifying best practice, it is necessary to adopt a framework within which to construct and classify examples. The ADRC suggests five categories in its strategy for disaster risk management.

1. Establishment of coordination mechanisms and a legal framework for disaster risk management
2. Integration of disaster reduction concepts into development planning
3. Improvement of information sharing and management
4. Promotion of education and public awareness
5. Development of multi-stakeholder partnerships and citizen participation

As all of these categories are directly relevant to the NDRM studies, they have been adapted and reworded as a framework for the following examples of best practice in Natural Disaster Risk Management. In the best practice examples cited below, details have not been repeated for those studies that are summarised already, in sections 8 and 10.

1. The Management Framework and Guidelines

The creation of a mechanism and structure for carrying out risk management studies is the first step. It has been argued in earlier sections that the guidelines that have been developed in Queensland built upon national and international best practice

1.1 NDRMS Guidelines: Zamecka & Buchanan and Indigenous Communities Guide

The guidelines lay down clear procedures to enable councils to arrive at management and mitigation treatments. The steps and tables/forms included in the guides are necessary, but the elements that are the core of the plan have been identified in this review as follows, and have been used to summarise and review all studies:

Core Elements

1. Structure of the report
2. Aims and Objectives
3. Membership of the Study Advisory Group (SAG)
4. SAG Meetings, Attendance and Community Engagement
5. Community Vulnerability Profile
6. Hazard Identification
7. Risk Evaluation
8. Risk Treatments

These elements should be stated and identified clearly and succinctly.

1.2 Clarity and Conciseness of the NDRM Study

Example of Best Practice: The Cairns study and its very compact executive study contain all the information that is needed and present that information clearly and concisely. The stages that lead to the risk inventory, as identified in the Zamecka & Buchanan NDRM Guidelines and Manual are best incorporated into an appendix.

2. Identification and Mapping of Hazards

Almost all studies identified or referred to mapping of hazard zones under the Integrated Planning Act. The State Planning Policy for Natural hazards established minimum standards by requiring councils to map flood, bushfire and landslide hazards and coastal

protection legislation has encompassed storm surge zones. Although this minimum standard exists and some councils, such as Cairns, already had the mapping done for them, hazard zone maps are not necessarily available to the whole community.

2.1 Hazard Zone Mapping

Redlands Shire Council hazard mapping is best practice among the group of local governments under review. The base map is the cadastre with street names enabling easy identification and a property search engine. Flood, acid sulfate and bushfire maps are added as overlays along with many of the other planning layers and zones. Thus you can construct your own map with as much or as little information as you require. This is an excellent resource, freely available over the website. It is accompanied by a text document that provides fuller detail.

http://maps.redland.qld.gov.au/website/redemapexternal%5Fv2%5F03/Default.aspx?Service=redemap_ext_rps_mxd

The mapping of Redlands Shire can be accessed at the above website. It is extremely interactive, clear and easy to use.

2.2 Flood Mapping

Ipswich City Council has provided a flood map overlaid on the cadastre. While nowhere near the quality of the Redlands Shire mapping it still allows individual properties to be accessed, but without any road labelling, so that a user has to have an accompanying road map. However, it is a basic information tool freely accessible to the community on the following website.

<http://www.ipswich.qld.gov.au/search.php?referrer=271&search=Planning+Scheme>

2.3 Acknowledgement of the Bushfire Hazard

Pine Rivers Bushfire Mitigation Program has won a Safer Communities Award for 2006 and is clearly an example of Best Practice in Community awareness and information. While most councils identified treatments that related to bushfire mitigation and community awareness raising, and as informants at the five case study councils confirmed that most treatments had been carried out, Pine Rivers Shire clearly went further in its community and organisational engagement.

Pine Rivers Shire Website at <http://www.prsc.qld.gov.au/c/prsc?a=da&did=1153196> guides users through a series of windows and embedded sites that include a number of clear, useful and community oriented publications. The (simplified) box below illustrates some of these areas and resources. This information resource is the basis of its community education, which was otherwise added to by a series of meetings and campaigns.

Bushfires, Storms & Floods

Although uncommon, fires, storms and floods are natural occurrences in the Shire. Natural disasters can have unexpected and devastating effects on a local community. Residents can prepare for and minimise the damage caused by natural disasters such as storms and fires.

To find out more about how you can prepare for an emergency, please contact the relevant authority listed below.

FIRE

Fire Emergency	000
Arana Hills Fire Station	(07) 3851 0563
Dayboro Fire Station	(07) 3425 1476
Eatons Hill Fire Station	(07) 3264 5819
Petrie Fire Station	(07) 3285 7004
Rural Fire Service	(07) 3247 8130
Firebans and Permits	1902 270 555

STORMS

Personal injuries	Qld Ambulance Service - Phone 000
Temporary property repairs	Pine Rives State Emergency Service (SES) Phone (07) 3285 7899 (all hours)
Downed power lines	ENERGEX - Phone 13 62 62 More information: www.energex.com.au
Flooding	Pine Rivers Shire Council - Phone 3480 0555
Residential property damage	Pine Rives State Emergency Service (SES) Phone (07) 3285 7899 (all hours)
Electricity Faults	ENERGEX - Phone 13 62 62

IN ALL EMERGENCIES AND LIFE THREATENING SITUATIONS, PLEASE PHONE 000.

Bushfire Management

Page Content Links:

Bushfire Management Plans
House Fires
Risk of Fire to your Property
How to Protect your House from Bushfire
Fire Affecting your Area

Pine Rivers Shire has adopted a overall plan for the management of bushfire hazard. The State government has also adopted a planning policy on mitigating the adverse impacts of flood, bushfire and landslide. Your property may be subject to specific bushfire management requirements and/or may be in an area that is susceptible to bushfires.

Bushfire Management Plans

If your property has a bushfire management plan property condition, then a Bushfire Management Plan exists for your property. To find out how to get a copy of a Bushfire Management Plan for your property, please visit our page about property conditions.

This plan may recommend building work be undertaken in accordance with the specific requirements of the *Building Code of Australia*. The plan may also recommend that buildings be designed in accordance with *Australian Standard AS 3959 "Construction of Buildings in Bushfire Prone Areas"*.

Your bushfire management plan may require evidence that fire fighting vehicles are able to access all parts of the main dwelling and ancillary buildings. In this regard a plan showing these access routes is normally required to be submitted for approval with the building application.

You may also be required to clear and maintain a buffer around the perimeter of each building. Refer to your bushfire management plan for maintenance requirements.
Council Contact Info: (07) 3480 6666

Ask for Development Services Department

Water Supply for Fire Fighting

Your bushfire management plan will generally require a dedicated bushfire fighting supply tank. This may be a separate tank located away from the house.
Every land owner should keep the fire fighting tank full at all times.

More Information about Bushfire Management

You should refer to the following documents available for download on the sidebar of this page:

Pine Rivers Shire Bushfire Management Strategy Final Report July 2003

State Planning Policy 1/03 - Mitigating the Adverse Impacts of Flood, Bushfire & Landslide

Other publications offering general information - "Bushfire Prone Areas, Siting and Design of Residential Buildings" and "Protecting your Home against Bushfire Attack" are available from the Rural Fire Services at:

GPO Box 1425

Brisbane Q. 4001

Telephone (07) 3247 1830

E-mail: rfscomaw@emergency.qld.gov.au

For general Bushfire Management advice please refer to the **Queensland Fire and Rescue Service** or the **Rural Fire Service**

House Fires

House fires are not covered by bushfire management plan. In case of fire in the house only, **phone 000**.

Risk of fire to your property

Council land

If you believe that Council land poses a risk your property please contact the Council on (07) 3480 6666 and ask for **Parks Department**.

Private land

If Private land poses a risk to your property please discuss the issue with the property owner. If you cannot resolve the issue, please contact the **Queensland Fire and Rescue Service** .

How to protect your house from bushfire

For information on how to protect your house from bushfire and what to do during a bushfire please contact the **Queensland Fire and Rescue Service** or the **Rural Fire Service** .

Fire affecting your area

For news about a particular fire that may be affecting your area, please refer to the **Queensland Fire and Rescue Service** website.

Related Articles:

Bushfires, Storms & Floods
Bushfire Management Strategy
Evacuation
Imminent Danger

Precautions

Houses For Bushfire-Prone Sites

Bushfire Management Strategy Study, Prepared For: Pine Rivers Shire Council, By: Landmarc Ltd, The Land And Disaster Management Resource Centre Of Coffey International Limited

Planning (Development) Conditions

Page Content Links:

Property (Development) Conditions remain with the land
What Property (Development) Conditions are attached to my land?
Public Access Files (PAFs)

Important

Many land constraints are written into the permit to develop the land. The constraints are called "Property (Development) Conditions". The conditions are transferred to the newly created properties forever.

Property (Development) Conditions remain with the land

The property (development) conditions remain with the land and are legally binding on the owner. Therefore, even if you are not the first owner of the property (i.e. you are not purchasing from the directly from the developer), the property (development) conditions are still effective.

What Property (Development) Conditions are attached to my land?

Your solicitor or conveyancing consultant is able to do a range of Council property searches that will reveal any property conditions that are attached to your land. You may require further information about a property (development) condition that affects your land. Your search will specify whether further information is available. This information is usually available to view at Council's Strathpine Customer Contact Centre An example of such information would be a Bushfire Management Plan. Council keeps documents such as Bushfire Management Plans filed for your reference. These files are called PUBLIC ACCESS FILES meaning you (as a member of the public) are allowed to access them. You may also photocopy (for a small fee) any of the documents in the Public Access File you wish to take away with you.

Public Access Files (PAFs)

To view a public access file, you need to make a note of the Council PAF file number that was printed next to the property (development) condition in the search or simply bring your search with you to the Strathpine Customer Contact Centre.

Important

Not all land constraints are revealed in a property search. For example, your land may be subject to special conditions of a State or Federal Government law or covenants on the deed set by the original developer.

Council Contact Info: (07) 3480 6666 Ask for Property Searches Section

3. Information, Communication and Management

3.1 Involvement in the risk management process to inform and empower the actors.

Active involvement of council employees and business and community members as stakeholders enhances their ownership and involvement in risk management.

Examples: Cairns City Council Local Counter Disaster Group led the study.

Other locally based study advisory groups, such as at Pompuraaw, despite being one of the smallest communities effectively carried out the study in house with strong community involvement.

Doomadgee did not have a suitable study leader within the community, but effectively used a consulting company that had a long association with that community.

3.2 An Inventory of Completed Treatment Case Studies

The type of website created by FEMA, cited earlier in section 5, or case studies and examples such as those published by ADRC and EMA are a means of presenting best practice examples to other organisations. This does not yet exist but could easily be put together as an information or research project.

4. Community Engagement, Education and Preparedness

4.1 Best practice in an aboriginal community.

Best practice in aboriginal communities starts and ends with total consultation, consensus and ownership. The Pompuraaw study illustrates the community engagement process most fully with the Indigenous Disaster Risk Management Guide reflecting many of its approaches.

4.2 Best Practice Community Engagement

The Shire of Yarra Ranges in Victoria is a best practice example of community engagement in the NDRMS process. This issue links to the lost opportunity of community involvement. Apart from Pompuraaw, the councils under review here did not engage the community sufficiently. The Shire of Yarra Ranges illustrates how they might have done it.

The Shire of Yarra Ranges website contains information and explanations with a link to the Community Emergency Risk Management Plan which gives full details of the campaigns, surveys and community engagement

http://www.yarraranges.vic.gov.au/page/Page.asp?Page_Id=1746&h=1

Emergency Risk Management Plan

In 1986 the State of Victoria, Australia, enacted legislation requiring each local government to form and administer a Municipal Emergency Management Planning Committee (comprising of stakeholders including emergency services and the community) chartered to devise a Municipal Emergency Management Plan. A need to undertake a comprehensive all hazards approach to emergency management was motivated by State and National Governments in the notification that disaster relief funding may be affected if the municipality had not adopted a risk management process.

In keeping with the Shire of Yarra Ranges' philosophy of empowering its community with its role in emergency management and to meet State and National Government requirements, the Shire embarked upon a strategy titled the Community Risk Based Emergency Management Plan. The plan involved extensive community consultation including telesurveys, face to face interviews, the media and targeted community group participation to explore the community's perception of the risks that impacts upon it. The results were then analysed and prioritised according to the Australian/New Zealand Standards of Risk Management AS/NZS 4360:involving identification of the risks and prioritisation according to likelihood and consequence factors. Treatment plans were then compiled for high and extreme risks followed by specific action plans assigning the responsible agencies involved and time frames. The Shire's plan has been targeted as a case study to educate other emergency management professionals on a national scale.

Download Files [Community Emergency Risk Management Plan](#)

5. Multi Stakeholder Partnerships and Whole of Community Participation

5.1 Stakeholder Engagement and Involvement

Best Practice example: Cairns Local Counter Disaster Group as a Study Advisory Group was particularly strong in the community diversity of its membership and hence involvement of multiple stakeholders. The Cairns study was multi hazard and identified treatment responsibilities that lay outside the control of council. On the other side there is a strong lack of involvement with such crucial sectors as the tourism industry, the retail sector and virtually the whole of the rest of private enterprise. The treatments target the government and related sectors, to the exclusion of the majority of businesses. This is a flaw common to all of the studies and a direction for enhancing best practice. The Zamecka & Buchanan NDRM Guidelines and Manual were best practice models for the NDRMS which incorporate whole of community – including private enterprise and the business community.

Other examples of best practice are Sarina Shire's engagement with the CSR distillery and Doomadgee's engagement with Century Zinc Mine, Pasminco. Pasminco's involvement in community projects in the region may be accessed at http://www1.industry.gov.au/content/controlfiles/display_details.cfm?objectid=59E72EC7-1978-48B0-AB670B49D406894F

5.2 Whole of Community

The Pompuraaw study was whole of community. It is however, a small community with relatively limited non council stakeholders. Indigenous communities lack a private sector, but still face challenges in coordinating and engaging the large number of government departments and organisations that operate in their communities.

6. Best Practice in a Complex World

This review has drawn attention to the weakness of many local councils' engagement with their own communities and a largely absent engagement with and involvement of private enterprise. Consultation with community groups, the general public and local businesses certainly took place, but the overall impression is that this was piecemeal and selective. This is not a flaw of the guidelines for the studies which clearly indicate the involvement of stakeholders and the whole of the community.

Strengthening stakeholder and community involvement is the strongest need in the next steps of risk management and mitigation. Existing guidelines and their ongoing modifications provide good practice guidance for the process. However, the development of a modified set of guidelines for Aboriginal and Torres Strait Island communities, alone illustrates the need for recognising and responding to the diversity of local governments. Best practices will reflect the diversity of the places of the state, and in doing so they will illustrate a range of choices and models.

In the town planning and urban design area (significantly the foremost group of non emergency managers to be engaged in emergency management in local government are the planners) an urban design guideline was introduced by government as the Australian Model Code of Residential Development (AMCORD). The aim of the guide was to improve the quality and diversity of emerging urban design. It used the terminology of prescriptive approaches to encompass minimum standards – legislation and regulations, and performance criteria to encompass the possibilities, range and diversity that contribute to best practice. It did not use the term best practice because of the dangers of directing design to a narrow range of solutions. However, the guidelines of AMCORD are just as precise as the risk management guidelines in directing planners towards a model of good practice.

Renn's risk management escalator (discussed in section 5) identifies an expansion of complexity in stakeholder and community engagement that suggests at the very least there will be a diversity of good or best practices. Best practice in one situation or place will not be relevant or applicable to another. The process of fully engaging whole of community and particularly private enterprise, both creates greater complexity and is in itself a necessary response to increasing complexity. This review began by identifying a classification of places that suggested significantly different responses would be inevitable. It has also been observed that the risk management process has been an important first step in identifying local government responsibility for natural hazard risk mitigation. As the process moves on and enters into greater areas of social and political complexity it is probable that we will have to modify a best practice concept towards more of a performance criteria approach.

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Report written by David King

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