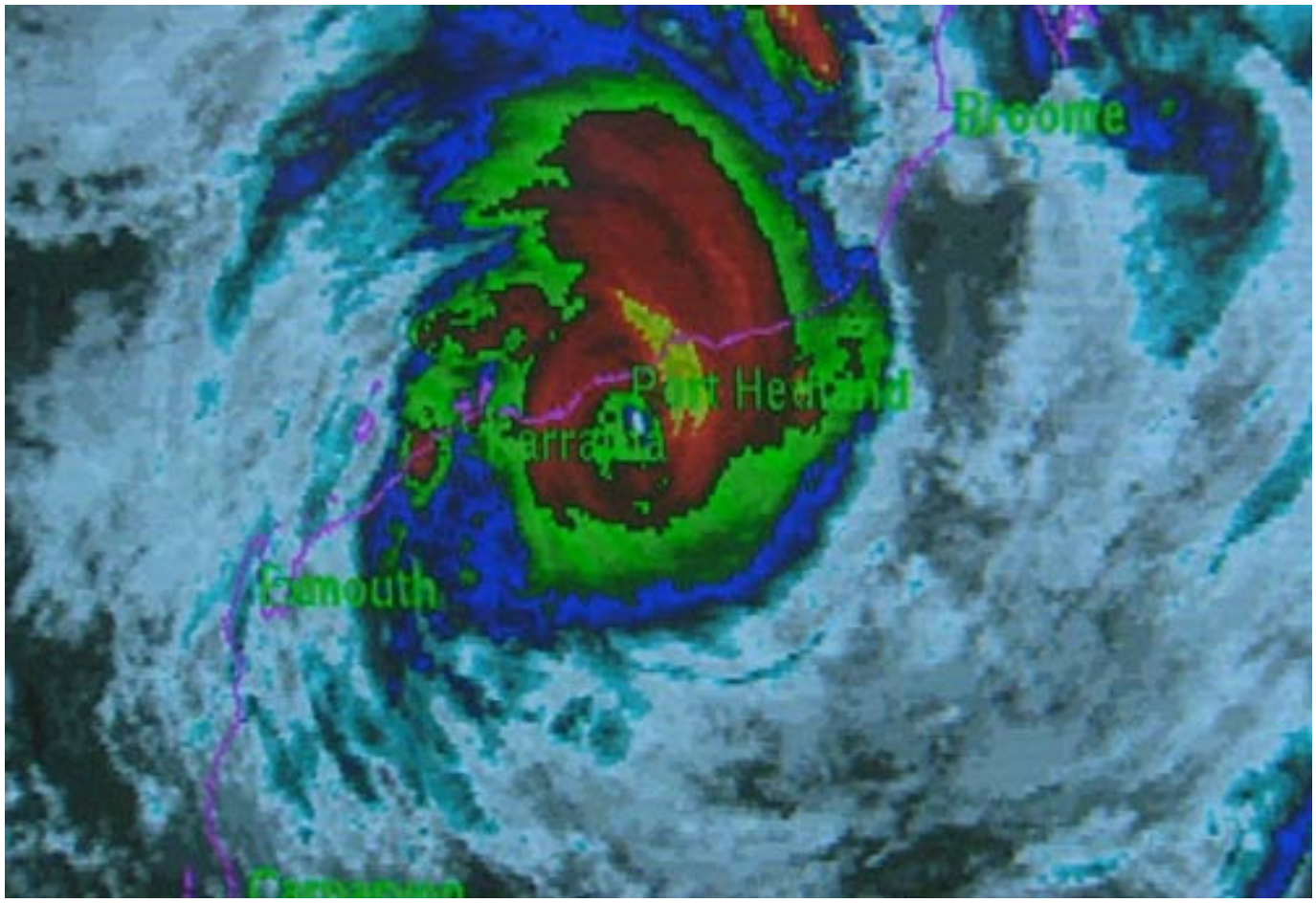
MAJOR INCIDENT REVIEW

TROPICAL CYCLONES

GEORGE AND JACOB



Fire and Emergency Services Authority of WA
November 2007

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This is a report for the FESA Chief Executive Officer by the MIR Investigation Team.

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Glossary

BoM	Bureau of Meteorology
DEC	Department of Environment and Conservation
DEMC	District Emergency Management Committee
DHW	Department of Housing and Works
DIA	Department of Indigenous Affairs
FMG	Fortescue Metals Group
HMA	Hazard Management Agency
IM	Incident Manager
IMG	Incident Management Group
IMT	Incident Management Team
LEMC	Local Emergency Management Committee (LEMC)
LO	Liaison Officer
LRC	Local Recovery Committee
MIR	Major Incident Review
OAMG	Operations Area Management Group
PIA	Post Incident Analysis
RIC	Remote Indigenous Community
RCC	Regional Co-ordination Centre
SCC	State Co-ordination Centre
SECG	State Emergency Co-ordination Group
SEMC	State Emergency Management Committee
SLIP	Shared Land Information Platform
SMAG	Subject Matter Advisory Group
TCILC	Tropical Cyclone Industrial Liaison Committee
USAR	Urban Search and Rescue
WAPOL	Western Australia Police
WAERN	Western Australian Emergency Radio Network

1. Executive Summary

Tropical Cyclone (TC) George was the biggest and potentially the most devastating cyclone to hit the Region in more than 30 years. Many long-term residents claim that it was a 'timely warning' to a largely complacent community. The general view of the cyclone management effort was of a seamless and well coordinated effort that had positive results.

A measure of the overall success was that, although there were three deaths and a number of serious injuries at remote locations, the major population centre at Port Hedland suffered only minor structural damage. Notwithstanding a permanent population of 15,000 (plus a significant itinerant population), there were no deaths and only minimal reported injuries. This is also of interest when it is considered that a significant number of itinerant workers and tourists live in campsites and caravan parks.

It was felt by many stakeholders that, given the cyclone's volatility and wide footprint, that FESA staff, volunteers and the broader community responded exceptionally well to the events and should be praised for their ongoing dedication and commitment to their community. One agency commented that FESA "could not have done more", and the efforts and contributions of volunteers and others have been applauded. These accolades were repeated by those present at a meeting of the Pilbara DEMC convened by the MIR team at Port Hedland and attended by representatives of all government agencies and other stakeholders.

The local community felt that there was community cohesion to a point and that most locals worked well together. There was also thought to be a strong level of inter-agency co-operation. FESA's decision to deploy Metropolitan based personnel was generally a positive move, prompting suggestions that pre-deployment of additional personnel in future cyclone events would strengthen community assurance and place the emergency response capability on the 'front foot'.

It should be noted that the circumstances surrounding the fatalities that occurred during TC George are subject to investigations by WorkSafe and the WA Police/Coroner's Office. It was therefore determined that in conducting this MIR, FESA would not investigate any of the circumstances touching on these matters. WorkSafe, the Coroner's Office and the Police were notified of the MIR terms of reference and of this intention.

Despite the tragic loss of life, all those involved in the management of the response and recovery from the cyclones should be congratulated for their dedication and commitment to ensuring the safety of their communities. However, in saying this and in line with FESA's value of continuously improving our services, this Report has been compiled to assist FESA in identifying which aspects of the operation worked well and what can be done to improve operations in the future.

Summary of Recommendations

1. Undertake a review of cyclone education, awareness and information dissemination programs in conjunction with the key stakeholders to ensure their effectiveness and identify areas for improvement.
2. FESA to work closely with industry to ensure better alignment between industry and FESA/BoM warning protocols to avoid confusion within the community.
3. All incident management team roles are to have role statements that are hazard specific.
4. The composition of incident management team roles should take into consideration the inclusion of local knowledge and experience.
5. That FESA refer the matter of developing greater community and industry awareness of the negative impact of excessive alcohol consumption during critical phases of the cyclone to WA Police in conjunction with Local Government.
6. That the Town of Port Hedland consider the recommendations from the *Tropical Cyclone George - Damage to Buildings in the Port Hedland.*
7. The Local Emergency Management Committee is to ensure that the local resource register is up-to-date for use during emergencies.
8. That FESA implements an operational management system that meets the needs of all its hazard management responsibilities.
9. Local evacuation plans to be reviewed to ensure they meet the needs of the community including the availability of current facilities.
10. Use of community and industry resources, especially in relation to accommodation and welfare be incorporated in local and district emergency plans.
11. FESA to liaise with relevant government agencies, industry and Local Governments to identify emergency accommodation and evacuation centres needs, to be assessed in accordance with the provisions of the *Emergency Management Act 2005.*
12. FESA engage industry to progress high-level discussions concerning industry evacuation responsibilities, expectations and decision making.
13. FESA and Local Government to provide guidance to industry in the development of emergency management planning, including the relative merits of remaining in place or evacuating in the face of cyclones.
14. That FESA separate the media-management and the community interface functions during major emergency operations.
15. All future major incidents are to have a suitable safety and risk management system in place.
16. The Local Recovery Committee establish protocols to more effectively engage local industry and community resources in the recovery phase.
17. Consideration should be given to including key Indigenous stakeholders within the local emergency management and recovery committees.

18. To assist with operational interaction with Indigenous communities, FESA consider allocating a dedicated officer within the local, regional and state operational centres.

19. A review of remote Indigenous communities be undertaken with the view to obtaining more comprehensive information about communities during planning stages. This should include specific plans, maps of locations, contact details and a more complete knowledge base of Indigenous communities.

20. FESA Operations to review its policies and procedures to ensure clarity of structures, roles and responsibilities between the hazard management function and the State Emergency Management Arrangements.

21. That FESA evaluate the effectiveness of the State Operations Centre layout.

22. That FESA ensures provision of emergency power at Port Hedland District Office.

23. A welfare officer should be assigned the responsibility for personnel welfare within the SOC during extended major operations.

2. Introduction

Tropical Cyclone George

The 2007 tropical cyclone season in Western Australia's north arrived late as predicted by the Bureau of Meteorology (BoM). When it did, it arrived in force with three tropical cyclones in just over three weeks affecting communities from the Northern Territory, the Kimberley, through to Karratha on the coast and as far inland as the Jigalong Community to the east of Newman.

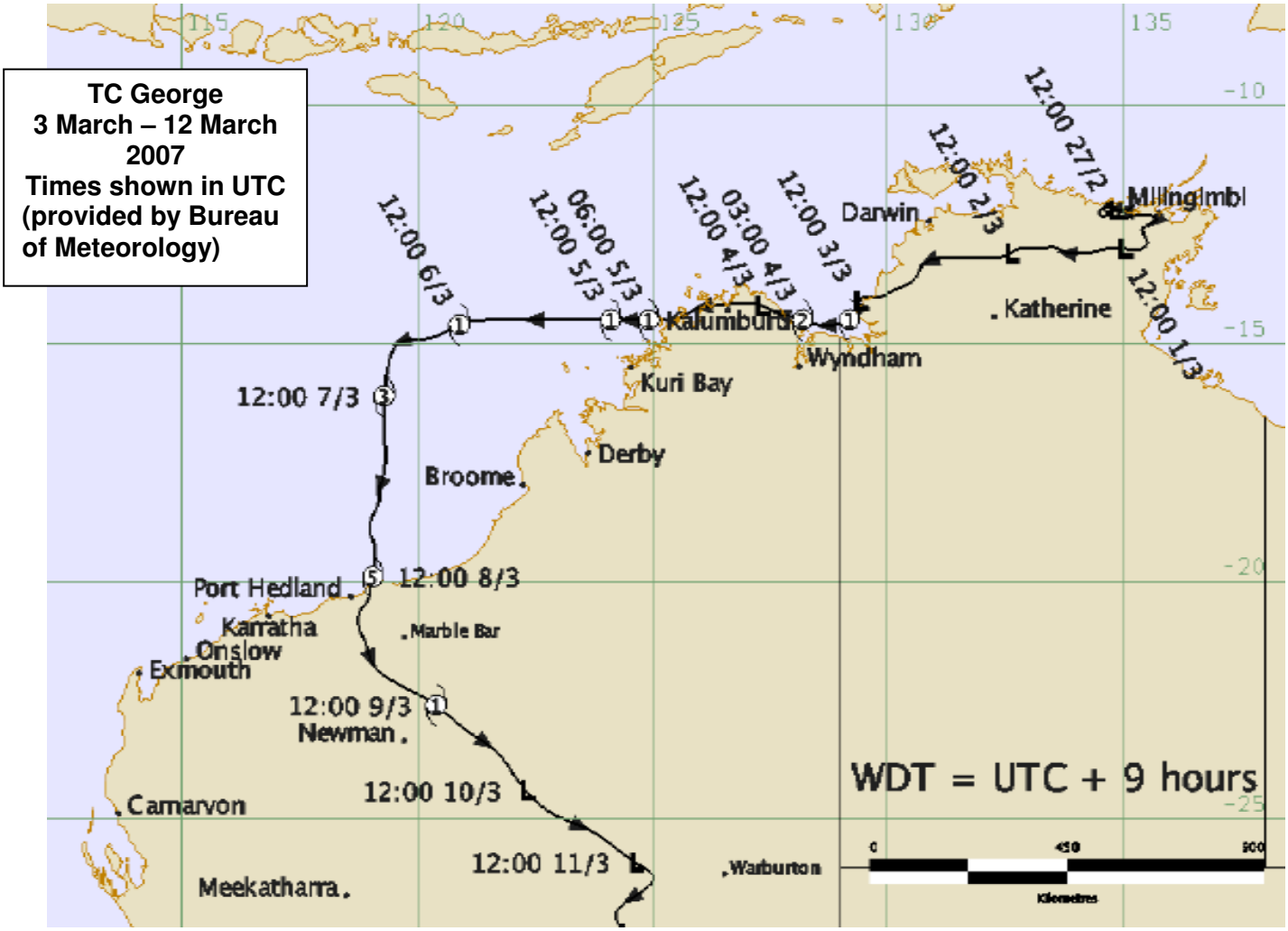
The most damaging storm Severe TC George was both very intense and physically large. Gales were reported as far north as the Northern Territory border on Sunday 4th March, as the cyclone moved across the North Kimberley from the Northern Territory. TC George then moved off the Kimberley coast and took a sudden turn towards the Pilbara coast during the night of Wednesday 7th March. TC George intensified to a high-end Category 4 system, when it made the landfall during the night of Thursday 8th March. Gusts of 154km/h were recorded at Port Hedland airport just prior to the failure of recording equipment and it is thought that winds further intensified later into the night, probably reaching Category 5.

Port Hedland was on the edge of the destructive core of George. It was the most destructive cyclone to affect the Pilbara Coast since Tropical Cyclone Joan in 1975, with a mean wind velocity of 195km/h gusting to 275km/h, being recorded offshore at Bedout Island. The cyclone was accompanied by torrential rain which continued for some time, but no significant flooding occurred due to the relatively dry pre-season in the Pilbara.

Low lying areas between Port Hedland and Karratha also faced a potentially dangerous storm surge threat, when George was predicted to make landfall to the west of Port Hedland. However, residents escaped direct impact from storm surge when the cyclone passed to the east of the town.

Significant cyclone impacts included two fatalities and numerous serious injuries at one of two rail construction camps south of Port Hedland and a further fatality at Indee Station. Although there was significant asset and infrastructure damage, disruptions to power, telecommunications, radar and broadcast capacity, in and around Port Hedland, there were no further injuries or fatalities.

A further feature of TC George was the extent to which it reached inland from the coast. Unlike many other cyclones, TC George did not lose its intensity and become a rain-bearing depression once it crossed the coast. TC George maintained its velocity and destructive force after crossing the coast and travelling land before losing significant strength. This had implications for the way in which FESA and the inland communities responded.



Passage of Cyclone George

At 0800 hours on Friday 9th March 2007, an 'emergency situation' was declared by the FESA Chief Executive Officer Pursuant to s50 of the Emergency Management Act 2005, for a period of 72 hours. The declaration covered the Town of Port Hedland, the Shire of Roebourne and the Shire of Ashburton.

Tropical Cyclone George - Coastal Crossing Details

Crossing time:	10pm WDT Thursday 8th March 2007
Crossing location	50km ENE of Port Hedland
Category when crossing the coast:	4 (confirmed Cat 5 on post-analysis)

Extreme values during cyclone event

Maximum Category:	4 (Cat 5 on post-analysis)
Maximum sustained wind speed:	195 km/h
Maximum wind gust:	275 km/h
Lowest central pressure:	910 hPa

Tropical Cyclone Jacob

A tropical cyclone warning was issued for Christmas Island on 7th March 2007, with the formation of TC Jacob which then changed course, and on 8th March tracked towards the Pilbara coast. No damage was reported at Christmas Island apart from a heavy swell affecting port operations.

There was heightened community awareness and concern, prior to the crossing of TC Jacob following the impact of TC George. People in Port Hedland, surrounding communities, stations and mine sites were anxious, preparing for the arrival of TC Jacob. Not the least of the many concerns facing residents was the potential danger from debris left in the wake of TC George and the effort required to mitigate the risk prior to the arrival of yet another cyclone. This, coupled with the need to make safe, buildings damaged by the initial bombardment, placed additional pressure on resources.

At noon on 12th March 2007, TC Jacob crossed the Pilbara coast 40 kilometres east northeast of Port Hedland as a Category 1 cyclone. No wind damage was recorded following, however, heavy rain combined with rainfall from TC George caused some additional concerns in relation to flooding on rivers east of Port Hedland, particularly the De Grey River.

Tropical Cyclone Jacob - Coastal Crossing Details	
Crossing time:	Noon WDT Monday 12 March 2007
Crossing location:	50 km ENE of Port Hedland
Category when crossing the coast:	1
Extreme values during cyclone event	
Maximum Category:	3
Maximum sustained wind speed:	130 km/h
Maximum wind gust:	175 km/h
Lowest central pressure:	958 hPa

It should be noted that unless otherwise indicated, a reference to Port Hedland in this report applies also to South Hedland.

3. Terms of Reference

FESA Policy No.54, Incident Analysis Policy, requires the highest level of incident analysis, Major Incident Review be undertaken for major multi-agency emergencies, resulting in significant community and agency impacts. An external facilitator is appointed to conduct this type of incident analysis.

The Terms of Reference for this review MIR are to:-

- examine all aspects of FESA's activities relating to the incident including incident background, response factors, resourcing and communications and to determine FESA's effectiveness in relation to the incident.
- assess the operational effectiveness of the State Tropical Cyclone Emergency Management Plan 2004 (WestPlan-Cyclone) as a blue print for incident response.
- examine the effectiveness of FESA's relationships with volunteers, industry, Local Government, government agencies and community groups during the incident response.
- assess the strengths and weaknesses of FESA policies, procedures, practices and equipment standards relevant to the incident. Examine any other matters relevant to the incident. Identify opportunities for improving service delivery.

Each of these Terms of Reference was addressed in the review, but not necessarily in the same chronological sequence, due largely to the interrelatedness of many of the review conclusions. The FESA Incident Analysis Framework requires that the critical aspects of Prevention, Preparedness, Response and Recovery (PPRR) are considered and documented during the analysis process.

The *Emergency Management Act 2005* defines emergency management as the management of the adverse effects of an emergency including —

Prevention: the mitigation or prevention of the probability of the occurrence of, and the potential adverse effects of, an emergency;

Preparedness: preparation for response to an emergency;

Response: the combating of the effects of an emergency, provision of emergency assistance for casualties, reduction of further damage, and help to speed recovery; and

Recovery: the support of emergency affected communities in the reconstruction psychosocial and economic wellbeing;

4. Methodology

Review Team

A Major Incident Review Team was established to undertake the Major Incident Review, consistent with the Terms of Reference.

Review Process

Documentation Review

A range of policies, plans and reports were reviewed to either provide background information, or to provide specific details regarding the events both pre, during and post cyclone. The MIR Team were given access to all records produced relevant to the incident, including incident management diaries, CD recordings of teleconferences, incident reports, situation reports (sitreps), BoM reports, Ministerial briefing notes, media releases and other various emails, submissions and reports.

Local Unit Debrief Input

The standard approach used to collate local unit membership input prior to a PIA or MIR involves the de-briefing of volunteers and personnel as soon as is practicable after the incident. This process was facilitated by Pilbara and Kimberley based FESA Managers with debrief reports provided and considered in the MIR process, including reports from metropolitan based SES members deployed to the Region. A considerable number of Pilbara based volunteers attended the community forums convened as part of the MIR.

Consultations

It was important to gain feedback from a range of key stakeholders. This was seen as central to the review process.

This was achieved by convening a number of debriefs, individual interviews and/or focus groups with community members, agency and industry representatives to seek the views of both internal and external stakeholders. Whilst the format of these sessions varied, the purpose of the consultations focused upon what worked well and what could be improved, in relation to FESA's management of TC George.

Details of individuals and groups consulted are attached at Appendix B. The Prevention, Preparedness, Response and Recovery (PPRR) framework was used to seek feedback and evaluate responses.

Analysis of Results

The outcomes of the consultation process, and the supporting documentation provided the major input for the review. This information was analysed and cross referenced and provided the basis for identifying the key issues and themes, from which recommendations were formed.

Context

The various matters canvassed in this report may lead to improvement opportunities for FESA and the various volunteer groups forming part of the wider FESA structure. Some however, will fall outside of FESA's authority or sphere of influence. It is imperative however, that each of the findings is viewed in the context of the environment within which FESA operates. The key elements of the environmental framework are discussed below.

Physical limitations

Consistent with FESA Policy Statement No. 54, 'Incident Analysis Policy', and with the FESA Values, the objective is to ensure *continuous improvement* of:

- delivery of emergency prevention, preparedness, response and recovery services;
- personal health, safety and welfare; and
- all areas affecting community safety.

In doing so, it is necessary to consider the practical and operational context, and the real limitations on FESA's capacity to have any significant influence on the physical impact a major cyclone has on a community.

In working towards its vision of 'A safer community', FESA's operational challenges include preparing for, and responding to, a range of natural hazards including fire, flood, earthquake, tsunami and cyclone. There are of course inherent differences in the nature of, the potential impact of, and the ability to combat those various types of hazards.

Relevant legislation

Fire and Emergency Services Authority of Western Australia Act 1998

Local Government Act 1995

Emergency Management Act 2005

The Regulations of the above Acts

Plans

At its inaugural meeting on 31 January 2006 the State Emergency Management Committee, as established under the Emergency Management Act 2005, approved the current State Emergency Management Hazard Plans and Support Plans as 'interim' State Emergency Management Plans, insofar as they do not conflict with the provisions of the Emergency Management Act 2005.

This included the State Tropical Cyclone Emergency Management Plan (known as WestPlan – Cyclone), September 2004.

5. Meteorological Characteristics

With permission, Section 5 is adopted from, the Bureau of Meteorology Report *Meteorological Aspects of Severe Cyclone George's Impact on the Pilbara*.

3-6 March

Formation

Tropical Cyclone George formed on 3rd March when a tropical low, which had tracked across the "Top End" of the Northern Territory, moved offshore into the Joseph Bonaparte Gulf. George subsequently weakened back to a tropical low as it moved westwards across the northern Kimberley. The system then re-intensified into a tropical cyclone shortly after moving offshore into the Indian Ocean on 5th March. TC George then moved away from the coast tracking steadily west at 6-8 knots (11-15 km/h) – close to the climatological average.

Oceanographic conditions along TC George's track were favourable throughout its life with broad areas of warmer than usual sea surface temperatures (SSTs) existing off the northwest coast of Australia.

TC George slowly intensified during 5th March and reached Category 2 intensity at 3am on 6th March before weakening back to Category 1 at 9pm on 6th March.

7 March

Abrupt southerly track shift

On the morning of 7th March, TC George turned abruptly to the south, making an almost 90 degree turn to the left of its previous track, and began to rapidly intensify. It became a Severe Tropical Cyclone (Category 3) by 9pm on 7th March.

The rate of intensification during the 24-hour period to 9 am 8 March was twice that of the standard Dvorak model of tropical cyclone development. Its maximum sustained (10-minute) wind speed is estimated to have increased from 90 km/h to around 165 km/h during this period. It is not uncommon for intense tropical cyclones (Category 4 or 5) to undergo some period of rapid development during their life cycle.

8 March

Intensification continues up to coastal crossing

Severe TC George came into range of the Port Hedland radar during the morning of 8th March, allowing hourly analysis of track positions. Only minimal intensification occurred during the less favourable diurnal period from 9am to 3pm. However, over the next three hours to 6pm, significant intensification occurred and the eye is estimated to have shrunk to around half the diameter of 24 hours earlier. At 7pm Bedout Island recorded a 10-minute mean wind of 195 km/h as the eye wall passed over the island. This is the highest 10-minute mean wind speed ever officially recorded in Australia. However it is very unlikely to be the highest mean wind speed that has ever occurred in Australia.

Characteristics of TC George close to landfall

Peak intensity

Dvorak analysis of satellite imagery indicates that peak intensity was reached just prior to landfall, with 10-minute mean winds of around 205 km/h, and wind gusts of around 285 km/h (Category 5). George was still at its maximum intensity when it crossed the coast 50km northeast of Port Hedland at 10pm.

Verification of Dvorak-based maximum mean wind speed estimates of tropical cyclones in the Atlantic basin against estimates based on aircraft reconnaissance indicates that 50 per cent of Dvorak estimates are within 9 km/h, 75 per cent are within 22 km/h and 90 per cent are within 33 km/h.

The supporting observation from Bedout Island provides added confidence in the Dvorak-based "best track" estimate of peak wind gusts (285 km/h).

Radius to the maximum wind speed band

Radar imagery of George as it approached landfall showed a well-defined elliptical eye of up to 25 km diameter across its long axis and around 15 km across the short axis. The ellipse rotated in a clockwise direction. Elliptical eyes are common in tropical cyclones with the ellipse often observed to rotate in the same direction as the cyclone circulation (Lewis and Hawkins, 1982).

After landfall, the shape of the radar-observed eye became more variable, but generally retained marked asymmetry. As TC George tracked inland, the eye diameter increased to around 30-35 km. This is consistent with a weakening in intensity.

The eye was clearly depicted in radar imagery through to 2am on 9th March after which radar imagery was not available again until the system centre was outside radar range. The eye could be identified in microwave imagery at around 3am; however at 7am the eye region was only weakly defined and had begun to fill with rain. By 9am on 9th March no eye could be discerned.

The radius of maximum winds (RMW) is generally observed to lie outside the inner radar-eye radius (IRR) by several to tens of kilometres (Meighen, 1990). The relative position of the RMW to the IRR varies across different tropical cyclones and during the life cycle of a particular system. For an intense tropical cyclone with a small IRR - such as George at landfall - the RMW is typically found around 5 to 10 km outside the IRR (ibid.). On this basis, the RMW for George is likely to have been around 15 to 20 km at landfall, increasing to around 20 to 25 km by 3am on 9th March.

The asymmetries described above should be kept in mind when interpreting the simplified depiction of the "eye swathe" in Figure 1.

Radius to Gales

The radius to gales is commonly used as one measure of the size of a tropical cyclone. Underlying terrain has an influence on the measurement of wind speeds. The increased roughness of the land surface compared with the ocean leads to greater frictional forces. Greater frictional forces result in lower mean wind speeds over land compared with over the ocean, but can also result in a higher ratio of wind gusts to mean wind speed - greater "gustiness". Thus the radius to gales measured over a water surface will be greater than if the same system were over land. In the following discussion we compare figures for radius to gales only when over an ocean surface.

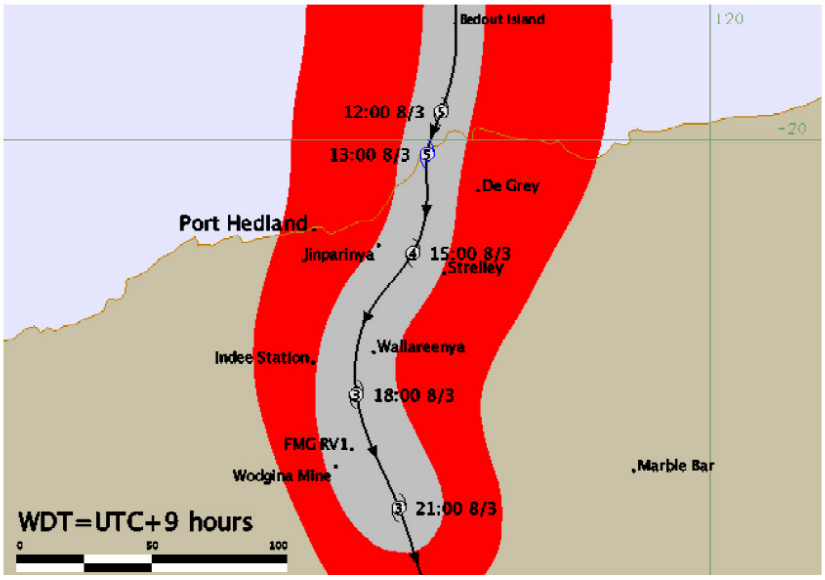


Figure 1. Simplified depiction of the swathe of the eye and of Very Destructive winds. Times are shown in Coordinated Universal Time (UTC). Add 9 hours to derive WDT times.

Scatterometer data from the QuikScat satellite provide periodic estimates of winds near the ocean surface. In the absence of in situ anemometers this data provides the best possible means of ascertaining radius to gales and has been used extensively in the "best track" analysis. (Additional information on scatterometry and the QuikScat satellite can be obtained from http://manati.orbit.nesdis.noaa.gov/quikscat/.) Anemometer data from Rowley Shoals and Bedout Island was used to validate the scatterometer data whenever possible.

Early on 8th March, TC George had an average gale radius of around 200 km. This is significantly larger than the climatological average of around 150 km for cyclones of Category 3 or greater intensity in the southeast Indian Ocean. (Average calculated on post-1999 data for which gale radius estimates are more reliable due to availability of scatterometer data.)

Gales extended further from the centre in the northern and southern quadrants (around 240 km) than in the eastern and western quadrants (150 and 180 km respectively).

Gale periods at observation sites

Rowley Shoals experienced a period of gales of approximately 25 hours, commencing around 3am on 8th March. Bedout Island recorded a period of gales lasting approximately 40 hours. Gales had commenced by 1am on 8th March and continued through until after 5pm on 9th March. Mean winds above hurricane force (119 km/h or greater) were recorded from 5pm on 8th March through until 11pm on 8th March inclusive, excluding a lull during the passage of the eye.

The first measurement of gales (mean wind speeds of 63 to 88 km/h) by the Port Hedland anemometer occurred at 5:20pm on 8th March. By 9:00pm WDT mean winds had increased to storm force (mean wind speed of 89 to 118 km/h). Wind gusts greater than 125 km/h, classified as "destructive" wind gusts, began to be felt in the Port Hedland area around this time. Loss of anemometer data at around 11pm has prevented an assessment of the duration of gales in Port Hedland.

By the time the Port Hedland anemometer was returned to service (just prior to 1pm on 9th March) mean winds at Port Hedland had eased below gale force but were still above 55 km/h.

Observations from Bedout Island (found to be in close agreement with the scatterometer data) indicate that gales continued over the ocean until 6pm on 9th March.

Rate of weakening after landfall

There is limited meteorological data upon which to assess the intensity and structure of George as it tracked inland. No wind speed measurements were obtained inland close to the centre of the system. Damage to the radar dome at Port Hedland resulted in the radar being offline from 10:10pm on 8th March until 7:20 pm on 9th March. Imagery from the Dampier radar was available until 2:00 am 9 March. Satellite imagery was accessible throughout. In addition to these sources of information, useful information was obtained from interviews with people who experienced the passage of the cyclone and through the work of the Cyclone Testing Station (CTS).

The Dvorak technique for analysing the intensity of tropical cyclones was not developed, nor calibrated, for use on systems weakening after landfall. However the structural changes indicated in satellite imagery remain useful indicators of the rate of weakening of the system and it is possible to make a subjective assessment of the rate of weakening based on available satellite imagery. By 2am on 9th of March the eye appeared larger than it had at landfall and deep convection was waning both near the centre and in the peripheral rain bands. However, the distribution and intensity of deep convection was still better than at 9am on 8th March.

Upper winds tend to be stronger in the mid-latitudes than in the tropics, particularly during winter. Hence, tropical cyclones making landfall on the Pilbara coast in March or April often encounter increasingly unfavourable upper winds as they track southwards. The combination of landfall with increasing vertical wind shear leads to rapid weakening of the system despite a relatively flat terrain. In the case of George however it is notable that the vertical shear remained weak as the system tracked south over land and George was observed to retain its cloud structure longer than average. It is therefore estimated that George weakened more slowly than is typical for intense systems making landfall in the Pilbara.

Kaplan and DeMaria developed an empirical model of the rate of decay of tropical cyclone winds after landfall based on analysis of tropical cyclones making landfall in the USA where aircraft reconnaissance and a dense land-based network provide better observational data as a foundation to the post-analysis. This model has been applied to TC George and forms the basis of the estimates of inland wind speed provided in the “best track”. These estimates are entirely independent of the wind speeds estimated by the CTS (2007b). The close agreement between the two methods creates greater confidence in the results than could be obtained by applying either of the methods in isolation.

Figure 1 shows the swathe of “very destructive” winds and the area likely to have experienced the relative calm within the eye. The area experiencing the band of maximum winds will be larger than the “eye swathe”. Hence the eye swathe should not be interpreted as the area experiencing the zone of maximum winds. The eye swathe matches both the available radar imagery and eyewitness reports. Although less useful due to poorer resolution, microwave imagery was also assessed for this part of the post-analysis.

The eye expanded as TC George moved inland, reaching a diameter of 30-35 km by around 3am on 9th March. A lull indicative of an eye passage was reported from Fortescue Metals Group’s Rail Village One (FMG RV1) and the Wodgina mine site, but not from Indee Station.

Radar imagery shows the eye deteriorated as it moved further inland, which is expected as a consequence of the weakening of the system after landfall.

Over the next few days TC George tracked in a generally southeasterly direction. The system is estimated to have weakened below tropical cyclone intensity by 9am on 10th March and lost identity as a discrete low pressure system around 3pm on 12th March.

Impact

De Grey Pastoral Station

TC George crossed the coast close to the mouth of the De Grey River. The De Grey pastoral station homestead sits on the banks of the De Grey River approximately 20 km inland. The closest approach of TC George to the homestead was around 20 km at 11pm WDT. Gusts in the zone of maximum winds are estimated to have been around 275 km/h at this time, while the radius of the eye is estimated to have been around 12-14 km and the radius to the band of maximum wind about 18-20 km. This is in agreement with witness reports indicating that a lull, indicating eye passage, was not experienced. It is also consistent with the observed level of damage and the directional spread of debris.

Port Hedland

Gales commenced in Port Hedland around 5pm on 8th March and "destructive wind gusts" (gusts of 125km/h or greater) commenced at around 8:30pm. Unfortunately the Bureau's Automatic Weather Station at Port Hedland Airport failed prior to the period of peak winds and was not returned to service until after winds had subsided below gale force. The peak mean wind measured at the airport prior to the equipment failure was 113 km/h at 10:51pm. The highest recorded wind gust was 154 km/h at around 11pm. Although there are no reliable anemometer records of the peak winds occurring in the Greater Port Hedland area, estimates of peak gust speeds can be made based on the failure of simple structures. The CTS estimated peak gust speeds in the Port Hedland area of 200 km/h.

The closest approach of TC George to Port Hedland occurred around midnight when the centre came within 40 km. By this time the maximum gusts in the eyewall region are estimated to have been around 250 km/h, having dropped from around 285 km/h at the coastal crossing. Winds are estimated to have been at a maximum 20 km from the centre, dropping off markedly with increasing radial distance. The estimates provided by the CTS are thus consistent with the estimates of peak wind gusts, given the observed structure of the system and taking account of the uncertainties involved.

Less than 2 per cent of buildings sustained structural damage (ibid.). The low damage figure relates to the fact that the estimated wind speed was 65 per cent of the current design wind speed for the area. Significant structural damage was only recorded in Port Hedland (not in South Hedland) and only in older buildings (ibid).

Storm surge

When a tropical cyclone crosses or closely approaches the coast, there is a concomitant rise in sea level above that expected from astronomical tides alone. This rise in water level is called a storm surge. It is caused principally by wind stress on the water surface and to a lesser degree by the reduction in atmospheric pressure. The sum of the storm surge and the astronomical tide produces the storm tide. Along the central Pilbara coast where tidal ranges are large, significant coastal inundation is generally averted if a tropical cyclone crosses at low astronomical tide, since the storm surge is rarely greater than the inter-tidal range.

Port Hedland escaped impact from storm surge, due to two mitigating factors. Firstly the cyclone crossed east of the town and winds in the Port Hedland area were generally blowing from the

land out to sea, so in this area the wind was acting to reduce water levels. The area of maximum storm surge would have occurred just east of the mouth of the De Grey River. Secondly, the astronomical tide was relatively low at the time of coastal crossing, and, as previously discussed, this acts to minimise the storm tide thus protecting low-lying areas from inundation.

Coastal crossing occurred on a rising tide at around 1300 UTC between the low tide of 1.16m at 1123 UTC and the high tide of 6.41m at 1733 UTC. Modelling suggests that TC George would have produced a storm surge of around 4.8m, including an allowance of 0.5m for wave set- up. (The input parameters were chosen to provide an upper estimate of storm surge risk so it is unlikely that the storm surge would have exceeded this figure.) Significant inundation occurs when the storm tide (storm surge plus the astronomical tide) exceeds the highest astronomical tide. The predicted tide close to the time of coastal crossing was around 2.3m. The Highest Astronomical Tide (HAT) height for Port Hedland is 7.5m. Hence we would expect that the storm tide of around 7.1m (2.3 + 4.8) at the time of coastal crossing did not exceed the HAT of 7.5m.

There are no tide gauges installed in the area where TC George crossed the coast. When the storm tide exceeds the HAT it is possible to obtain an estimate of the storm tide from a survey of debris lines in the impact zone. In this case a survey was not attempted, as it was unlikely that any evidence would remain. This decision was supported by reports from people at De Grey Station indicating they were unable to find any evidence of storm surge at the coast.

Inland

Unfortunately no anemometer data is available inland close to TC George's track. The methodology used to estimate wind speeds for this part of TC George's track is described above. Wind gusts of around 215 km/h are estimated to have occurred at Indee Station, where one fatality occurred and significant damage was sustained. There was a level of damage sustained at FMG RV1. Two fatalities and numerous injuries occurred at this location.

The "best track" estimate of maximum wind speed indicates that gusts of around 195 km/h are likely to have been experienced at this site.

The CTS was unable to find reliable structural indicators of wind speed at the RV1 site. However a comparison of tree damage in the area with that of the Port Hedland area (where estimates were able to be made based on failure of simple structures) produced an estimate of wind gusts of approximately 180 km/h. Given the relative uncertainties in both methods this is considered close agreement.

6. Sequence of Events

Hazard Management Agencies (HMA's) utilise various criteria for defining operational phases depending on the hazard. FESA utilises the Cyclone Community Alert System to assist community members prepare for and manage the potential impacts of a cyclone.

In order to ensure simplicity of understanding, the system is based on four stages, three signified by the colours blue, yellow, and red as the cyclone approaches the coast and the fourth "All Clear With Caution" issued when the wind and any storm surge danger from the cyclone has passed. (Blue Alert indicates precaution; Yellow Alert indicates action; Red Alert indicates shelter)

In all of its community based education strategies and publications, FESA provides a comprehensive description of what each of the four phases of the Cyclone Community Alert System mean and the recommended course of action that the community should follow to avert risk to individuals and to property.

The cyclone alert system has been used to define the operational phases of TC George as shown at Table 1 as outlined below.

Date	Time	Details
7th March 2007	2200 hrs	First warning to Port Hedland
8th March 2007	0400 hrs	BLUE ALERT for Port Hedland (change of track overnight)
	0600 hrs	YELLOW ALERT for Port Hedland
	1800 hrs	RED ALERT - Port Hedland
		YELLOW ALERT for Wallal to Mardie, including, Roebourne, Wickham, Karratha, Point Samson, Dampier and in or near the inland communities of Marble Bar and Nullagine.
		BLUE ALERT for Mardie to Onslow, Wallal to Bidyadanga and for Tom Price and Pannawonica.
9th March 2007	1000hrs	All Clear for Port Hedland

Table 1

The incident planning objectives were divided into pre and post impact objectives to assist determination of priorities. In summary, these objectives were:

- Pre-Impact Objectives
  - Planning – storm tide, critical infrastructure and analysis of risks forecast track.
  - Information – timely warnings and safety messages.
  - Logistics - resource acquisition (State, Regional and local), particularly aircraft and management support personnel.
  - Coordination – SECG, OAMG and IMGs.
  - Evacuation – low-lying areas Port Hedland/Karratha.

- Post-Impact Objectives
  - Rescue – SES/USAR Teams mobilisation.
  - Logistics – air resources identified and procured.
  - Coordination – SECG, OAMG, IMG and DACC1 (Port Hedland).
  - Planning – flooding, isolation, resupply, Remote Indigenous Communities (RIC's), and the approach of TC Jacob.
  - Information – public and community, media and record management.
  - Evacuations – assistance and advice provided to community, RIC's, Local Government and industry groups.

Organisational structure

FESA's management response to this event included a staged approach at local, regional and state level.

FESA Incident Management Teams (IMTs) were established at Port Hedland, Karratha, Marble Bar, Nullagine, Newman, Tom Price, Paraburdoo and Onslow, each under the control of an Incident Manager. The Regional Coordination Centre (RCC) was activated at Karratha by the OAM and the FESA SOC was activated by the State Duty Director.

Support requirement

FESA identified specific support requirements and liaised with the relevant agencies to assist with this event.

In summary, FESA approached Western Australian Police (WAPOL), Department of Child Protection (DCP), Department of Health (DoH), Department of Defence (DoD) and Emergency Management Australia (EMA) to provide Liaison Officers who were based at the FESA SOC.

This allowed information to be communicated and coordinated across agencies. Examples of this included a request by the Hazard Management Agency (HMA) to WAPOL who assisted with the closure of Paraburdoo Airport.

Support from EMA enabled alternative transport options to be identified and utilised during the event. Resourcing of media management officers required an inter-agency approach and additional support to the FESA media team comprised of WAPOL and other experienced former employees now working with other public sector agencies.

Similar support was provided by Lifeline and other agencies in dealing with a range of issues including medical and community evacuations, community and state infrastructure repairs and reporting, welfare and recovery.

Given the nature and scale of the event, the recovery phases drew upon both local and state resources. The Town of Port Hedland provided support at the local level whilst the Department of Premier and Cabinet (DPC) oversaw state level recovery coordination.

7. Examination of all aspects of FESA's activities relating to the incident including incident background, response factors, resourcing and communications and to determine FESA's effectiveness in relation to the incident.

The effectiveness of FESA's activities is discussed below and covers the emergency management elements of preparedness, response and recovery.

Cyclone preparedness

Overall feedback from stakeholders is that FESA was well prepared for the cyclone season in the Pilbara. This was largely due to the extent of FESA's Wet Season community engagement initiatives and the seasonal work carried out by Regional officers and volunteers. Within FESA, concern has been largely directed at planning and procedural issues, and the organisation and management of resources. These are addressed in more detail below.

It was frequently mentioned during discussions with Pilbara residents that there is a level of complacency about cyclone preparation which is compounded by the increasing numbers of itinerant (fly-in fly-out) workers to accommodate expanding mining activities in the Region. Many resident families have never experienced cyclones before and some were evidently not in the region when the 2006/07 pre-season briefings were held.

There is also evidence to suggest that some locals are confused about exactly what each successive stage of the FESA Cyclone Community Alert system means and the actions expected during each phase.

Community Engagement Programs

Each year FESA develops its wet season program to meet the needs of the community at risk to the seasonal hazards during the months of November to April; including flood, cyclone, storm surge and severe storms. The ultimate goal is to build capacity within communities and to raise awareness of cyclone preparedness. This latter aspect included the Community Alert System stages, the psychological effects of a tropical cyclone and of storm surge and evacuation procedures.

The 2006/07 Wet Season Program comprised local strategies to meet the needs and associated risks of communities, including:

- Local Media – communication of cyclone awareness and preparedness messages through Community Newspapers, GWN TV (Mary G ad) and radio advertising and interviews.
- Promotion of Local Government green waste clearance.
- Education, including SES and VES unit visits to schools and community groups and activities implemented through school networks.
- Local initiatives by units and FESA personnel.
- Pre-season BoM tour to Local Government areas including LEMC and DEMC meetings to promote predictions for the 2006/07 wet season.
- Dissemination of information designed to assist travellers, including campervan hire companies, visitor centres, ABC, WA Caravan Association and DEC.

New residents to the region were identified as a particularly vulnerable group who were reached through a number of important strategies, one of which included a large scale program in partnership with local industry.

Emergency Awareness Resources

Awareness resources made available to the Pilbara community through FESA include:

Cyclone education resources:

- *Cyclone Ready Residents* publication
- *Cyclone Ready Action Card*
- *How the Community Can Prepare* - flyer specifically developed for the Pilbara
- *Travel Safe in the North West,* publication
- Videos:
  - *Vance Revisited*
  - *What is a Tropical Cyclone*
  - *Cyclones are serious*
- Cyclone tracking maps
- EMA *Surviving Cyclones* publication

Flood education publications:

- EMA *Floods Warning, Preparedness and Safety*
- EMA *Flood action card*
- *Evacuation Guide*

RIC's education resources:

- Broadcasting for Remote Aboriginal Communities (BRAC's) media opportunities
- Regional initiatives
- TV and radio promotions using Mary G ads

SES awareness materials:

- Wet season hazards presentation kit

Pre-Cyclone Season Clean-up Activities

Generally, people were satisfied with FESA's input into the pre-season, clean-up activities. It was reported that some complacency existed in the community over the need for clean up and preparation.

The Town of Port Hedland indicated that there was a reduction in the amount of pre-cyclone season green garden waste collected than previous years. Others indicated that the pre-cyclone preparation was much more of a "just in time" nature this year. Local Government ability to exercise "clean-up" powers under the Local Government Act 1995 can only be exercised after a cyclone alert has been issued, which in effect is too late. This may have some broader implications in relation to the emergency management provisions of the Local Government Act 1995.

The *Local Government Act 1995* (sections 3.24 to 3.36) empowers local governments to require owners or occupiers of land to undertake specific activities in relation to such land, including anything that is prescribed in Schedule 3.1, Division 1, of the Act.

Schedule 3.1, Division 1, Clause 10, specifies that a notice issued by local government under section 3.25(1) may require a land owner or occupier to:

"Take specified measures for preventing or minimising:-

- danger to the public; or
- damage to property, which might result from cyclonic activity."

NB: Sections 44 to 49 of the Emergency Management Act 2005 include similar provisions, but have not yet come into operation, pending the declaration of 'cyclone areas' under that Act.

Information Dissemination

Community perceptions are that FESA's programs are helpful in the provision of advice and information. Also that FESA has an effective relationship with Local Government, working in a supportive strategy to disseminate information through its emergency management services.

The following suggestions made to improve overall service provision includes:

- The continuing provision of induction packages provided by mining companies and other employers to new employees and their families was seen as important and might benefit from more direct FESA involvement; and

- Provision of "just in time" public education is required in order to capture the transient and tourist populations.

Cyclone Community Alerts

The internet and electronic media provides access to multiple sources of information which enables communities to make risk-based choices during impending cyclones.

The formal FESA Cyclone Community Alert System is provided to the community and is based on the intelligence that is gathered and interpreted from the BoM.

Major industries within the Pilbara utilise web-based technologies to source worldwide weather data and analyse any associated risk to their operations. These sources of information are used to assist in planning the potential closure of mining, shipping and loading operations, thereby mitigating risk and minimising potential revenue losses, in the event of cyclones and storm-surge.

Because information sourced by industry may vary from cyclone warnings issued by BoM to FESA community alerts, there is the risk of confusion within the community. Employees may receive information from the company that might not correlate with that issued by BoM/FESA. It should also be noted that smaller companies usually source their alert information from BoM/FESA.

The BoM cyclone warnings were seen as accurate, although some feedback suggested the information was overly generic and should be district specific, including community locations or even down to a more detailed level covering individual stations or camp sites.

From 0001hrs on Friday 9th March the Port Hedland RCC communications were offline due to disruptions to telephone services and power supplies caused by the cyclone. During this time the Karratha FESA office provided the RCC function.

There was some concern raised regarding the issue of FESA Community Alerts, with Tom Price learning of the changed alert status later that day from the ABC, rather than through normal practice of the FESA RCC. This diversion from normal protocol was possibly an oversight, due to the distractions facing the Karratha RCC following the receipt of news of fatalities at FMG RV1 and the need to mobilise the evacuation of injured persons. The heightened alert for Tom Price was not a critical decision, but given the intensity and unpredictability of the cyclone, it was probably good insurance.

Some queries also emerged over the dissemination of the "All-Clear" in some parts of the region and the level of consultation entered into prior to announcements being broadcast. For instance, the Water Corporation had only a limited amount of time to assess damage before the Red Alert was lifted, and would have appreciated more time to make a more considered inspection of its infrastructure. SES crews in some locations were unable to conduct safety patrols prior to members of the public heading out onto the streets. Stakeholders also reported that on at least one occasion, warnings broadcast by the media were at odds with information published on the BoM website. It is likely that this may have contributed to the problems facing the Water Corporation and the SES.

There were a number of issues raised surrounding the decision making process and the communication of FESA Community Alerts when FESA was moving from one stage to another. Examples included:

- Who is to make the decision on calling the Community Alerts (Local Emergency Management Committees or the FESA Region)?

- The shift from Blue to Yellow alert at Port Hedland appeared to be declared remotely between 0500-0600 hrs and without wider consultation with Incident Managers in the Region.

- There were some complaints from the community that the ABC was not always consistent in the timing of their broadcasting announcements. Cyclone Warnings and FESA Community Alerts should be broadcast at fifteen minutes and forty-five minutes past the hour. In turn, the ABC expressed concern they were not being provided with timely information to meet scheduled broadcast times.

- The All Clear with caution should only be issued when roads and public places are made safe. Lifeline agencies must have had the opportunity to undertake damage assessments prior to the Red Alert being lifted. However, Horizon Power advised they will not attend to downed power transmission lines during a Red Alert and yet, made mention that members of the community were moving around in areas where fallen lines posed an imminent threat.

- An aircraft operated by Qantas landed at Port Hedland during the Yellow alert. This, apart from the inherent dangers of landing in unstable air, meant that passengers needed to be transported and accommodated upon their arrival at a time when all movement is restricted and was not, in hindsight, a desirable outcome.

- The Shire of Ashburton advised that Qantas landed and took off at Tom Price during the Red Alert stage.

- It was reported that some Port Hedland parents protested when they discovered that schools were closed during the Yellow Alert as they had expectations that their children would be supervised at school. This highlighted a lack of community understanding of

school policy and the consequences of Community Alerts on businesses and departments.

- Red Alert – A need to enforce people staying in shelter on Red Alert needs to occur. It is extremely hazardous for personnel trying to effect repairs with "sightseers" around.

- The Water Corporation indicated that they would have liked more time for maintenance crews to assess infrastructure damage before the Red Alert was lifted. (They only had 30 to 45 minutes).

- Industry not being invited to, or notified of all meetings of the IMG.

Industry Strategy

Industries' interests are to minimise lost productivity from 'shut downs' during the Cyclone Community Alert phases. There are positive opportunities for FESA to enter into strategic partnerships with industry in order to expand FESA's Community Engagement initiatives.

A significant part of the 2006/07 strategy involved FESA's Community Engagement Directorate working with industry groups in the region to facilitate the dissemination of individualised pre-season information packages to resource sector employees, including Woodside, BHP and Pilbara Iron. Information was communicated through a variety of routine safety and tool box meetings, lunch time presentations and induction packs for new employees. Strategies to target families included a family "sundowner" sponsored by Woodside, to promote safety messages in a presentation by FESA and BoM personnel.

Industry representatives were positive in their feedback on the current working relationships with, and support from, FESA. Industry is uniquely placed to communicate effectively with employees, who make up a significant proportion of the Pilbara community.

Industry representatives also expressed a willingness to engage more closely in the public dissemination of information, indicating that there are often unique opportunities that present themselves. For example, BHP expressed an interest in building some current cyclone education footage into a company DVD education package. They were also positive about the material and support provided by FESA.

There are positive opportunities for FESA to enter into strategic partnerships with industry in order to expand FESA's Community Engagement initiatives.

Remote Construction / Mine Camp Locations

A number of concerns were raised in relation to the number of camps (resource exploration, infrastructure construction and survey etc.) scattered throughout the region, many of which (for reasons of commercial confidentiality) whose locations, size, composition and workforce numbers are unknown.

It appears that there is no formal requirement for the camp operators to advise authorities (including local government) of these details, which makes pre-cyclone planning problematic.

As noted, the circumstances surrounding the fatalities that occurred during TC George are subject to investigations by WorkSafe and the WA Police Coroner's Office. It was therefore determined that in conducting this MIR, FESA would not investigate any of the circumstances touching on these matters. WorkSafe, the Coroner's Office and WAPOL were notified of the MIR terms of reference and of this intention.

Recommendations

1. **Undertake a review of cyclone education, awareness and information dissemination programs in conjunction with the key stakeholders to ensure their effectiveness and identify areas for improvement.**

2. **FESA to work closely with industry to ensure better alignment between industry and FESA/BoM warning protocols to avoid confusion within the community**

Training

Due to the cyclone's unpredictability and its wide geographical impact, the deployment of additional highly qualified personnel was deemed necessary. A number of Australasian Inter-service Incident Management System (AIIMS) Level 2 and 3 qualified personnel were despatched to undertake several roles on the incident management team and this included the role of Incident Manager. Level 1 is the lowest level of incident whilst a Level 3 incident is a large multi-agency event that may take many hours or days to resolve.

FESA has introduced this important incident management concept in the last three years when deficiencies in training and capability were identified in previous incident analyses.

Some SES personnel have a view that FESA has restricted the number of persons trained to AIIMS Level 3, with most candidates coming from a Fire Services background. Enquiries indicate that the focus on fire personnel being trained as a priority was as a result of the 2004 Auditor General's Report into bush fire management.

It has been suggested by many that the number of suitably qualified people with local knowledge be increased, along with the necessary support and training. This would provide a greater selection of suitably skilled personnel to deploy during emergencies and reduce the reliance on the same limited few.

Training course participation is open to all operational personnel and volunteers who possess the necessary pre-requisite qualifications, experience and competencies, to undertake these roles. There is a need to ensure that all IMT roles have specified competencies and people trained to meet those competencies.

Some of the key areas where training requirements have been identified (according to individual needs), include:

- a clear understanding of cyclones and their phenomena;
- an awareness of relevant procedures (i.e. SES Operating Instruction No 7 and Tropical Cyclone Warning Systems);
- an understanding of SEMC Policy Statement 7 and IMG/OAMG operations and functions; and
- an understanding of the fundamental differences between operational coordination and response.

Immense value was gained from the deployment of FESA personnel to assist in the management of TC George, operating as role models and mentors. Notwithstanding the perceived disappointment of a few local SES personnel and volunteers, the overall experience was a positive one for most. While there was some disquiet about the lost opportunity for local

personnel for on-the-job training, it was stated by some that mentoring and empowerment was a particularly useful experiential learning tool.

Recommendations

3. **All IMT roles are to have role statements that are hazard specific.**

4. **The composition of IMT roles should take into consideration the inclusion of local knowledge and experience.**

Alcohol Consumption in the Community

Police and emergency services personnel commented on the excessive amounts of alcohol consumed, both in town and at remote work sites during the Yellow and Red Alert.

Excessive alcohol consumption by workers resulted in hindrance to emergency services personnel and presenting law and order difficulties. It has become common practice throughout the Pilbara and Kimberley, to hold cyclone parties, involving excess alcohol consumption, with participants stocking up on supplies once a Yellow Alert is imminent.

The practice of permitting alcohol consumption by employees on work sites during cyclones is an issue requiring further examination and discussion.

The excessive consumption of alcohol during cyclones is a matter for the wider community to consider for further action.

Recommendations

5. **That FESA refer the matter of developing greater community and industry awareness of the negative impact of excessive alcohol consumption during critical phases of the cyclone to WAPOL in conjunction with Local Government.**

Indigenous Community Planning

RICs are discussed at the end of this section.

Damage to Buildings within the Port Hedland Area

In the *Tropical Cyclone George - Damage to Buildings in the Port Hedland Area (TimberED Services, Perth)* it was found that less than 2% of buildings sustained structural damage. The worst structural damage observed was loss of the major part of the roof structure. This type of damage was only observed in Port Hedland, and only in older buildings. The report concluded that structural damage was caused by:

- Deterioration of older structural elements.
- Inappropriate re-roofing practices. In a significant number of cases, the re-roofing removed the prime tie-down system without replacing it with other systems.
- Not following current practice for this area.
- Failure of non-structural elements such as flashings and trims. Where these were fixed to roof sheeting, then the loss of the trim led to the loss of some roofing as well.
- Pressurisation of roof space through roof vents (in gables and in some cases by rotating vents.

The report further found that building constructed to the current codes and standards performed well.

The recommendations of the report highlight the need for regular inspection and maintenance of older structural elements.

Damage to older buildings that had been re-roofed highlighted the following recommendations:

- Inspect for signs of rot, termite damage or member corrosion and replace damaged elements.
- Check that the batten-to-rafter connections and rafter to the wall connections comply with the current recommendations in the appropriate framing standard.
- Upgrade with extra anchorage (eg pap straps or framing anchors) where connections do not meet the current standard.
- Ensure that tie-down rods are linked to the roof anchorage system. If the over-battens are replaced, the tie-down rods need to connect with them. If other anchorage is use, then the tie-down rods must be incorporated in the new anchorage system.

Whilst the Building Codes and Standards are not the responsibility of FESA, there are opportunities to address these issues with Local Government as an awareness and prevention strategy for minimising cyclone damage and personal injury.

Recommendations

6. **That the Town of Port Hedland consider the recommendations from the *Tropical Cyclone George - Damage to Buildings in the Port Hedland* Report.**

RESPONSE

Organisation of Resources

There were positive comments about the availability of locally based resources in a time of need. Industry and the community contributed significantly through the provision of equipment and personnel. Notwithstanding the effectiveness of local networks and contacts, several people recommended the need for more formal arrangements in the future.

Formal Resource Sharing Arrangements

It was identified that there is a need for greater knowledge of resources available within the region (especially from industry) and that LEMC should create and maintain a local resource register. It should be noted that WAPOL in Port Hedland claim to have such a register which was being updated at the time of discussions.

One industry representative talked about the value of establishing mutual aid agreements or memorandum's of understanding to be used in times of emergency. This has worked well in the Kalgoorlie region.

Recommendation

7. **The Local Emergency Management Committee is to ensure that the local resource register is up-to-date for use during emergencies.**

Communication Systems

There was considerable frustration expressed on several occasions about the adequacy of communications systems within the Region. Comments and observations include:

- FESA is operating with two operational management systems (EM2000 and OMS) in different locations. Furthermore, neither system is universally available across the Region. However, both systems have the potential to be suitable if properly supported and if personnel are trained in their use. It was suggested that a decision needs to be made by FESA as to which system to favour and then deploy and support the selected system accordingly.

- Local computer systems appeared to operate slowly.

- Port and South Hedland mobile phone coverage extends only to 50km out of town. Radio kits were not made available to the IMG on this occasion.

- The AIIMS toolbox is seen as a useful resource and a worthwhile initiative. However, it is not regarded as "user friendly" and cyclone relevant. It was suggested that resources be devoted to improving its operability and then to ensuring more universal application across FESA.

It is acknowledged that FESA is in the process of rolling out its WA Emergency Radio Network and Clever Networks program which should resolve these matters. Additionally, it is intended that upgraded satellite communication will form part of this technology upgrade.

Recommendation

8. **That FESA implements an operational management system that meets the needs of all its hazard management responsibilities.**

Deployment of FESA Resources

Despite some negative local reaction, referred to previously in this report, ultimately, there was wide community praise for the work of the Major Emergency Team (MET) and of the decision to mobilise them to provide adequate shift coverage throughout the emergency.

This was reinforced by the view that the MET should form part of an 'early call' first response effort in future cyclone events. Thus, more effective organisational planning would have been possible prior to the impact of the cyclone, leaving personnel free to focus totally on response rather than be distracted by other matters.

Similarly, deployed personnel identified a need for the Region to have in place and maintain, structured mobilisation plans for their guidance when teams are deployed to the region. It was reported that plans were either not in place, or were inadequate and that time was wasted due to the lack of these pre-plans.

These may include:

- Copies of industry cyclone plans.

- Accurate organisational structures, personnel lists (along with names of designates or proxies) and reporting protocols.

- Details and locations, contacts, etc of RICs, mine sites, major installations, stations and remote camps.

- Names and phone numbers of key personnel and agencies, including mobile phone numbers.
- Instructions for issues such as airport arrangements, vehicle storage details etc.
- Welfare arrangements, meals, supplies, accommodation, etc.
- Kits to be made available to incoming staff/volunteers upon arrival.

Major Impacts - Evacuations

Approximately 1500 Port Hedland residents were advised to evacuate during the Yellow Alert. SES volunteers conducted doorknocks of private residences to inform residents of the impending dangers and it was noted that, in cases where residents were not at home, no follow up action was possible, and no written advice was left for the attention of occupiers.

Members of the Strelley and Jinparinya Aboriginal Communities self-evacuated to either private homes or to the indoor basketball centre at South Hedland. As stated elsewhere, communities such as Marda Marda were offered evacuation assistance but refused to leave. Other communities were evacuated ahead of the cyclone but some members returned of their own accord prior to the impact.

At around 0450hrs on Friday 9th March, duty FESA personnel at Karratha RCC were informed by Newman Police that the TC George had severely impacted on FMG mine site at Wodgina some 120 km south of Port Hedland; that a fatality had been recorded along with 17 injuries to construction workers and that urgent evacuation was required of 17 injured and up to 170 other personnel. It was subsequently clarified that, although the FMG Wodgina mine site had been hit badly, the fatalities and injuries had in fact occurred at the FMG railway construction camp RV1 some distance EastNE of the Wodgina mine site. The RC1 location had housed almost 200 personnel in temporary 'donga' accommodation and had been devastated by the cyclone.

The FESA RCC immediately proceeded to make arrangements to evacuate injured RC1 personnel, utilising charter helicopters. Port Hedland Regional Hospital was notified of the emergency and arrangements were made with the Health Department to fly additional health care personnel from Perth to assist with the injured, once they were evacuated. It is noted from FESA Sitreps, that at 0750hrs that same morning, TC George was still rated at Category 3 at a point 110 kms South of Port Hedland in the vicinity of the RC1. At around 1130hrs that morning, a task force arrived at RC1, comprised of surgeons, nurses, paramedics, police, SES rescue team and FESA personnel.

At this point the cyclone was still at the low end of Category 3, producing strong winds and rain. The immediate task facing the group was to identify, prioritise and stabilise the injured personnel, prior to evacuation. Between 1230hrs and 1800hrs on Friday 9th March, the task force undertook nine rotational flights using three helicopters to evacuate 17 stretcher cases and 10 seated injured to Port Hedland. The remaining construction personnel were evacuated by bus from RC1 on Saturday 10th March ahead of TC Jacob, when the floodwaters had sufficiently subsided to permit vehicular access.

The medical evacuation of injured personnel from RC1 represents an outstanding effort in the entire emergency response effort in the aftermath of TC George.

The circumstances of the devastation at RC1 will be the subject of a Coronial investigation. FESA Sitreps and records provide further detail of the evacuation and are available to the Coroner on request. It is evident from FESA reports and personal accounts that personnel from a number of agencies made an outstanding contribution in rescuing injured construction workers during ongoing cyclonic conditions.

Accommodation and Evacuation

Existing emergency accommodation facilities in the Region are inadequate for the needs of the permanent population should wide-scale evacuation be required. In some cases, potential sites are not fit for purpose. For example, the South Hedland basketball centre was utilised during TC George, but is unsuitable due to limited ablution facilities.

Many of the agencies (including FESA) were frustrated by the lack of available accommodation for their workers assisting in the recovery phase. The specific circumstances brought about by the resources boom, means that the Pilbara will continue to experience accommodation shortages for the foreseeable future. This will impact on the capacity and rate of longer term aspects of recovery.

The Federal Government-owned former detention centre at Port Hedland (which was mothballed in mid-2004) can house up to 720. Following representations by SECG to the Federal Government, the centre was made available for the short term housing of some evacuees and visiting emergency management personnel during TC George, who were otherwise without accommodation.

The inadequacy of catering arrangements was an issue raised both in the community and volunteer forums and the LEMC meeting. Food and drink supplies for volunteers and agency personnel actively engaged in operational duties, was intermittent and sub-standard.

It was suggested that the mess facilities operated by resource sector companies could have been utilised to provide additional catering services for volunteers and agency personnel. This is an issue to be explored as part of future planning for the better utilisation of local resources.

The impact and severity of TC George, especially in outlying areas, has heightened awareness and concern about the potential to require the evacuation of hundreds and perhaps thousands of people in the event of future similar emergencies. Some companies have expressed a need for heightened evacuation preparedness, seeking assurances from FESA that the safety of their employees can be assured in the event of future risks. FESA's clear view is that mining companies, like all other citizens; need to build in resilience and capacity to mitigate the impacts of a cyclone including evacuation plans. In the event the specific company has exhausted all its options, then the State may consider assistance.

Regional population escalation arising from the resources boom has placed pressure on the capacity of Port Hedland and Karratha to cope with evacuees from remote locations.

A view expressed by some, is that industry has an obligation to act early on cyclone alerts and, if on-site accommodation is unlikely to withstand cyclonic conditions, then the timely evacuation of its workforce to Perth is a better option. On the other hand, there is a need for the development of location specific industry preparedness plans which take account of workforce numbers, the vulnerability of individual sites, distance from and availability of, alternative safe havens and a risk analysis against the relative merits of remaining in-situ, or evacuating. There are parallels here with some of the 'Should I Stay or Should I Go' decision-making criteria outlined in FESA's bush fire "Prepare, Stay and Defend, or Go Early" campaign. These may be useful in developing evacuation plans for cyclones and floods.

Recommendations

9. **Local evacuation plans to be reviewed to ensure they meet the needs of the community including the availability of current facilities.**

10. **Use of community and industry resources, especially in relation to accommodation and welfare be incorporated in local and district emergency plans.**

11. **FESA to liaise with relevant government agencies, industry and Local Governments to identify emergency accommodation and evacuation centres needs to be assessed in accordance with the provisions of the *Emergency Management Act 2005.***

12. **FESA engage industry to progress high level discussions concerning industry evacuation responsibilities, expectations and decision making.**

13. **FESA and local government to provide guidance to industry in the development of emergency management planning, including the relative merits of remaining in place or evacuating in the face of cyclones.**

Media Management

Possibly because of the world wide focus on the impact and massive devastation to New Orleans in August 2005 by Hurricane Katrina, and the more recent March 2006 impact of TC Larry on Innisfail in Far North Queensland, there is now a significant international media interest in natural events. TC George was no exception and attracted round the clock enquiries from local, national and overseas media outlets.

Media management is vital to the effective execution of emergency response. The HMA Media Liaison Officer (MLO) forms an essential link between the HMA and the local community; the wider public and to external outlets. In addition, the MLO has a responsibility to communicate key messages in support of the emergency management role.

FESA deployed a MLO to the Pilbara on Thursday 8th March, followed by two additional media personnel on Sunday 11th March. The professionalism and quality of media liaison was positively commented on, both internally and by the media outlets. The MIR has identified a number of observations regarding media management, which include:

- The role of the MLO is regarded as extremely important by both external media and internal management. There was a strong message that the MLO role needed support which should have been deployed much earlier. The demands on the initial MLO posting during the cyclone's impact meant that the role was critically under-resourced, requiring the MLO to work extremely long hours without rest.
- It is noted that the ABC made a strategic decision to fly up five personnel from Perth to the Pilbara two days before the impact of the cyclone and fully utilised these resources throughout the event.
- The ABC was extremely complimentary about FESA's media management and have offered the following additional observations:
    - It is useful for the ABC to have a direct link into FESA's media, as this helps them have greater credibility through accuracy and timeliness.
    - The ABC lost its own transmission capability at Port Hedland due to the cyclone and was particularly appreciative of the SES restoring it.

A debrief report has been provided by the State Emergency Public Information Coordinator (SEPIC). This is titled "Report to Public Information Group (PING) SEMC: Issues Relating To the Media and Public Information Function in the Emergency Response to Cyclones George and Jacob, March 9 – 12, 2007".

FESA Media and Public Affairs has considered the SEPIC debrief findings to incorporate the lessons learned from TC George/Jacob as part of its annual review of media and public information plans and procedures. Changes and improvements include:

- the development of a talking points template to simplify the information flow and approvals process,
- the development of job cards for key media and public information roles,
- the addition of trigger values for a media and public information response geared to operational delivery and resourcing,
- formalisation of an in-house needs-based community call centre and a review of public information processes and systems,
- investigating the establishment of a multi-faceted volunteering program in support of media and public information.

The current practice of combining the functions of media management and community information needs to be reviewed by FESA when dealing with major emergencies as the demand significantly increases which results in the media officers being unable to fulfill their primary function.

Recommendation

14. That FESA separate the media-management and the community interface functions during major emergency operations.

Urban Search and Rescue Mobilisation

FESA's Urban Search and Rescue (USAR) group is comprised of highly-trained and specialised career firefighters, ambulance paramedics, medical officers, SES volunteers and engineers equipped with highly specialised equipment. They are based in the metropolitan area with a capacity for rapid deployment anywhere within the State in response to emergencies. The USAR group was issued with an order for deployment to the Pilbara at 0700hrs on Thursday 8th March and after some air-movement delays, were able to mobilise a team in three separate deployments over a period of two days. Because of air cargo limitations on the charter-flight, it was necessary to dispatch a two-member USAR support team by road to transport a specialised USAR equipment cache to the Region.

Once in Port Hedland, the USAR team members were assigned to support SES teams undertaking combat roles and undertook initial reconnaissance of remote communities. On Sunday 11th March, the major task of the USAR team shifted to preparations for the anticipated impact of TC Jacob. On Tuesday 13th March, when TC Jacob was declared to be no longer a threat, the USAR team was stood down and returned to Perth. The input of the USAR team was well received locally, with several stakeholders praising their skills, professionalism and compatibility to work side by side with volunteers.

Inter-agency USAR protocols make provision for the deployment of a USAR trained Department of Health Doctor when a USAR Task Force is mobilised. It was reported that, due to misunderstandings and the limitations on aircraft seating, no USAR doctor was assigned with the team. They were however accompanied by a St John's Ambulance Paramedic to provide first aid assistance and team support.

The USAR group's capacity to undertake reconnaissance and search and rescue operations is a valuable first-response asset. It was likely that an earlier decision to pre-deploy the USAR group during the Yellow Alert phase (or sooner), may have been of greater benefit and would have overcome the subsequent delays experienced with aircraft movements.

The USAR group debrief noted:

- The value of strengthening ties between FESA and Indigenous Communities, for the purposes of providing prevention and preparation training at an appropriate level.
- That the Pilbara Norforce personnel could be trained to USAR Category1 to strengthen the communities' resilience in emergency situations.
- A need exists for regular Regional disaster training exercises.
- There is a need for more effective (State emergency level) airlift planning and procurement arrangements, including the wider provision of dangerous good waivers.

Safe Work Practices

As with all major emergency incidents the importance of safe work practices and ensuring adequate risk management is dynamically managed should be paramount. Safety issues including near misses, have not been formally reported or investigated during or post this incident. Whilst this may indicate a lack of incidents it also may indicate that a formal process of safety and risk assessment was not in place.

Recommendation

15. **All future major incidents are to have a suitable safety and risk management system in place.**

RECOVERY

Community perception is that the recovery in the Pilbara Region has been managed well, with the majority of clean-ups occurring quickly, particularly in the towns. The continuation of the FESA response teams in the community was seen as extremely helpful in contributing to recovery. Local Government involvement has been positive, particularly in relation to their support for FESA and its volunteers.

Recovery however, goes well beyond superficial clean-up and property restoration. Recovery goes to longer term aspects of the community's capacity to overcome the emergency and includes the next phase of planning. Lessons learned from the incident including the findings of this FESA MIR, the Coroner's findings and other investigations are all relevant to the process.

Utilisation of Local Resources

There were some anecdotal views expressed that local industry resources were not utilised as fully as they could have been and "if only asked", industry could have provided more. This comment is not limited to the recovery phase, but applies equally to the preparedness and response phases. A speedy return to normality also benefits industry, which is able to assist in areas of equipment, personnel and catering supplies. Future emergency management planning should to take this into account and develop a more rigorous process for industry assistance.

Recommendation

16. **The Local Recovery Committee establish protocols to more effectively engage local industry and community resources in the recovery phase**

Town Community Expectations

Community expectations of FESA, SES volunteers and other agencies were considered unrealistically high during the recovery phase. The SES in Port Hedland has limited resources and there are limits to their capacity to respond. Some volunteers received negative and often hostile responses from members of the community for not undertaking tasks outside of the SES area of responsibility. For example, the SES will attend to the removal and making safe of trees fallen on buildings, but trees that have fallen on fences or other parts of private properties, that don't represent a hazard, remain the responsibility of owners. One resident wanted the SES to pump out his overflowing swimming pool, while another resident complained that the Town of Port Hedland had failed to allocate funds to replace his damaged shed. Some residents thought that, because they paid their Emergency Services Levy, they were entitled to SES services for the general clearance of fallen trees and storm debris from their gardens. Local Government also reported similar criticisms from ratepayers seeking the same service.

This issue indicates a low level of community understanding of the role that SES volunteers play during and immediately following an emergency. It reinforces a need for FESA to communicate to the public the specific range of services provided by volunteers and the limitations applying to that service.

Defusing/debriefing

Many people spoke of the shock that affected them personally in the aftermath of the cyclone. This was largely due to that fact that a majority of residents had never experienced one before and it was the first major cyclone to hit the Port Hedland area in a number of years. The fact that deaths and injuries were also reported caused additional distress for many. Residents of RICs also reported feeling "shell-shocked" after the event and in need of counselling support which didn't arrive.

Counselling services were provided in Port Hedland, but not necessarily sufficiently publicised or fully utilised. Local Government also provided a range of debriefing supports to the community and specifically to the individuals affected by the loss of housing, etc. Indigenous communities in the main received no debrief or counselling support and in some locations, it was two to three days before any outside assistance arrived. According to the locals, one group that appears to have missed out on any debriefing opportunities, are those fly-in/fly out workers who were immediately sent home (often to other States) once the Red Alert had lifted. Anecdotal reports are that several individuals were affected. Clearly, the employee welfare is an employer responsibility, however this appears to have been overlooked and the needs of individuals remain unmet.

It was observed by the MIR Team during visits to the region that some individuals still appeared to be affected by the event and that debriefing and/or counselling activities may need to continue as a service provided by the Recovery Committee. This was evident also with some FESA personnel with many years experience in dealing with emergencies.

There has also been the suggestion that more support could have been provided to the volunteers, when “unwinding” from the cyclone.

8. Indigenous Communities

There are 283 or more RICs located within Western Australia, many of which are at the extremes of geographic isolation. This, along with their diverse nature, size and low population base has limited the provision of adequate servicing. Inadequate services and infrastructure, transient populations, accessibility issues, an enduring legacy of economic and social disadvantage and exposure to high natural hazard risk (i.e. floods and cyclones) has left these communities highly vulnerable. The circumstances of Aboriginal people differ significantly between locations, which further complicates the delivery of emergency management services to communities that have diverse and complex needs.

Formal emergency management in RICs is currently limited, and there is also a lack of detailed understanding and shared view around the level of risk faced by these communities.

In the context of this MIR, it is pertinent to first detail with the complexities of the delivery of emergency services to Indigenous communities, both town based, hub communities and homeland communities.

For clarity the following definitions of communities apply:

Town Based Indigenous Community: a community located in the confines of a townsite, or as either defined by the town extent of development or formal gazettal.

Hub Indigenous Community: a community with a population of more than 200 people.

Homeland Indigenous Community: a community with a population of 50 people or more.

Town Based Indigenous Communities

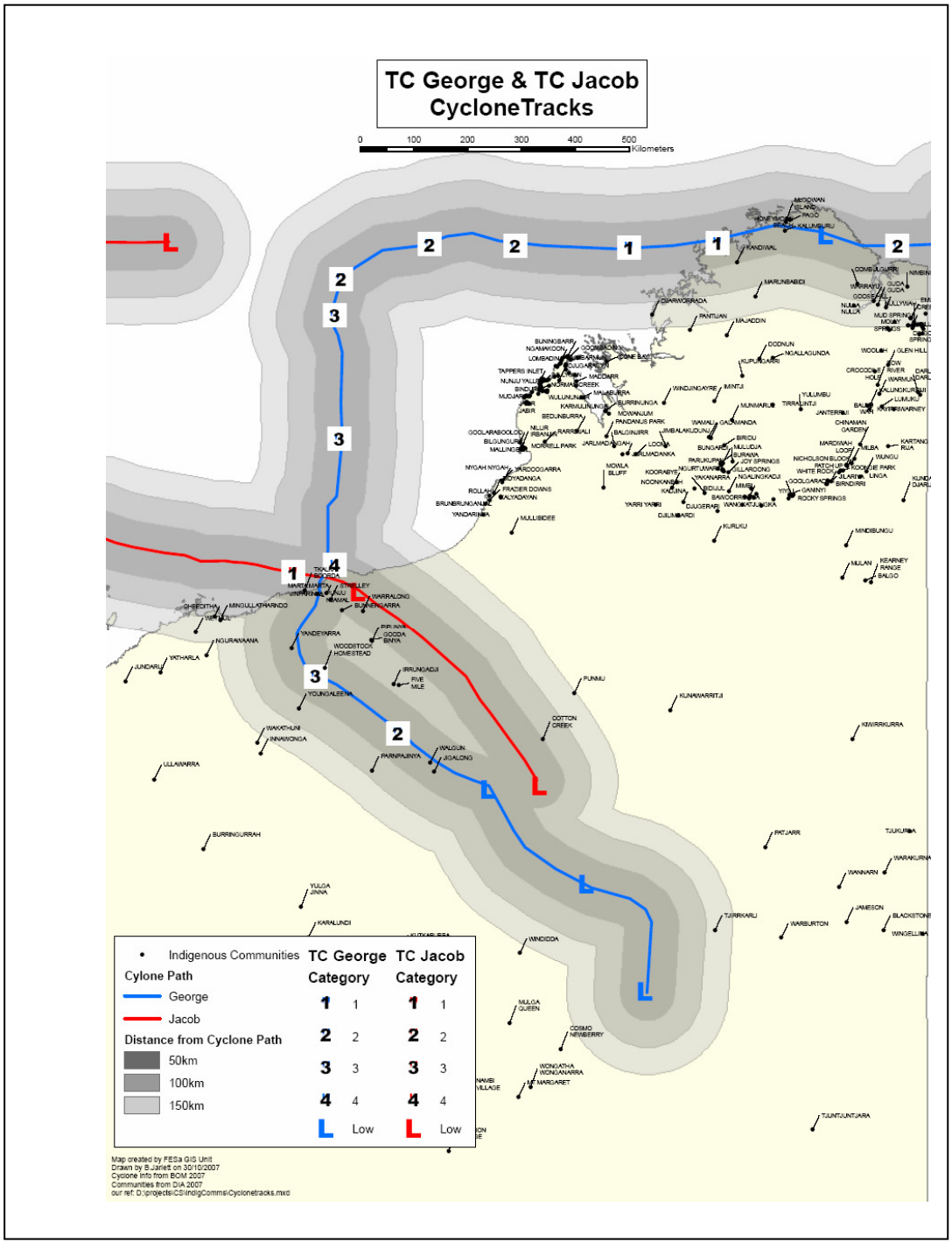
Town based communities are subject to the same local emergency management arrangements during the prevention, preparedness, response and recovery of a natural hazard impact as that which applies to the broader community in relation to community announcements, alerts and public information.

It should be noted that in terms of community alerts, unless the alert refers to or specifies Indigenous communities in the warning, it can not be assumed that the Indigenous community will realise that they are in the impact area. For example, where alerts refer to 'Newman', community members of Jigalong may not necessarily consider themselves to be at risk.

For the purposes of this report, there are 10 communities considered to be 'town based' or urban Indigenous communities.

Affected Communities

The map below depicts the Indigenous communities affected by Cyclones George or Jacob either pre or post impact (including subject to cyclone warnings).



Major affected communities included:

Tkalka Boorda, Jinparinya, Strelley, Warralong, Bunnengarra, Coongan, Pipunya, Gooda Binya, Yandeyarra, Woodstock, Mumbultjari, Irrungadji, Youngaleena Bunjima, Pumajina, Camp 61, Billanooka, Walgun, Jigalong, Robertson Range, Puntawari, Cotton Creek, Tjirrkarlie.

Indigenous Community Feedback

Pre-impact

Planning

The development of effective partnerships between RICs and emergency management agencies is an essential element of prevention planning. Inadequate infrastructure, transient populations, accessibility issues and exposure to high natural hazard risk (i.e. floods and cyclones) makes these communities highly vulnerable. Concern was expressed by some Indigenous communities, corporations and agencies, about the limited pre-cyclone preparation by some remote communities.

The Pilbara Meta Maya Regional Aboriginal Corporation felt that they had been excluded from any initial management planning process, even though they are responsible for the provision of housing and essential services. It was their view that they should have been actively involved in Community Emergency Management Planning throughout the whole process.

The Bloodwood Tree Association emphasised that a greater need existed for communication of messages on pre-cyclone planning, particularly in small remote communities such as Jinpirinya and Marta Marta

FESA records reflect the following routine pre-season activities were undertaken in the 2 year period prior to Cyclones George and Jacob:

Community	Month/Year	Purpose	Visiting Officer/s
Jigalong	November October 2006	Pre-wet planning	District Managers Port Hedland (East & West Pilbara)
Punmu	November October 2006	Pre-wet planning	District Managers Port Hedland (East & West Pilbara)
Kunawarritji	November October 2006	Pre-wet planning	District Managers Port Hedland (East & West Pilbara)
Parnngurr(Cotton Creek)	November October 2006	Pre-wet planning	District Managers Port Hedland (East & West Pilbara)
Kiwirrkurra	November October 2006	Pre-wet planning	District Managers Port Hedland (East & West Pilbara)

Although unconfirmed, it is believed communities of Tkalka Boorda, Jinparinya, Warralong and Strelley which were in the full impact zone of TC George were not included in the pre-wet season planning visits.

Warnings and Alerts

FESA cyclone Standing Operational Procedures require pre-impact contact to all affected communities (including pastoral) to ensure that the community is in fact aware of, and prepared for, the imminent cyclone threat. In this instance, whilst FESA IMT officers have advised that communities were contacted pre impact, some community members claim that they did not receive this advice. Incident records or operational logs do not provide sufficient detail as to be able to verify whether contact was made.

The Strelley community made an early decision to self evacuate to Warilong for safety reasons. The community has learned from experience the importance of ensuring a clean-up occurs all year round, rather than waiting until just before the cyclone season. Community representatives expressed a desire for the Cyclone Community Alert System to be simplified for their residents.

Police representatives were of the view that preparation and training to allow remote communities to stay put, rather than bringing them into Port Hedland, would be a positive move – especially as there is very limited emergency accommodation available in Port Hedland or Karratha and that travel during emergencies can pose risks (review accuracy and what actually happens)

Jinparinya Community has a population of 65 people and is a small Homeland Community located 40 km from Port Hedland. Community members were evacuated to family and friends in Port Hedland, while their infrastructure suffered extensive damage.

The community was of the view that emergency management planning services to remote areas were not as accessible to the extent they are in Port Hedland.

Post Impact

Accessing Services

As a general observation and, based on their perceptions of the responsiveness of FESA to their individual community needs when, compared to other non-Indigenous communities, Indigenous community members consistently alluded to inequitable service delivery.

Despite the extent of the damage suffered, the community's perception is that FESA assigned only two people (one officer and volunteer) to assist the community during the response and recovery phases. From the community perspective, this is indicative of FESA's lower prioritisation of their needs. However, FESA allocates tasks according to the priorities in the operational area impacted by the emergency. Improvements could be made in FESA's operational interaction with Indigenous communities through allocating a dedicated officer within the local, regional and state operational centres. The primary role of these officers would be to ensure an effective and efficient emergency liaison and response capability.

Air Reconnaissance

It was claimed that helicopters engaged by FESA to undertake damage and flood survey work following the All Clear, had flown over remote communities without landing to ascertain if assistance was required. Whilst the tasking of pilots to undertake immediate, wide-area survey work is appropriate, the communities had immediate expectations of assistance in the aftermath of the cyclone, especially given that communications were interrupted and some locations were temporarily cut-off by floodwaters.

It was reported that in Jinparinya community, there was a requirement for the medical evacuation of an older community man who had become quite distressed during the incident. It was suggested that Jinparinya had been without communication and had no other means of signalling their need for immediate and urgent assistance.

Information about Communities

It was reported that during TC George, a resident of the Marda Marda Aboriginal Community sustained a spinal fracture and required transport to Port Hedland Hospital in a truck by fellow community members, because paramedics were unaware of the community's location.

FESA has followed up on this matter with St John Ambulance Volunteer Branch in Port Hedland, St John Ambulance call centre in Perth and the Port Hedland Hospital and was unable to verify the veracity of this claim, with no record of any call for assistance being made.

Notwithstanding the veracity of this claim, it highlights a need for the collation and management of more comprehensive information about communities during planning stages.

The need to establish specific plans, maps of locations, contact details and a more complete knowledge base of Indigenous communities, and make them accessible to other agencies, was raised by Department of Indigenous Affairs.

Community information should include (but not be limited to):

- Profile
- Population
- Maps
- Location (coordinates)
- Infrastructure and community assets
- Contact details of key community members
- Emergency plans
- Availability of community resources for response and/or recovery

Due to the dynamic nature of Indigenous communities, information should be reviewed at least annually to confirm the currency of details. For example, communities may vacate existing sites and re-establish in new locations in response to cultural events. It is also not uncommon for break-away groups to establish in new locations after a community disagreement.

FESA already maintains extensive mapping resources which can be built on to provide a more effective set of risk management tools for RICs to assist in supporting community based prevention and preparedness planning for the future. These can readily be made available widely to agencies.

Partnerships and coordination

Pilbara Meta Maya Aboriginal Corporation has a contractual service provision relationship to Government for the coordination of municipal and housing maintenance support to a number of Indigenous communities. They have a sound understanding of the needs of those communities and maintain good contacts with community leaders. They also had a capacity to bring key people together in a consultative way to deal with issues.

The Marda Marda community sustained some damage in the cyclone. They were aware in advance of the impending arrival of the cyclone and ordered extra fuel stocks as an early precaution. Marda Marda was unable to access information on the internet due to communication services being down. Evacuation assistance was offered to them but they refused to leave. No counselling services were offered.

The Pilbara Meta Maya Regional Aboriginal Corporation stated that they had been involved previously in emergency planning processes, but this involvement had fallen away in recent times. They are also not a member on the local recovery committee. As a key contractual provider of maintenance and infrastructure provision services for Indigenous communities, they have a claim to greater active inclusion from prevention planning through to recovery.

Meta Maya had made their own assessment of the cyclone's impact on communities in order to obtain the necessary levels of assistance required from government. Having identified these needs, there had been some considerable delays in 'getting things fixed', indicating a need for improved recovery readiness planning by government agencies.

Although, DHW Aboriginal Housing Board are funded to provide municipal and housing services to Indigenous Communities they tender to private enterprises such as Parsons Brinkerhoff who in turn tenders to Pilbara Meta Maya.

The Bloodwood Tree Association drew a comparison with the community's recovery approach to Tropical Cyclone Joan in 1975, (the last cyclone of similar magnitude) noting that there was greater community cohesion and overall involvement in the clean-up effort then, than on this occasion. The MIR Team met with representatives of a number of RICs and in addition, received written comment and/or debrief reports from several of the communities. A number of criticisms pointed to varying degrees of dissatisfaction with follow up by emergency services personnel and delays with damage assessments and critical infrastructure repairs.

It is important that key Indigenous stakeholders are involved in all phases of prevention, preparedness, response and recovery to ensure consistency of communication.

Pilbara Meta Maya Aboriginal Corporation believe that FESA and the LEMC should draw more extensively on the Corporation's networks and expertise in bringing together groups to develop agreement on effective community emergency management plans. Consideration should be given to including key Indigenous stakeholders within the local emergency management and recovery committees.

Recommendations

17 Consideration should be given to including key Indigenous stakeholders within the local emergency management and recovery committees.

18 To assist with operational interaction with indigenous communities FESA consider allocating a dedicated officer within the local, regional and state operational centres.

19 A review of remote indigenous communities be undertaken with the view to obtaining more comprehensive information about communities during planning stages. This should include specific plans, maps of locations, contact details and a more complete knowledge base of Indigenous Communities.

9. Assess the operational effectiveness of the State Tropical Cyclone Emergency Management Plan 2004 (WestPlan - Cyclone) as a blue print for incident response.

Context

FESA has six key areas of responsibility in relation to emergency management generally, and cyclones in particular. These are:-

- Administration of the *Emergency Management Act 2005* [1];
- Executive and administrative support of the SEMC (planning) and the SECG (operational coordination). It should be noted that any assessment in relation to the latter role, or of the SECG itself, falls outside of the Terms of Reference of this MIR, and is being dealt with as part of a debrief of the SECG;
- FESA is the prescribed Hazard Management Agency (HMA) for cyclones[2] - the emergency management role;
- As the HMA for cyclone, FESA is responsible for "preparing a strategic plan of arrangements (WestPlans) designed to cope with the particular hazard, that includes details of joint agency operational arrangements"[3]. (This responsibility has been re-enforced in State EM Policy 2.2, 'Development and Review of State Emergency Management Plans', approved by the SEMC at its meeting on 4 December 2006. Policy 2.2 includes a detailed template to be used when preparing WestPlans.)
- As HMA for cyclones, FESA is also responsible for submitting a post operation report to the SEMC – refer PS7 (Annex H, 1c(7) and PS12, 'Post Operation Report'.
- FESA is a Combat Agency for cyclones[4] - the emergency services role.

In addition to hazard-specific WestPlans (e.g. WestPlan – Cyclone), there are a number of other WestPlans that might need to be activated as a result of the onset of a particular emergency. This could include the following:

• WestPlan – Health	• WestPlan – Welfare
• WestPlan – Public Information	• WestPlan – Recovery
• WestPlan – Registration and Inquiry	

The provisions of SEMC PS No. 10, 'Procedures for Activating State Support Plans', are also relevant to the above.

The above listed WestPlans are primarily the responsibility of other departments. Unless an issue relevant to these WestPlans was raised with the MIR Team, this Report does not touch on their provisions.

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[1] *Government Gazette* dated 26 May 2006, 'Administration of departments, authorities, statutes and votes' (page 1940)

[2] Regulation 17(2)(b) of the *Emergency Management Regulations 2006*

[3[SEMC Policy Statement No. 7 (PS7), 'Western Australian Emergency Management Arrangements' (Annex H)

[4] *Fire and Emergency Services Authority of Western Australia Act 1998* (Part 3A, 'State Emergency Service'), and PS7 (Annex H).

WestPlans are a strategic document. However, the provisions of WestPlan – Cyclone (paragraph 1.6) also specifies the following objectives:

(a) "To outline the "comprehensive approach" to the tropical cyclone hazard in Western Australia.

(b) To define the responsibilities of FESA SES as Hazard Management Agency, Combat Agencies and Support Agencies in the event of a tropical cyclone emergency.

(c) To detail arrangements for the control, coordination and response of State Authorities to a tropical cyclone emergency.

(d) To identify Prevention and Preparedness strategies to be undertaken throughout Western Australia.

(e) To provide guidelines for the Response and Recovery to a tropical cyclone emergency in Western Australia."

'Scope' (para 1.8) requires that "Each agency with a statutory role shall have in place appropriate operational procedures, which detail that agency's response, including resources and communications, in accordance with this plan."

In relation to paragraph 1.8, the MIR Team has been provided with copies of the following FESA-SES Operations Instructions (OI):

- OI No. 7, 'Cyclone Procedures' (OI7); and
- OI No. 4, After-Hours Response Procedures (OI4).

The current version of WestPlan–Cyclone that has been approved by the SEMC is dated September 2004. It is a public document, and is available on FESA's websites (portal and internet).

Following the approval of State Emergency Management Policy 2.2, and prior to TC George, FESA Operations commenced a review of WestPlan-Cyclone. FESA was aware that the current version of the document did not reflect:

- the organisational (and positional) changes flowing from the September 2006 FESA restructure;
- current operational arrangements; and
- the provisions of the *Emergency Management Act 2005* (particularly in relation to the availability and exercise of emergency powers) and of the *Emergency Management Regulations 2006*.

Analysis

For the purpose of this MIR, there appears to be two inter-related questions:

- How FESA performed against the provisions of the current iteration of WestPlan-Cyclone; and
- How effective and relevant those provisions were.

The MIR Team has examined each of the WestPlan provisions, particularly those that might be regarded as 'action items', and has concluded that most of the requirements were complied with and were effective. It is important to note that the effectiveness of WestPlan-

Cyclone as an emergency management tool must be viewed in the context of a range of competing factors that may affect outcomes. Broadly, these include:

- The overall effectiveness of all procedures and documentation supporting a comprehensive and integrated (multi-agency) approach (PPRR) to cyclones. This includes FESA's own operational documentation, e.g. OI7, the operational documentation of other government agencies and in this case, the Town of Port Hedland Local Emergency Management Arrangements and Local Recovery Plan;
- The level of preparedness undertaken by individuals and communities, including the unpredictable behaviour of human beings in a crisis (consumption of alcohol, adherence to instructions, etc), which may impact on orderly emergency management;
- The extent to which a single negative issue may distort perceptions and detract from an otherwise positive outcome; and
- The track taken by the cyclone in relation to populated areas, and its impact thereon. It has been suggested that with a cyclone, unlike a hazard such as fire, there are relatively few Response actions during the actual impact of a cyclone except 'Just sit back and let nature take its course!'

Clearly, the experience gained by FESA and other stakeholders during TC George and Jacob will include a number of Lessons Learnt which should ideally be reflected in WestPlan–Cyclone and/or other agency documentation. To assist in that process, the MIR Team has collated that information against the relevant provisions of WestPlan–Cyclone.

WestPlan Cyclone – Paragraph 6.12h Closure of Roads

During the passage of TC George, Main Roads WA experienced difficulties in its communications with FESA, concerning a decision to close the Great Northern Highway. This was because of uncertainty of FESA's regional boundary jurisdiction. Although Main Roads WA has the power to close roads, they are reluctant to do so without first consulting with the HMA.

Long driving distances in the Kimberley and Pilbara means that, in the interests of public safety, the timing of road closures at pre-determined milestones prior to possible cyclone impacts, is critical. Delays in closing roads in the onset of a cyclone may unnecessarily expose road users to risk. Whereas, those travellers already on the road must have sufficient time to reach their destination before the cyclone's impact. The timely closure of main roads during cyclones is essential to ensuring public safety and a need exists to review joint protocols with Main Roads WA.

WestPlan Cyclone – Paragraph 6.12e Securing and Closure of Ports and Airports

Aircraft operated by Qantas landed at Port Hedland during the Yellow alert. This, apart from the inherent dangers of landing in unstable air, meant that passengers needed to be transported and accommodated upon their arrival. Whilst movement is not restricted it was not desirable. Personnel providing transport and shelter to disembarking passengers during cyclone conditions may have been exposed to unnecessary risk. Clearly, the control of an aircraft in flight during bad weather rests with the pilot, whereas Air Services Australia controls restrictions on air space. Airports owners (normally local government) control restrictions on the use of airfields.

Section 6.12 e of WestPlan-Cyclone states that the securing and closure of ports and airports 'may occur' as part of cyclone pre-impact activities, when community alerts are issued. The terminology used in the policy is very imprecise and may leave the reader in doubt as to what

considerations should take place before such a course is adopted. This illustrates a need for improved consultation and more precise decision making on aircraft movements during a cyclone alert. However it should be noted that the strategic action statement is made to cover all circumstances for Categories 1-5. For instance in a Category 1 it may not be necessary to close facilities.

WestPlan Cyclone – Paragraph 6.31 Transport

One of the first flights into Port Hedland after the All-Clear was issued was dominated by media news crews, whose bookings were to the exclusion of emergency management personnel. Also, during the days immediately following the cyclone, there were ongoing difficulties in securing flights for recovery personnel. The air transport needs of emergency management personnel must therefore be given a high priority ahead of other passengers. However it will need more research and liaison with transport operators.

During the emergency, FESA, the Health Department, WAPOL, DPC, and other agencies, individually procured air transport services for their own use. It is apparent from discussions with stakeholders, that there was little interagency coordination, and therefore limited potential to share services. Transport of health equipment and personnel were essential to the response and recovery effort and yet, difficulties were encountered in securing adequate aircraft seating. The Health Department and FESA both encountered air cargo payload limitations and obstacles with limited dangerous goods capability of some charter operators. There is a need for interagency coordination of overall air transport service procurement.

The Health Department commented on an observed need for a member of personnel or volunteer to be assigned to both Port Hedland and Perth airports, throughout the emergency event, as 'airport marshals'. It was noted that much 'on the ground' organisation was left to chance and agency team leaders spent precious time organising the movement of people and equipment. In a number of cases, evacuees (some with injuries) were left unassisted while waiting for flights. Airport marshals would coordinate the dispatch and receival of personnel, equipment and evacuees and form the single point of contact/liaison for Incident Managers. The airport marshall would also form a very useful purpose in ensuring that the welfare needs of evacuees and emergency services personnel are met, including the in-transit requirement for food, refreshment, transport, contact with families, agencies and support organisations such as Red Cross, St John Ambulance etc.

In conclusion, FESA's current review of WestPlan-Cyclone clearly needs to look not only at that WestPlan, but also at all ancillary and related documentation, both internal and external.

WestPlan Cyclone - Operations Principles – Paragraphs 2.9 to 2.16 and Subsequent Paragraphs (Preparedness and Response)

WestPlan–Cyclone outlines a range of management obligations for FESA as the HMA, but should also be read (and implemented) in conjunction with paragraphs 43, 44 and 45 of PS 7 (Operations Management Structure). These provisions establish the operations management structure relevant to an emergency response, as determined by SEMC. WestPlan–Cyclone also details the roles of specific co-ordinating and management groups necessary to assist the HMA in delivering an effective response to cyclones.

This again illustrates the view that WestPlan-Cyclone is not a stand-alone policy document, but is reliant on a level of interplay with other procedural documents and policies applicable to SEMC and to FESA as the HMA on this occasion.

The comments below may need to be considered in the context of FESA's planned production of a new policy outlining emergency operational management, to be written on behalf of SEMC:

- There is limited understanding of the differences between emergency coordination and emergency response management (operations) with untrained and inexperienced personnel, which became evident in areas such as the relationships between the IMGs and IMTs, including misunderstanding about the role of each group.

- There were perceptions that the Port Hedland LEMC switched between operational and co-ordinating roles. It should be noted that a LEMC is not an operational group and in fact it should be referring to an IMG.

- There may have been confusion about the location of the Operations Area Manager (which moved from Karratha to Port Hedland towards the end of the incident) without effectively communicating that decision throughout the Region. However, this has since been clarified as an internal communication issue.

- The operations of the RCC were unclear to many. A formal structure assigning individual roles and responsibilities should have been drawn up prior to the cyclone's impact.

- SES personnel in Port Hedland were operating under FESA-SES Operating Instructions Nos 4 & 7, which are documents not widely known or available, but operate as an adjunct to WestPlan-Cyclone.

- The DEMC was not needed on this occasion, as the DEMC is not an operational group. The OAMG is the operational committee and was activated. This created parallel efforts and should be clarified for future events.

- The overall links - communications and relationships between the OAMG, IMGs and IMTs was at various times, problematic. This sometimes led to breakdowns in the flow of information and sometimes created a perception of mismanagement.

- In one situation, directions were issued to the Region from the Police representatives, to immediately deploy resources to evacuate Nullagine following reports that flooding had reached critical levels and was threatening the community. This contradicted local information that the flooding at Nullagine was within acceptable limits and posed no risk to the community. This intervention caused unnecessary distraction for the IMG at a time when available resources were stretched to cope with the existing situation.

Recommendation

20. **FESA Operations to review its policies and procedures to ensure clarity of structures, roles and responsibilities between the hazard management function and the State Emergency Management arrangements.**

10. Examine the effectiveness of FESA's relationships with volunteers, industry, Local Government, Government agencies and community groups during the incident response.

Relationship with Industry

Port Hedland's community is favourably positioned to benefit from the Region's strong industrial base. The willingness of the major resource sector companies to make their assets available in times of emergency, is a significant benefit to the community's emergency management capability. This was demonstrated during TC George when helicopters, trucks, other equipment and personnel were made available to support the response and recovery effort. Much of this assistance was due to effective informal relationships between industry, FESA Regional management and local volunteer units.

There would be strong benefits in formalising the current informal arrangements through agreements (as previously mentioned) and through membership of the emergency management forums provided by LEMC. It was reported that industry is under-represented on the Port Hedland LEMC, with generally, only one company being represented. The representation of each major resource company on LEMC is regarded as essential to reinforcing relationships beyond prevailing informal links. The community, industry and FESA, each have a mutual interest to ensure that full participation and information sharing occurs.

Relationship with Government Agencies

The MIR team was advised that a sound and supportive working relationship exists between Police and FESA, both at Port Hedland and Karratha. Police were of the opinion that, despite the technical communications difficulties experienced during TC George, normal inter-agency networks appeared to work well.

Horizon Power commented that the relationship between the two organisations was effective and both groups understood each other's needs.

Due to the annual incidence of cyclone activity, it is suggested that FESA representation on the LEMC be considered, noting that this is not normally the case with FESA normally operating at the District and State level. LEMC participation is a community responsibility and every effort is to be made to encourage relevant member organisations to participate/contribute to these.

Relationship with Local Government

The Town of Port Hedland is in receipt of a funding grant from FESA under the 'All Western Australians Reducing Emergencies' (AWARE) program. AWARE is a community-centred emergency management initiative which provides funding to local governments for the identification of risks or hazards within their community. The program enables the community to develop appropriate remedial options using the Emergency Risk Management (ERM) process, which includes customised training for relevant personnel. The current $30,000 allocation to the Town of Port Hedland will enable the Town's emergency management officer to review the Town's Local Emergency Management Arrangements to enhance the community's capability to identify risks and withstand emergencies.

As highlighted earlier, FESA's representation on the Town of Port Hedland's LEMC could be investigated to assess practicality noting that it is generally limited to the (volunteer) SES Local Manager.

11. Assess the strengths and weaknesses of FESA policies, procedures, practices and equipment standards relevant to the incident. Examine any other matters relevant to the incident. Identify opportunities for improving service delivery.

The purpose of this section of the report is to consider the various internally generated protocols under which FESA operates. Broad details of the State level arrangements (generated external to FESA) are provided to document the context in which the FESA protocols sit.

FESA has a comprehensive suite of robust policies, procedures and practices that have been developed and tested over a considerable period of time.

Context

The successful management of a major cyclone operation by FESA involves the operation and integration of a range of policies, procedures and doctrine. These range from overarching State level through to FESA (organisational and operational) level arrangements and policies. Table 5.1 represents the various reporting arrangements involved.

State (whole of Government) level arrangements are documented in the Emergency Management Act 2005, Emergency Management Regulations 2006, SEMC policies (particularly Policy Statement No. 7 (PS7), 'Western Australian Emergency Management Arrangements'), and State emergency management plans. Relevant plans included:

• WestPlan - Cyclone[5]	• WestPlan – Health
• WestPlan – Public Information	• WestPlan – Welfare
• WestPlan – Registration and Inquiry	• WestPlan – Recovery

Also, to ensure that incident management operates consistently, especially within a multi-agency environment, it is common practice for emergency services to operate using an incident management system. Australian emergency services including FESA utilise the Australasian Inter-service Incident Management System (AIIMS). (Table 5.2 depicts the basic reporting arrangements and how they interact with the various emergency management planning committees.)

At the FESA level, the documents, systems and practices in place include:

- FESA-SES Operational, Planning, Systems & Doctrine (OPSAD), particularly Parts 4 – 'Operational Responsibilities', and 5 – 'Information Management' (which includes details concerning EM2000 – see third dot point below);
- FESA-SES Operations Instruction Nos. 4 - 'Cyclone Procedures', 3 – 'Deployment of SES Resources in Support of Operations' and 7 - 'After-Hours Response Procedures'. (It is noted that these OIs are not accessible via the FESA portal, whereas the equivalents in respect of fire, 'Standing Operational Procedures', are.);
- A computer-based operating system 'EM2000'. (The genesis of this system, which was developed and implemented by the State Emergency Service, pre-dates FESA. It is noted that a different computer-based system {'Operations Management System'} is used in respect of fire operations.);
- State and Regional Coordination Protocols, including the obligations and reporting requirements set out within the Regional Coordination Centre (RCC) Manual;

[5] NB, matters relating to 'WestPlan – Cyclone' are specifically covered in Term of Reference 2.

- The establishment and maintenance of a group (currently 22 persons) of Level 3 - qualified Incident Managers, who have met the criteria deemed by FESA to be prerequisites for the successful management of major emergencies; and
- 'FESA Major Emergency Teams, Version 3.0, August 2006', covering the establishment, maintenance and operation of four Major Emergency Teams (METs) - to ensure that mobile teams, with the necessary competencies and knowledge, are available at short notice to assist in the management of an emergency anywhere within the State. These METs are on a duty roster, and are activated by the State Duty Director (also a rostered position).

Successful emergency management also involves an understanding of, and working within, existing partnering arrangements and the various other alliances that exist locally - including Local Government, community, agency and industry organisational partnerships.

Community safety may ultimately depend, to some extent at least, upon FESA personnel (personnel and volunteers) possessing a sound understanding of the complex suite of policies, procedures and practices that apply, and also of the community relationships that exist, particularly within the cyclone-prone Pilbara and Kimberley regions.

Policies, procedures and practices

As evidenced above, FESA has a comprehensive suite of policies, procedures and practices in place to cover emergency management operations generally, and specifically in respect to cyclones. These have been developed and tested over a period of time. In general terms, FESA personnel are well-versed in, and accepting of, such arrangements.

The development of the SOC Protocols are based on fire management competencies, without other competencies such as cyclone being considered.

It is also noted that:

- FESA Operations has recently drafted an integrated FESA Operational doctrine;
- OPSAD's used by State Emergency Services across Australia are being reviewed at a National level; and
- "Annually, Operational Services updates the "Emergency Management and Coordination Guidelines". This document details Operational Service's approach to emergency management, coordination and lists the personnel positions and on-call positions for the rosters.

Equipment and technology Issues

The status of the various operational management systems needs to be considered. The SES system (historically used and with reporting provision for, Cyclone operations) being EM2000, was not available at Karratha office, as apparently its licence had expired. Karratha personnel then had to rely on the Operational Management System (traditionally Fire Service) suite to record incident data.

The Port Hedland office on the other hand, used EM2000 for the logging of incident data and reporting, which could not be interrogated at Karratha. WAPOL used the recently developed WebEOC and eventually, liaison officers placed with WAPOL, could provide intelligence from various out-stations. FESA operations then had three different and incompatible databases to use.

The OAMG (Karratha) ultimately employed liaison officers to interrogate WebEOC for situational detail. This is likely to have caused concerns strategically at the SOC, where incident detail would be sought, but was not available to them – without going to the OAMG.

There was considerable difficulty in communicating within, and to and from Port Hedland and also to communities outside of that town. The available satellite communication proved to be unreliable. At two interviews, it was pointed out that the 'Iridium' based satellite telephones did provide coverage, but no FESA owned Iridium devices were made available for this operation.

It should be noted that FESA has commenced the implementation of the Western Australian Emergency Radio Network project and it is set to revolutionise emergency services radio communications in Western Australia. The project will bridge the communications gap during the management of fires, floods and other natural disasters.

Once implemented the system will enable Fire Services, marine rescue volunteers, the State Emergency Service, WAPOL and other emergency service organisations throughout the State to have interoperable communications during a multi-agency incident.

A further aspect of the program will see the implementation of Radio of Internet Protocol (ROIP) capability and Satellite communications both mobile and fixed at regional centres. These elements will increase radio communication range at all centres with an in built flexibility of cross band repeating and internet transmission.

Facility issues

Port Hedland and Karratha

There were some comments made by personnel involved in the operational arrangements about some deficiencies in the Pilbara emergency management facilities, from which to manage and co-ordinate the event. Whilst the Port Hedland facility is fit for purpose it had insufficient resilience with respect to emergency power supply and became inoperable when mains power failed due to poor maintenance of the emergency generator. The Karratha office has limitations and may need to be included in the CWIP or another suitable leased facility sourced.

Perth State Operations Centre (SOC)

The SOC is a purpose-built facility on the 3rd Floor of FESA House, and is well set up. However, the size and layout of this facility was limited by the space available at the time of construction.

Senior SOC personnel were debriefed by the MIR team and a number of their comments have been discussed elsewhere in this report. The following comments are also made:

- There was a need to review the facilities for accommodating multi-agency liaison officers.
- The Media facility needs to be expanded.
- During TC George and Jacob, some Planning and Logistics functions were transferred to the 5th Floor because of a space shortage due to simultaneous metropolitan fire management activities. This is the advantage of locating the SOC at headquarters that provided options for the coordinating teams.
- It was identified that there are insufficient data points within the SOC to enable the connection of laptops belonging to personnel from other agencies to on site printers.
- Television channels 2, 7, 9 and 10 were unavailable, leaving only Foxtel. Without free to air channels, local news could not be monitored. Similarly, radio broadcasts were unavailable.
- No single officer was assigned the responsibility for personnel welfare within the SOC. However, it was noted that Senior Human Resource staff were asked to keep checking on staff and volunteer welfare throughout the operation.

Recommendations

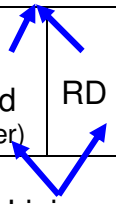
21. **That FESA evaluate the effectiveness of the State Operations Centre layout.**

22. **That FESA ensure the provision of emergency power at Port Hedland District Office is adequate for the facility.**

23. **A welfare officer should be assigned the responsibility for personnel welfare within the SOC during extended major operations.**

Table 5.1 - FESA Reporting Relationships – Organisation & Platform

Tier	Command	Coordination	FESA Reporting		Traditional Platforms	
			Delegation	Location	SES	Fire Services
State	CEO	State Emergency Coordination Group	CEO	State Coordination Centre	EM2000 - Briefing Note	Briefing Note (SMEAC)
	Chief Operations Officer		Chief Operations Officer			
	State Duty Director		State Duty Coordinator		EM2000	OMS/(BOMS)
Regional	Operations Area Manager	Operations Area Management Group	Reg. Duty Coord (Officer)	Regional Coordination Centre	EM2000	OMS/(BOMS)
Local	Incident Manager/ Controller	Incident Management Group	Field Liaison Officer		EM2000 or Fax/phone/radio	Fax/Phone Radio



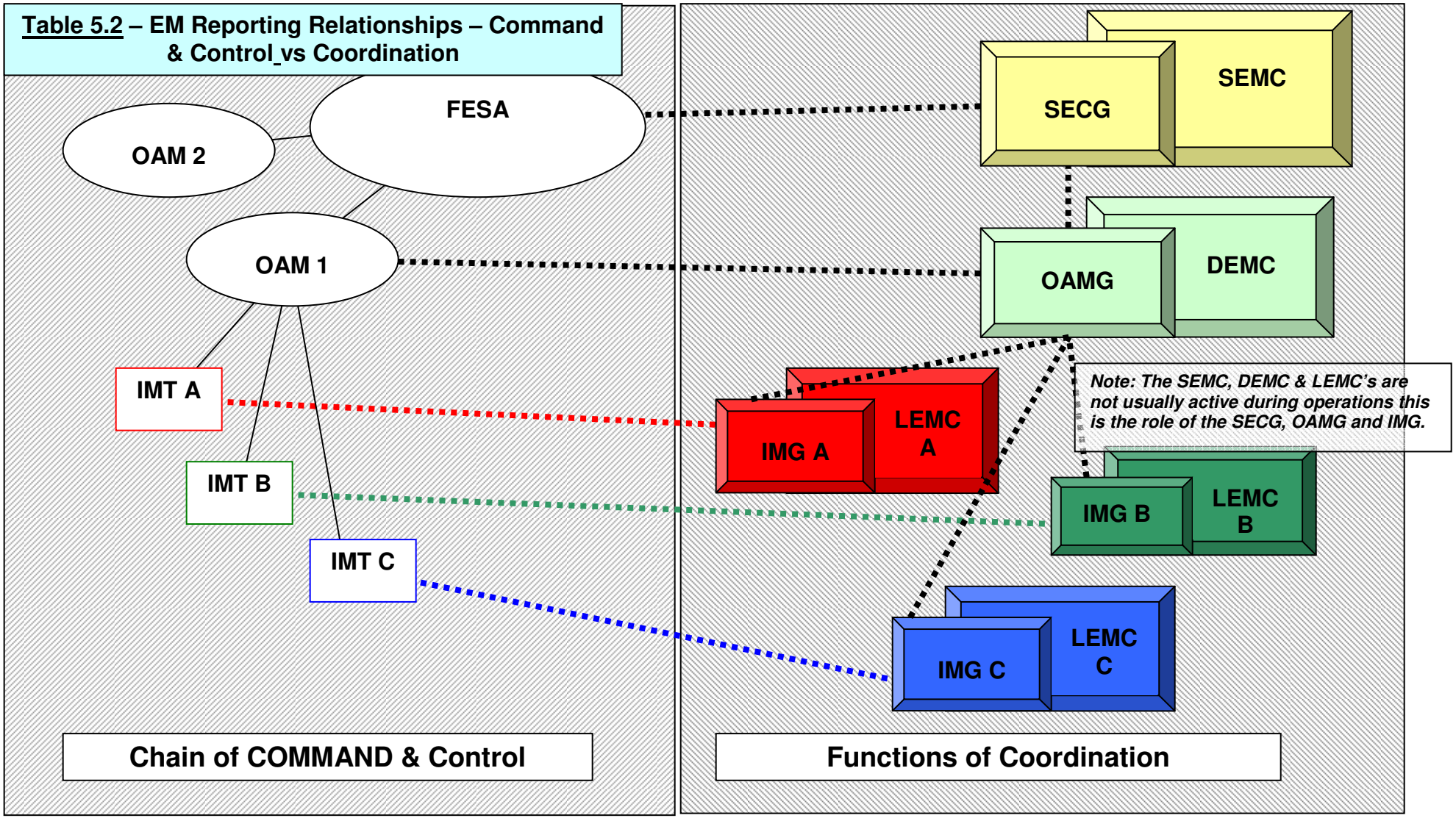


Table 5.2 – EM Reporting Relationships – Command & Control vs Coordination
FESA
OAM 2
OAM 1
IMT A
IMT B
IMT C
SECG
SEMC
OAMG
DEMC
IMG A
LEMC A
IMG B
LEMC B
IMG C
LEMC C
Note: The SEMC, DEMC & LEMC's are not usually active during operations this is the role of the SECG, OAMG and IMG.
Chain of COMMAND & Control
Functions of Coordination

APPENDIX A

Remote Indigenous Communities - Supplementary information

Communities are defined as remote according to the National Emergency Management Strategy for Remote Indigenous Communities "Keeping Our Mob Safe", and based on the COAG Report.

RICs are defined by some or all, but are not limited to, the following characteristics, which present complex emergency management risks and challenges:

- Entrenched levels of disadvantage
- Geographical isolation
- Lack of services or infrastructure
- Lack of access to services
- Restricted or limited accessibility
- Vulnerability and exposure to hazards
- Low economic base
- Unique cultural or communication issues

Emergency Management Policy and Framework

The enduring legacy of issues faced by both communities and service providers continues to present major challenges to all service providers. For example, while the Emergency Management Act 2005 has formalised Local Government responsibilities there are major issues facing Local Governments in the provision of any services to RICs. In many instances Local Government has limited relationships with the RICs in their district.

'Keeping Our Mob Safe' - A National Emergency Management Strategy for Remote Indigenous Communities

The National EM strategy for RICs6 - Keeping our mob safe: National emergency management strategy for Remote Indigenous Communities is a response to an identified need for a practical approach by government at the local, State/Territory and national levels, and by Indigenous communities to address the community emergency management priorities of remote Indigenous communities. Importantly, the strategy also takes into account the broader community safety priorities and needs of RICs, as related to emergency management."

The strategy intends to provide a strategic direction for emergency management and a framework for a coordinated and cooperative approach to risk assessment, decision-making and resource allocation. Its stated focus on preparedness and prevention also enables government to address deficiencies effectively in RICs before they face emergencies. Because some of these emergencies regularly occur in Australia due to the pattern of natural hazards (for example, tropical cyclones, flooding and bushfires), it is imperative that government fulfils its mandate to protect all citizens in a meaningful and timely manner.

The development of effective partnerships between RICs and emergency management-related agencies is the key to the success of this strategy. Building the capacity within and between agencies to support and assist Indigenous communities is a necessary first step. Beyond this, a host of priorities require attention, including encouraging communities to build their own capacities for emergency management through enhanced communication and engagement with agencies; better community decision-making; improved resource agreements with partner agencies; more targeted training for community members and emergency management providers; real employment opportunities for Indigenous peoples (including voluntary work); and

[6] Taken from "Keeping our mob safe – a national emergency management strategy for remote Indigenous communities" (pages 6 & 7) – available on the website of Emergency Management Australia – www.ema.gov.au

community education to raise awareness and prepare for emergencies. Keeping Our Mob Safe is a National emergency management strategy for RICs and was launched by the Attorney-General Philip Ruddock on 24 July 2007. The strategy is designed to determine the community emergency management priorities of RICs in response to an identified need for a practical approach by government at all levels.

The National strategy was drafted quite some time before its launch, and was brought to the attention of the Community Development and Justice Standing Committee. The Committee's Report 'Inquiry into Fire and Emergency Services Legislation was tabled in Parliament on 19 October 2006. Recommendation 83 of that Report was that:

"Government should both assess, and ensure, the commitment of appropriate levels of resourcing and funding to ensure effective implementation of the National Emergency Management Strategy for Remote Indigenous Communities."

A State strategy is currently under development and should take into consideration the issues raised in this report.

Indigenous Environmental Health Coordinating Committee (IEHCC)

In 2005, FESA in collaboration with the Indigenous Environmental Health Coordinating Committee (IEHCC) identified the need for a statewide emergency risk assessment to gain a broad overview of the level and types of risks facing RICs within Western Australia. The purpose of this was to support the development of a strategic approach to emergency management activities for RICs.

Indigenous Environmental Health Needs Survey

The Indigenous Programs Unit represents FESA on the IEHCC, an intergovernmental working group that undertakes the Indigenous Environmental Health Needs Survey (EHNS). The EHNS has to date been the most comprehensive form of data on Indigenous Communities in Western Australia.

The survey covers 286 occupied discrete Indigenous communities in WA (this includes remote and town reserve communities). Indicators include water, electricity, sanitation, solid waste, housing, dust, the dog program and emergency management.

The 2004 survey reported that in areas prone to cyclones, 23 out of 113 had cyclone evacuation plans, indeed Kullari and Malarabah communities at 81% and 92% respectively, had the highest number of people living in communities prone to cyclones with no cyclone evacuation plans7.

It should be noted that the evacuation plans referred to in the survey are most likely to have been local arrangements, developed by community and may not be considered to be consistent with the FESA standard plans.

FESA's Services to Indigenous Communities

Operational Services

Operational emergency services to Indigenous communities for the "Wet Season" are provided by the FESA operational regions. Regional services include pre-season awareness visits to the community; the purpose of this visit is to address the preparation and planning for the "wet season". Similarly emergency services provide an emergency response service, pre, during and post incident. FESA also coordinates the resupply of essential food and fuel supplies if

[7] http://www.dia.wa.gov.au/EHNCC/EHNS2004/EHNSReport2004.pdf)

communities run low or out of supplies. FESA is also responsible for coordinating an evacuation of a community.

Indigenous Programs Unit

The Indigenous Programs Unit (IPU) is a small team comprised of two full time officers (one of which is funded by the Commonwealth). In general terms, IPU operates at two levels – one dealing in development of Indigenous emergency management policy and strategy and, secondly, direct service delivery and support to Indigenous communities.

Direct services include training, liaison and advocacy support to Indigenous communities. Since its inception and based largely on experiences working in the Regions, IPU officers have fostered extensive community networks and relationships with government and non-government organisations within the emergency management sector. The IPU is recognised as a focal point by both FESA and other government emergency management sector stakeholders as a conduit for engaging with Indigenous communities.

The IPU is often called upon to assist Indigenous communities to resolve issues that may not be considered conventional HMA matters dealt with by FESA e.g. restoration of community water bore.

The Safer Country Programme

The Safer Country Program is an Emergency Risk Management (ERM) training program developed in 2004 by FESA's IPU. The program is based on the National ERM standard derived from AS/NZS 4360:2004. It aims to build the capacity of Indigenous communities, in partnership with government and non-government service providers, to build emergency risk management capacity.

Safer Country has been facilitated with the following high risk Indigenous communities:-

- Bardi/Ardyaloon, Beagle Bay, Lombadina, Djarindjin and Bidyadanga in the West Kimberley;
- Jigalong and Kiwirrkurra in the East Pilbara;
- Warburton, Warakurna and Blackstone in Ngaanyatjarraku; and
- Oombulgurri, Kalumburu and Halls Creek in the East Kimberley.

<u>The Safer Country Program in RICs near the Town of Port Hedland</u>

The Safer Country Program has been delivered in Jigalong Community in the Pilbara. However, FESA's IPU has generally not focused on town based communities of Port Hedland on the understanding that these groups would be incorporated in arrangements provided by Local Government and FESA. Emergency management services to these communities have been, to some extent ad-hoc, requiring some renewed focus by FESA and Local Government.

Aerial Capture Program

The FESA IPU in collaboration with the Aboriginal Lands Trust, the Department for Planning and Infrastructure-Planning for Aboriginal Communities Project (PACP) and the Shared Land Information Platform Emergency Management Project (SLIP EM) submitted an application for funding to have high-risk RICs included on the State's aerial capture program.

The aerial capture program provides necessary and recent aerial data for the planning of remote communities. The IPU also seeks to encourage the integration of the PACP into the Local Emergency Risk Management Process, a key responsibility of Local Government under the *Emergency Management Act 2005.* The land use planners from the Shire of Wyndham East Kimberley, the Aboriginal Lands Trust (ALT), PACP through the IPU have all attended the EMA Program Risk Based Planning Program.

All are involved in planning for the communities of Oombulgurri and Kalumburu both currently located within 1:100 year flood zones. Both communities have been listed as the highest priority under the aerial capture program due to this risk. The other communities on the program are:

- Kiwirrkurra
- Warralong
- Burringurrah
- Muludja
- Cosmo Newberry
- Mt Margaret
- Ngallagunda
- Immintji
- Kupungarri (replacing Dodnun)
- Mulan
- Ringer Soak

The imagery will be flown when suitable weather allows for programming of the airplane in line with other state government imagery requirements.

Geoscience Australia FESA Mapping Project

As one of the most important types of data used in natural disaster management are spatial data, (which are data that can be mapped in order to explore the relationship between communities, land, natural hazards and distance from places of importance) it was decided to explore the possibilities of mapping the risk. Once mapped, risk data can assist decision makers to have a better understanding of communities and provide a tool that allows them to prioritise community needs and programs.

Geoscience Australia and the IPU worked together to develop a mapping tool to undertake a case study to better understand how geospatial data can assist emergency managers. It is planned that this may lead to the development of a tool that will assist a strategic approach to emergency management for RICs in WA.

The mapping tool was developed using data from a variety of sources but primarily from the IEHCC Environmental Health Needs Survey.

The WA State Government has recently implemented SLIP, which allows direct access to the Government's spatial information (mapping, imagery and location data). FESA, together with other HMAs has developed a pilot service, based on SLIP, to provide a shared mapping service configured for emergency management requirements. The initial focus for this pilot has been to support HAZMAT, Search & Rescue and Bushfire needs, but is now being extended to potentially support cyclone requirements. This pilot service will enable the linking of the high risk assessment mapping and community imagery with the associated SLIP information.

Remote Aboriginal Program Housing and Infrastructure Database (RAPHID)

DHW has enabled FESA's IPU remote access to its database. The database provides information on community infrastructure RAPHID is designed as the State's collaborative central database of Aboriginal Communities and the housing and infrastructure within. It runs through a web-based system and offers information regarding community populations, housing and infrastructure.

APPENDIX B

PERSONS CONSULTED	MAJOR INCIDENT REVIEW
Roger Richardson	**Tropical Cyclone Industry Liaison Committee**
Helen Shanks	**Department of Indigenous Affairs**
Ricky Osbourne	**Manager, Pilbara Meta Maya Regional Aboriginal Corporation**
Trish	**Pilbara Meta Maya Regional Aboriginal Corporation**
Kevin	**Pilbara Meta Maya Regional Aboriginal Corporation**
Troy Bridle	**Pilbara Iron Ore**
Eddy Marsland	**Pilbara Iron**
Graham Locker	**Emergency Service Coordinator BHP Billiton**
Rod Evans	**Airport Manager**
Gerry Dixon	**Woodside Gas**
George Shaw	**President, Karratha Chamber of Commerce**
Supt. Murray Smalpage	**WA Police**
Insp. John Ballantyne	**WA Police**
Senior Sergeant Phil Gores	**WA Police**
Inspector Wayne Silver	**WA Police**
Sergeant Geoff Dorrington	**WA Police**
Sergeant Charlie Moylan	**WA Police**
Vicki Jack	**Department of Education and Training**
Simon Watkin	**Department of Environment and Conservation**
Lynn Nanini	**Main Roads WA**
Bill Wallace	**Main Roads WA**
Patrick Melberg	**Department of Health**
Debra Carne	**Department of Health**
Grant de Vos	**Horizon Power**
Brett Hovingh	**Horizon Power**
Andrew Geddes	**Child Protection**
Chris Adams	**CEO Port Hedland**
Arnold Carter	**Deputy Shire President Port Hedland**
Terry Sargent	**Town of Port Hedland**
Andriena Ciric	**Town of Port Hedland**
Andrea Moore	**SES Consultative Committee Rep Pilbara (Tom Price)**
Vivienne Welch	**SES Consultative Committee Rep Kimberley (Broome)**
Di Nicholl-Smith	**RFDS**
Mark Smith	**Defence**
Philipa O'Donnell	**Australian Broadcasting Corporation Karratha**
Morgwn Jones	**Ranger, Ashburton Shire**
Alan Moles	**CEO of Roebourne**
George Jones	**Water Corporation**
Lindsay Copeman	**Port Hedland Port Authority**
Joanne Gordon	**Department of Housing and Works**
Lyle Gilbert	**St John Ambulance**
Betty Matthews	**Volunteer Port Hedland VFRS and SES**
Carol	**community member**
Sarah	**community member**
Eric	**Community member**

Wayne Ness	**Community member**
Jo Cummings	**Port Hedland Volunteer Emergency Services**
Mike Cummings	**Port Hedland Volunteer Emergency Services**
Allen Gale Chris Hudson	**FESA** **FESA**
Craig Hynes	**FESA**
Gary Gifford	**FESA**
Glenn Tunstead	**FESA**
Graham Swift	**FESA**
Greg Pobar	**FESA**
Howard Fiedler	**FESA**
Ian Bowden	**FESA**
Jan Bandy	**FESA**
Jim Cahill	**FESA**
John Newman	**FESA**
Lee Vallance	**FESA**
Mark Purchas	**FESA**
Mike Breen	**FESA**
Murray Bawden	**FESA**
Paul Carr	**FESA**
Paul Ryan	**FESA**
Peter Cameron	**FESA**
Peter Cann	**FESA**
Rob Cox	**FESA**
Rob Fraser	**FESA**
Russell Hayes	**FESA**
Tony Taylor	**FESA**

APPENDIX C

Summary of documents reviewed

FESA Policy Statement No. 54, 'Incident Analysis Policy'.

Tropical Cyclone George - Damage to Buildings in the Port Hedland Area. Report TR52 (draft) March 2007. Cyclone Testing Station, School Of Engineering, James Cook University; Queensland

*Government Gazett*e dated 26 May 2006, 'Administration of departments, authorities, statutes and votes'

Emergency Management Regulations 2006

Fire and Emergency Services Authority of Western Australia Act 1998

SEMC Policy Statement No. 7 (PS7), 'Western Australian Emergency Management Arrangements'

All BoM bulletins/cyclone warnings relevant to the period

WestPlan Cyclone

WestPlan – Health

WestPlan – Public Information

WestPlan – Welfare

WestPlan – Registration and Inquiry

WestPlan – Recovery

WestPlan – Reception (Reception of Evacuees from Overseas)

'Keeping Our Mob Safe' - A National Emergency Management Strategy for Remote Indigenous Communities

Draft SEMC Policy 1.2, 'Emergency Management in Remote Indigenous Communities' has been drafted.

Report of the Community Development and Justice Standing Committee 'Inquiry into Fire and Emergency Services Legislation' WA Parliament 19 October 2006.
FESA-SES Operational, Planning, Systems & Doctrine (OPSAD)

FESA-SES Operations Instruction Nos. 4 - 'Cyclone Procedures', 3 – 'Deployment of SES Resources in Support of Operations' and 7 - 'After-Hours Response Procedures'.

'FESA Major Emergency Teams, Version 3.0, August 2006'.

Port Hedland Regional Coordination Centre – Regional Emergency Management and Coordination Guidelines – September 2006.

Woodside Gas / SES joint community advice circular – Pilbara Region.

Undated submission from Strelley Community.

Submission dated 18 June 2007 from Bloodwood Tree Association.

Undated submission from Marta Marta Aboriginal Community.

TC George Resource Deployment and Mobilisation Plan

HANSARD 22 March 2007 - Hon Tom Stephens MLA.

Report to Public Information Group (PING) State Emergency Management Committee (SEMC) i*ssues Relating To The Media And Public Information Function In The Emergency Response To Cyclones George And Jacob, March 9 – 12, 2007*