# FINDINGS AND ACTIONS FROM INQUIRIES CONDUCTED BY THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION INTO THE BOORABBIN FIRE 28 DECEMBER 2007 - 8 JANUARY 2008

JULY 2009

Government of Western Australia
Department of Environment and Conservation

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## EXECUTIVE SUMMARY

At approximately 3PM on 28 December 2007, the Kalgoorlie office of the Department of Environment and Conservation (DEC) was notified of a wildfire that had commenced near an informal vehicle bay in the road reserve on the north side of the Great Eastern Highway, approximately 80 kilometres west of Coolgardie. The fire was spreading rapidly in a northerly direction in the Boorabbin National Park, managed by DEC. The fire was given an official incident name, "Goldfields Fire 13". Subsequently, the incident has been generally referred to as "the Boorabbin Fire".

The fire spread rapidly in drought-affected sandplain/heath vegetation. The prevailing and forecast weather was hot, dry and windy. To assist local staff DEC sent fire suppression resources (fire crews, machinery and incident management staff) from neighbouring regions and from the south-west to commence suppression action the next morning. Other agencies were called in to assist with key tasks, such as the protection of infrastructure and manning of roadblocks. By nightfall on 29 December 2007, the fire was 4,170 hectares in size and still north of the highway.

During the morning of 30 December 2007, a strong northerly wind change caused breakaways from the containment lines and the fire, burning in tongues, crossed the highway from north to south. Roadblocks were established; however several escorted convoys of vehicles were permitted to travel through the fire area during the afternoon, as directed by a helicopter flying overhead. By early evening the headfire was approximately eight kilometres south of the highway and the flanks were burning quietly with a lull in the wind. A decision was taken to lift the roadblocks, subject to vehicles being escorted through the fire area and sentries were placed on the highway on both sides of the fire. Just before 8PM, a south west wind change arrived at the fire. It was still hot and dry and with the fresh wind change fanning the eastern flank the fire escalated and quickly drove a new headfire in a north easterly direction towards the highway.

A convoy of vehicles from Coolgardie arriving at the eastern side of the fire, without an escort, drove into the fire area. The intended police escort and the eastern sentry had become trapped on the west side of the fire because they were providing assistance to the drivers of other vehicles. Several trucks were engulfed in flames resulting in three fatalities.

The highway was closed to traffic and remained closed until containment lines were completed and a fall-back strategy was implemented on 9 January 2008. The final size of the fire was 39,630 hectares.

A police investigation of the incident commenced soon after the fatalities were reported. DEC began its own inquiries and reviews of the incident soon after the fire suppression action was concluded. In order to gain a prompt insight into the circumstances that caused the fatalities, DEC's Director General requested his Principal Policy Officer to carry out a rapid chronology and review of critical aspects of the incident. The report of this review was presented in January 2008.

DEC formed an Incident Response Team to coordinate all aspects of the aftermath of the incidents. A Post Incident Analysis was initiated following debriefs conducted with the incident management teams and fire personnel who worked on the fire. A team of experienced senior fire practitioners in DEC (the Lessons Learned Coordination Group, LLCG) was convened to analyse the information and issues coming out of the debriefs and to formulate recommendations and actions to improve DEC's fire management and incident management procedures.

On 22 January 2008, DEC contracted GHD Pty Ltd to carry out a review of the development of the Boorabbin fire incident. This chronological account of the weather, fuel, landscapes and fire development from ignition to the completion of fire suppression operations was completed in June 2008.

On 25 February 2008, DEC contracted GHD Pty Ltd to undertake a review of the operational management of the fire. The review documented and critically assessed operational decisions and actions taken by DEC staff before and during the Boorabbin fire incident. Forty six "Learning Points" and 55 recommendations were contained in the GHD report, which was completed in July 2008.

DEC staff also participated in a debrief conducted by the Goldfields Operations Area Management Group on 20 February 2008, and held discussions with staff of the Coolgardie Shire Council and the Yilgarn Shire Council.

The reviews of the incident that were initiated by DEC were conducted concurrently with an investigation by the Police Arson Squad on behalf of the Coroner. DEC and DEC's contracted reviewer, GHD, did not have access to evidence collected and obtained by the police from other sources.

DEC's fire management role is derived primarily from its broader role as a land management agency as prescribed in the *Conservation and Land Management Act 1984*. As the manager of more than 27 million hectares of publicly owned lands and waters, DEC also has obligations and powers under the *Bushfires Act 1954* and the *Emergency Management Act 2005*.

DEC's Fire Management Services (FMS) branch is located within the Department's Regional Services Division, together with DEC's nine regions. Fire management programs are developed and carried out collaboratively between the staff in regions, FMS, Science Division and the three Parks and Conservation Services Divisions.

The DEC Goldfields Administrative Region manages an area of 8.3 million hectares of conservation reserves and also has responsibility for fire preparedness, weed control and feral animal control on another 40 million hectares of unallocated Crown land and unmanaged reserves. Approximately half of the 30 staff who work in the region are trained and experienced to carry out fire management roles.

The Department's fire management work is underpinned by a Fire Management Policy and a Code of Practice for Fire Management. A series of Fire Management Guidelines and Fire Management Principles also provide the framework for operational activities. A compendium of Fire Operational Guidelines direct and guide fire managers on the standards, specifications and procedures to be applied in fire management operations.

The command and control structure used by DEC for responding to all emergency incidents, including wildfires, is the Australian Inter-Service Incident Management System (AIIMS). The control system of AIIMS consists of four functional areas: Control; Planning; Operations; and Logistics. The size and roles of an Incident Management Team can be scaled up or down, depending on the circumstances and the requirements needed to manage the incident effectively.

Whilst the number of staff and resources within the Goldfields region that are available for wildfire suppression is relatively modest, DEC's overall suite of human and physical resources available to respond to wildfires is significant. The majority of DEC's fire management resources are based in the south-west, but these resources are highly mobile and can be deployed to other regions when necessary.

The Post Incident Analysis (PIA) conducted by DEC was derived primarily from information provided during the staff debrief sessions that were carried out during January and February 2008. Forty subjects / issues were analysed by the LLCG to endeavour to understand *what happened* and *why it happened*, and to identify *what can be done to improve performance* and to *prevent a recurrence* of such an incident. The PIA made 170 recommendations to improve DEC's fire management and incident management procedures.

The summary of the PIA highlighted three dominating causes of the incident outcomes – the expectations of fire behaviour in shrubland fuels at night; the procedures for managing road blocks; and the strategic assessment of the fire's potential.

It was concluded that the most critical contributing factor was the unfamiliarity of the members of the Incident Management Team (IMT) with the extremes of fire behaviour that occurred at Boorabbin under the conditions that prevailed on the night of Sunday 30 December 2007. The extensive fire suppression experience of the IMT did not include fighting fires at night in those fuels and weather conditions, exacerbated by prolonged drought.

The second key finding was that the IMT did not have an interagency standard operating procedure for managing roadblocks, and the DEC guideline was not sufficiently comprehensive. In the absence of a well defined interagency guideline the IMT and supporting agencies improvised a system that allowed escorted convoys to proceed through the fire area when it was safe to do so. The absence of a risk assessment process (to determine whether roadblocks should be lifted); the inadequacy of interagency resources; and the absence of the Air Observer in the helicopter at night were all critical factors.

It was concluded that the initial appraisal of the fire did not foresee the full potential of the fire to become an extended suppression campaign that could compromise traffic movement and public safety on the Great Eastern Highway for a lengthy period. This potential complexity for managing the incident, coupled with the threat to extensive infrastructure assets in the corridor parallel to the highway, required a more comprehensive response capability.

The Operational Review conducted by GHD Pty Ltd examined DEC's fire management and incident management performance before and during the Boorabbin fire under the headings of Fire Prevention; Fire Preparedness; Operational Response (during four phases of the suppression of the fire); and Recovery. The report contained 46 "Learning Points" and 55 recommendations for improved fire management and incident management procedures.

Following the completion of the GHD Operational Review the LLCG undertook a strategic analysis of the major factors that contributed to the fatalities that occurred on December 30 2007. The relative importance of 20 individual factors was assessed. The analysis concluded that there were many complex, interacting contributing factors and extenuating circumstances that lead to the incident outcomes.

Since the Boorabbin fire incident, DEC has been working collaboratively with other agencies to implement remedial actions in areas where there are shared responsibilities. A notable example of this is the development of inter-agency *Guidelines for the Operation of Road Closures During Bushfires*. These guidelines were prepared jointly by WA Police, DEC, FESA and Main Roads WA during 2008 and they were implemented successfully during several major wildfire incidents in the 2008/09 fire season.

Extensive bushfire mitigation works have also been carried out cooperatively by agencies along the Great Eastern Highway corridor, between Southern Cross and Coolgardie, during 2008 and 2009. Completed works include vegetation clearing around power poles and near the trans-Australia railway line; fuel modification (scrub rolling) adjoining the highway and other strategic locations; verge vegetation management; improved signage; and additional water access points and pipeline crossings.

This report lists all of the recommended actions contained in the reviews that have been completed by DEC, and also provides a statement on the current status of implementation of each recommendation.

The Department of Environment and Conservation expresses its deepest sympathy to the families and friends of Lewis Bedford, Robert Taylor and Trevor Murley who tragically died in the Boorabbin fire.

# PART 1: INTRODUCTION

## 1. Purpose and structure of the report

The primary purpose of this report is to outline the findings, the actions taken and the actions proposed to be taken by the Department of Environment and Conservation (DEC) in response to the reviews and inquiries that have been conducted by DEC following a wildfire that commenced on 28 December 2007. The fire identity is Goldfields Fire 13 and is also known as "the Boorabbin Fire". The learning points and the action summaries from the reviews and inquiries are found in the final chapter (Part 6) of this report. In order to establish a context for the lessons learned section of the report, an introduction section (Part 1) and a background section (Part 2) are provided for readers who are unfamiliar with the role and structure of DEC and DEC's interaction with other emergency services organisations in Western Australia. A brief description of the incident is also provided in the introduction.

This report draws heavily on the content of the debriefs and the Post Incident Analysis (PIA) report completed by DEC, by reports compiled by an independent consultant contracted by DEC (GHD Pty Ltd) and reports by other organisations that have conducted reviews following the Boorabbin incident. The description of the incident (Part 3) summarises the work done by GHD Pty Ltd in their independent chronology and review of DEC's operational performance. Similarly, the analysis of the incident (Part 4) summarises the content of several reviews that have examined the incident in detail. The reports from those reviews are available in full for readers wishing to obtain a greater level of detail. The analysis of the contributing factors relating to the fatalities (Part 5) was prepared by DEC for the investigation that was conducted by the WA Police for the Coroner and was submitted to the Coroner in November 2008.

In anticipation of the Coronial Inquest DEC has conducted an exhaustive search for information relevant to the incident and has explored all avenues available to DEC to analyse that information for the benefit of the Coroner and other interested parties.

DEC has adopted a "Lessons Learned" approach to the investigation, review and analysis of issues arising from the incident. This approach seeks to analyse what was done well during the incident and what was not. It takes considerable effort to examine all of the decisions taken and the processes that were implemented to ensure that we learn from these experiences and improve our ability to manage large, complex incidents effectively in the future. Learning points that are identified during the reviews of an incident become "lessons learned" only after they are acted upon and incorporated into operational practise.

The structure of this report includes, of necessity, some overlap with the content of other reports that are summarised in this document.

## 2. Specialised terms, acronyms and abbreviations

| | |
|---|---|
| AAR | After Action Review |
| AIIMS | Australasian Inter-Service Incident Management System. A scaleable management structure for the management of emergency incidents. |
| AO | Air Observer |
| Authorised Officers | Any person appointed in accordance with Part IV of the *Conservation and Land Management Act* 1985 (CALM Act). |
| Back burning | A fire ignited along the inner edge of a fire control line to consume the fuel in the path of a wildfire. |
| BOM | Bureau of Meteorology |
| Burning out | Setting fire so as to consume unburnt fuel between the fire control line and the wildfire. |
| Burning program | A schedule of prescribed burning operations to be undertaken within a specified period of time (season, year, 3 years) |
| CASA | Civil Aviation Safety Authority |
| Conservation Commission WA | A body established under Part III of the CALM Act, in which the lands managed by the Department are vested. The Commission is responsible for the development and approval of management plans and providing independent advice to the Minister. |
| Containment Line | A natural or constructed barrier, or treated fire edge, used in fire |

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| | suppression and prescribed burning to limit the spread of fire. |
| DCP | Department for Child Protection |
| Debrief | The collection and collation of information from personnel involved in an emergency incident. |
| DEMC | District Emergency Management Committee |
| Department, Departmental, DEC | Relating to the Department of Environment and Conservation. |
| DEC-managed land | Land of a type described in the CALM Act for which the Department is responsible. . |
| EM | Emergency Management |
| FESA | Fire and Emergency Services Authority |
| Fire control line | See Containment Line. |
| Fire danger | The resultant of all factors which determine whether fires start, spread, and do damage and whether and to what extent they can be controlled. |
| Firefighter | Any employee or agent of the Department who occupies or is designated to occupy a position in the Australian Inter-service Incident Management System – Incident Control System (or its successors) for the purpose of fire suppression. |
| Firefighting operations | Any work or activity associated directly with the control of wildfire. |
| Fire investigator | A person accredited by the Department for the purpose of investigating the cause and origin of wildfire. |
| Fire prevention | All activities concerned with minimising the incidence of wildfire, particularly those of human origin. |
| Fire protection | All activities designed to protect an area (including human life, property, assets and values) from damage by wildfire. |
| Fire regime | The history of fire use in a particular vegetation type or area including the frequency, intensity and season of burning. It may also include proposals for the use of fire in a given area. |
| Flank fire | The sides of a fire between the head and the tail. Fire intensity is less than at the head. |
| FMS | Fire Management Services Branch, within DEC's Regional Services Division. |
| FOG | Fire Operational Guideline |
| FOO | Fire Operations Officer |
| FPC | Forest Products Commission |
| Fuel modification | An operation to change the arrangement of fuel components, usually by rolling or slashing the scrub layer to assist prescribed burning, or to make suppression or containment more effective. Also described as "chaining" or "scrubrolling". |
| GEH | Great Eastern Highway |
| GFR | Goldfields Region. One of nine administrative regions in DEC. |
| GHD | GHD Pty Ltd. A firm providing consulting services on natural resource management, including bushfire and risk management. |
| GIS | Geographic Information System. A system capable of creating computer generated maps. |
| Hazard | A fuel complex defined by volume, type, condition, arrangement and location that determines both the ease of ignition and of fire suppression difficulty. |
| Head fire | The front of a fire where it is spreading fastest – the tallest flames and the greatest intensity are at the head. |
| HMA | Hazard Management Agency |
| ICC | Incident Control Centre |
| IMS | Incident Management System (previously Incident Control System (ICS), see AIIMS) |
| IMT | Incident Management Team |
| Incident | An emergency incident that requires a specialised response by competent personnel and appropriate equipment over a relatively short period of time (hours to days) before normalcy can be restored. |
| Incident Action Plan (IAP) | A plan developed by an Incident Management Team and approved by the Incident Controller for the combat of an emergency incident. |
| Incident Controller (IC) | The person having overall management of the fire |

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| Incident level | A descriptor reflecting the level of complexity of an emergency incident ranging from Level 1 for low complexity to Level 3 for high complexity |
| Incident Preparedness and Response Plans (IPRP) | A plan prepared by each region and district for the purpose of preparing for and responding to wildfire on DEC-managed land. |
| Interim management guidelines (IMG) | A document that provides guidance to land mangers in the absence of an approved management plan. |
| IMT | Incident Management Team |
| IRT | Incident Response Team |
| Level 1 incident | A minor incident; able to be managed by the District Duty Officer using District resources; likely to be resolved in hours. |
| Level 2 incident | An incident carrying moderate risk that will require the consideration of a number of local resources; will draw resources from outside the District; could involve several agencies; probable that more than the first (24hr) shift will be required to resolve; will need consideration of the incident being managed from an Incident Control Centre; and may require the deployment of the high level components of an IMT. |
| Level 3 incident | A major incident carrying high risk that will require many resources; inter-agency operations will require days or weeks to resolve; will require the incident to be managed from an Incident Control Centre; and will require the deployment of a well resourced IMT |
| LGA | Local Government Authority |
| LLCG | Lessons Learned Coordination Group. A group of experienced fire management practitioners in DEC, formed to analyse the issues arising from the incident debriefs. |
| Management plan | A plan required under Part V of the CALM Act for the management of a defined area of land |
| Media Officer (MO) | Position in the Information Unit of the Planning Section of the IMT with responsibility for media interactions |
| MRWA | Main Roads Western Australia |
| OAMG | Operations Area Management Group |
| OP | Operations Point |
| OSH | Occupational Safety and Health |
| Planning Officer (PO) | Officer in the IMT with responsibility for the Planning Section |
| Post incident analysis (PIA) | The analysis of all activities associated with prevention, preparedness, response and recovery of an emergency incident aimed at developing recommendations to ensure improved performance in future. |
| Pre Formed Team (PFT) | An Incident Management Team of approx 65 people who are rostered on a weekly basis to respond to emergency incidents where DEC is the HMA. Each PFT has a consistent leadership and membership and team members gain effectiveness by working together on a regular basis. |
| Prescribed burning | The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives. It is undertaken in specified environmental conditions. |
| RDO | Regional Duty Officer |
| Rehabilitation plan | A plan setting out actions required to stabilise and rehabilitate disturbance associated with fire suppression operations |
| Risk | The combination of the probability of a situation occurring and the consequence of that occurrence |
| RM | Regional Manager |
| Safe | A stage reached after a fire (prescribed or wildfire) when no further action or attention is required to prevent the fire escaping from its intended location. |
| SAR | Search and Rescue |
| SDO | State Duty Officer |
| SEMC | State Emergency Management Committee |
| SES | State Emergency Service |
| SITREP | Situation Report |
| Situation Officer (SO) | Position in the Situation Unit of the Planning Section of the IMT with |

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| | responsibility for preparing information about the current and forecast incident situation. |
| SOP | Standard Operating Procedure |
| TIC | Thermal Imaging Camera |
| Unallocated Crown land (UCL) | Land belonging to the Crown with no vested purpose. |
| Unmanaged reserves (UR) | Land belonging to the Crown that has not been vested with an agency for management. |
| VCP | Vehicle Control Point |
| WAERN | Western Australian Emergency Radio Network |
| WALGA | Western Australian Local Government Association |
| WAPOL | Western Australian Police Service |
| Water point | A permanent (dam, water hole, tank or hydrant) or mobile (tanker or moveable water tank) source of water for the replenishment of fire suppression equipment. |
| Westplan Bushfire | A plan required under the *Emergency Management Act 2005* that sets out the arrangements for the management of wildfire incidents. |
| Wildfire | An unplanned grass, scrub or forest fire. |
| WTA-FPP | Wildfire Threat Analysis and Fire Prevention Plan |

**Parts of a wildfire**

Terms commonly used to describe wildfires are: origin, head, tail, flanks, rate of spread, flame height.

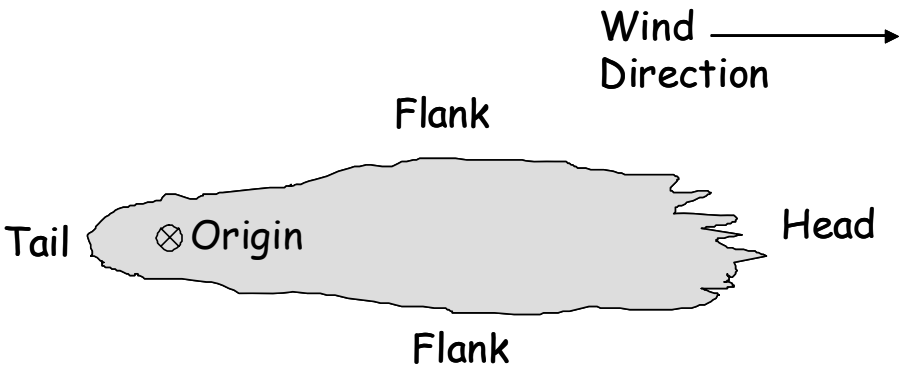



**Figure 1 Diagram showing terms relevant to parts of fire**

**Origin** is where the fire started – important to protect this area for fire cause investigation.

**Head** (or front) of the fire is where it is spreading fastest – the tallest flames and greatest intensities are found here.

**Flanks** of the fire are the sides between the head and the rear, roughly parallel to main direction of spread. Fire intensity is less than at the head.

**Tail** of the fire is where the fire is spreading slowest and fire intensity is least.

**Change in fire shape following a wind change**

When a wind change occurs a wildfire will change shape, with one of the flanks becoming the new headfire. The fire behaviour on the windward flank will increase in response to wind strength and direction as depicted in the diagram below.

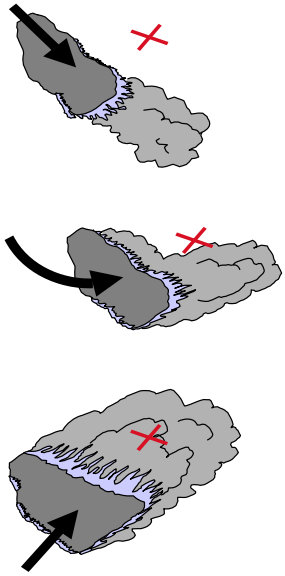


**Figure 2 Diagram showing how a flankfire becomes a headfire in response to a change in wind direction**

**Figure 3 A flankfire develops into a headfire in response to a change in wind direction**

## 3. Description of the incident

The Boorabbin fire commenced at approximately 2PM on Friday 28 December 2007 near an informal roadside vehicle bay on the north side of the Great Eastern Highway, approximately 80 kilometres east of Southern Cross in the Shire of Coolgardie. DEC was notified about the fire at 3.10PM. The fire spread from the road reserve, which is managed by Main Roads WA (MRWA), into the Boorabbin National Park which is managed by DEC. This national park comprises mostly salmon gum and other woodland and sandplain heath and shrub vegetation. The cause of the fire was declared to be "undetermined" however a human caused ignition, either accidental or deliberate, is most likely the cause.

Following receipt of the fire report, two DEC officers were despatched from Kalgoorlie in light suppression units at around 4PM to attend the fire. On arrival at the fire it was evident to these officers that suppression of the fire would require heavy earthmoving equipment and tankers. These were ordered and arrangements were put in place for resources to arrive at the fire on the morning of Saturday 29 December 2007. DEC was the Hazard Management Agency (HMA) for the full duration of the suppression activities at the fire

The Incident Controller in Kalgoorlie notified WA Police (WAPOL), the Fire and Emergency Services Authority (FESA), the Shire of Coolgardie and Western Power in the first few hours following the initial fire report.

The development of the fire on Friday 28 December 2007 is shown in Figure 5 below.

**Figure 4 Rapid headfire spread north of Great Eastern Highway on 28 December 2007**

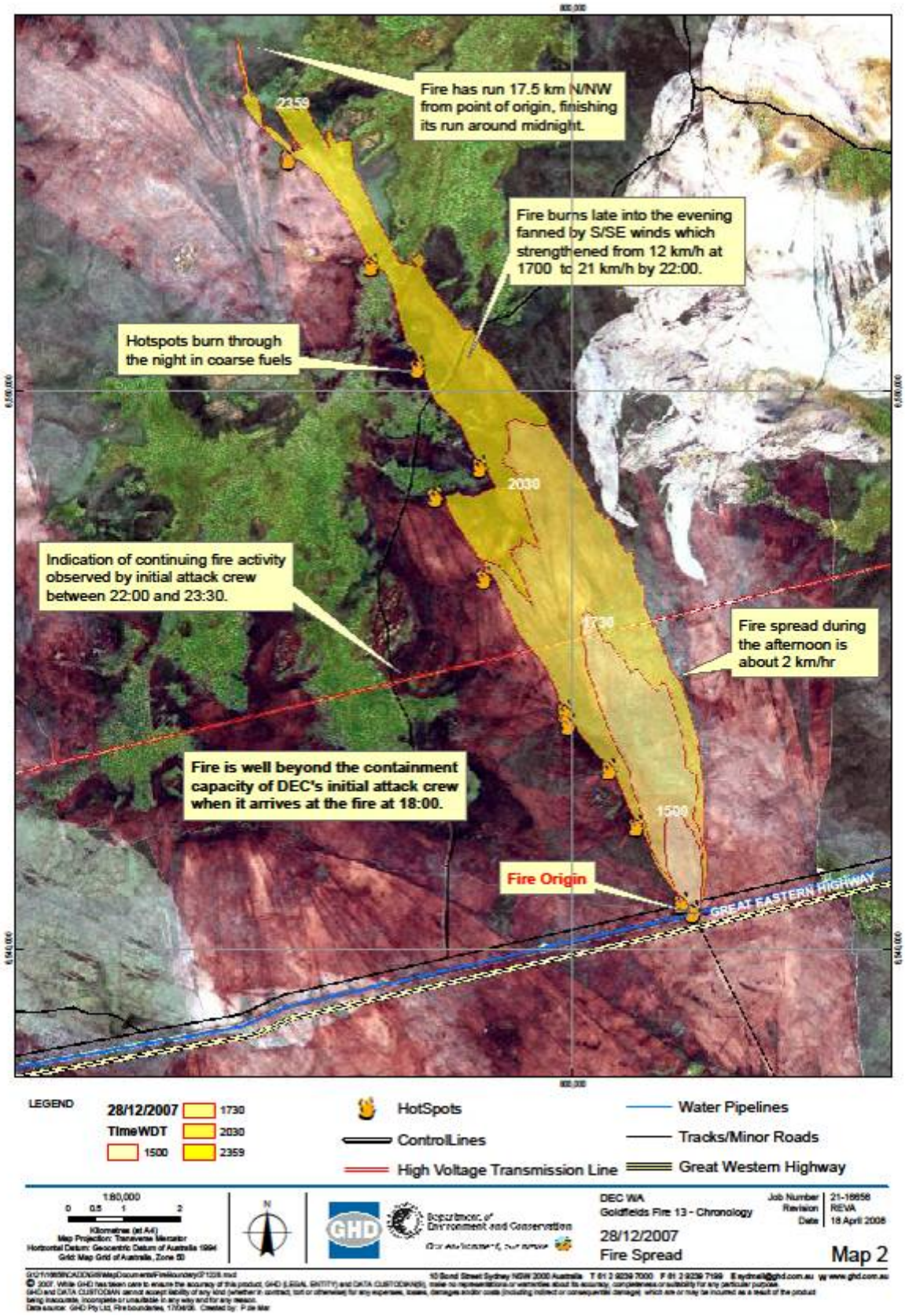



**Figure 5 Fire origin and spread on 28 December 2007 (from GHD Chronology, June 2008)**

Work commenced on Saturday 29 December 2007 to establish containment lines, initially to the north of the highway. The forecast for Saturday was for 38 degrees and for Sunday the forecast was for 43 degrees with strong north-westerly winds.

The fire was divided into sectors; Sector A being the eastern flank and Sector B being the parallel western edge. The strategy was to conduct a direct attack on the flank fires and to catch up with the head fire when it was slowed or halted by running into low fuel areas. This needed to be achieved whilst the southerly winds continued to push the fire away from the Great Eastern Highway on the northern side.

The strategy was modified when it was discovered that there was an unexpected tongue of fire emanating from near the point of origin of the fire running north west. This made Sector B redundant and so Sector C was created on the south side of this run of fire, placing a critical defensive containment line between the fire and the Great Eastern Highway. The allocation of resources to sectors on Saturday morning is shown in Figure 6 below.

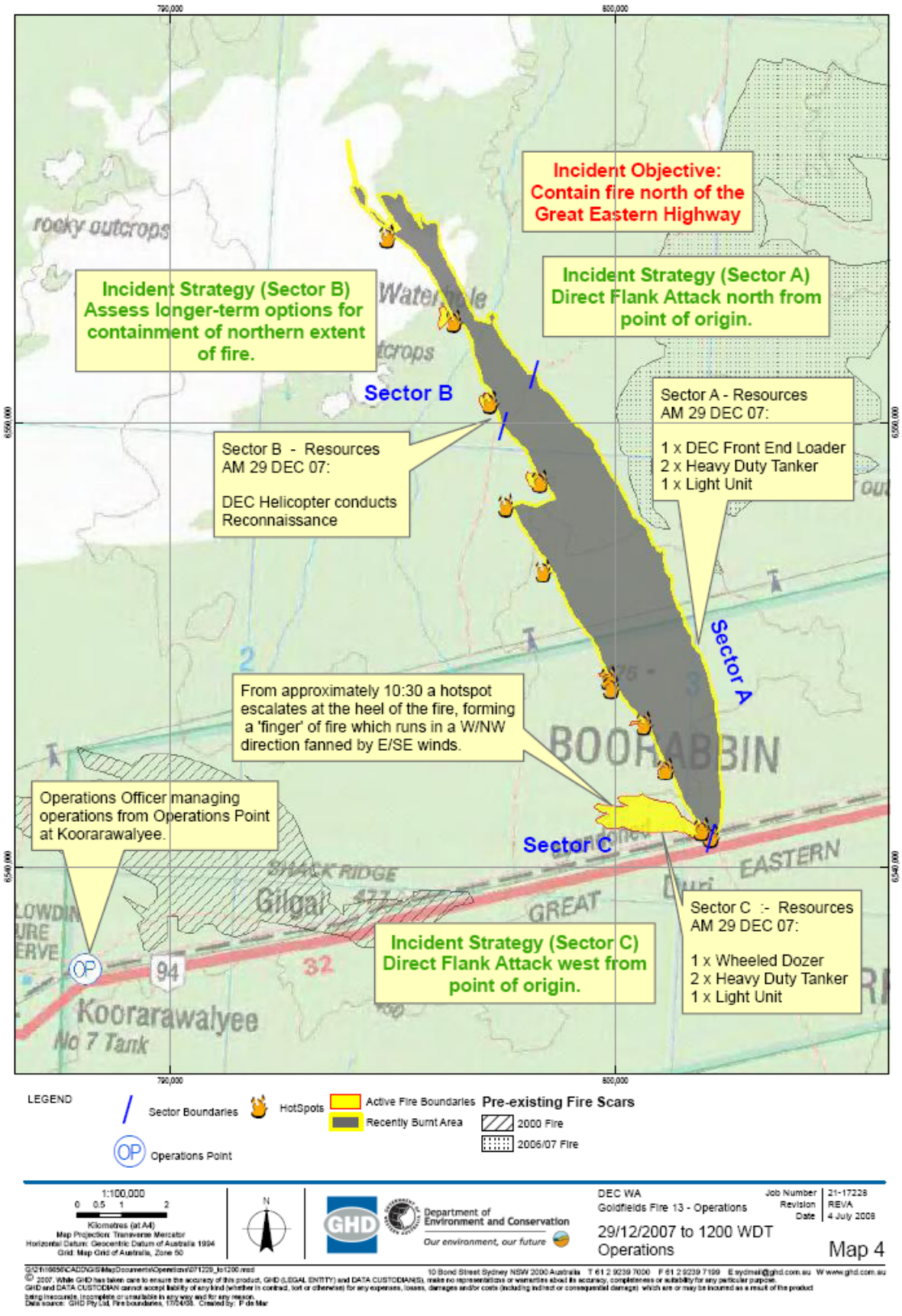



**Figure 6 Allocation of resources to sectors on Saturday morning 29 December 2007 (from GHD Operational Review, July 2008)**

A direct attack on the flank fire edges on Sectors A and C was executed as this provided safe refuge for crews in the burnt ground if needed. The attack units consisted of front end loaders to clear a fire break track, each supported by two fire tankers. Difficulties encountered included a convoluted boundary where the fire edge was variable and staking of truck tyres by severed vegetation.

The suppression operation was supported by an air observer in a helicopter that was used to gain an overview of the fire and a first hand appreciation of fire behaviour and fire development.

Physical conditions at the Operations Point at Koorarawalyee, west of the fire, were taxing as staff worked from an open tent amongst heat, dust and flies.

**Figure 7 Briefing conducted by Operations Officer at the Koorarawalyee Operations Point**

Despite the difficulties, substantial progress was made on containment line construction on both sectors. At 7PM only 2 kilometres remained to be done on the critical Sector C to join with a low fuel fire scar to the west, resulting from a wildfire in 1998. (See Figure 8)

It was decided that it was not possible to fight the fire in darkness as the fire edge had largely self extinguished and could not be detected, presenting the risk of excluding burnt material outside of the containment line. Resting crews overnight was a priority for longer term fatigue management and to ensure the daylight effort was maximised.

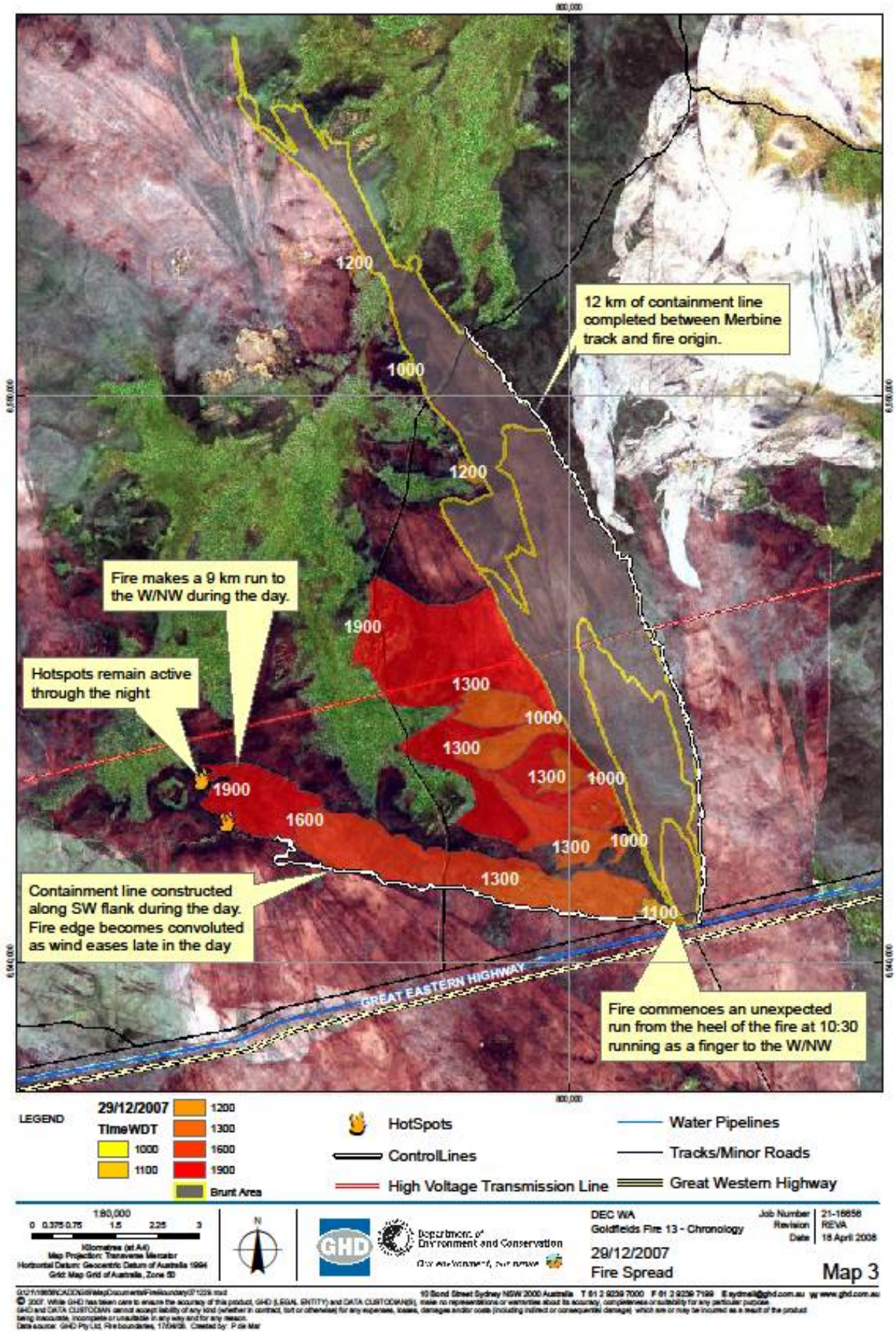



**Figure 8 Fire spread during 29 December 2007 (from GHD Chronology, June 2008)**

The weather forecast for Sunday 30 December was extreme with very high temperatures and strong winds backing around from the north to the south west. Crews were organised to commence at 6AM on Sector C.

At about 11AM on Sunday 30 December, a DEC front end loader broke down and repairs were organised. All fire trucks, including the light units, were moved onto Sector C as the priority objective.

At 11.03AM the helicopter reported a hop over on Sector C, and shortly after another was reported. These escapes escalated, running south and presented no prospect of control. Crews were ordered to exercise the escape plan to avoid entrapment. At 11.46AM the helicopter reported the fire had crossed the Great Eastern Highway running at an estimated rate of spread of 3-5 kilometres per hour.

**Figure 9 One of the headfire tongues crosses Great Eastern Highway from north to south on Sunday 30 December 2007**

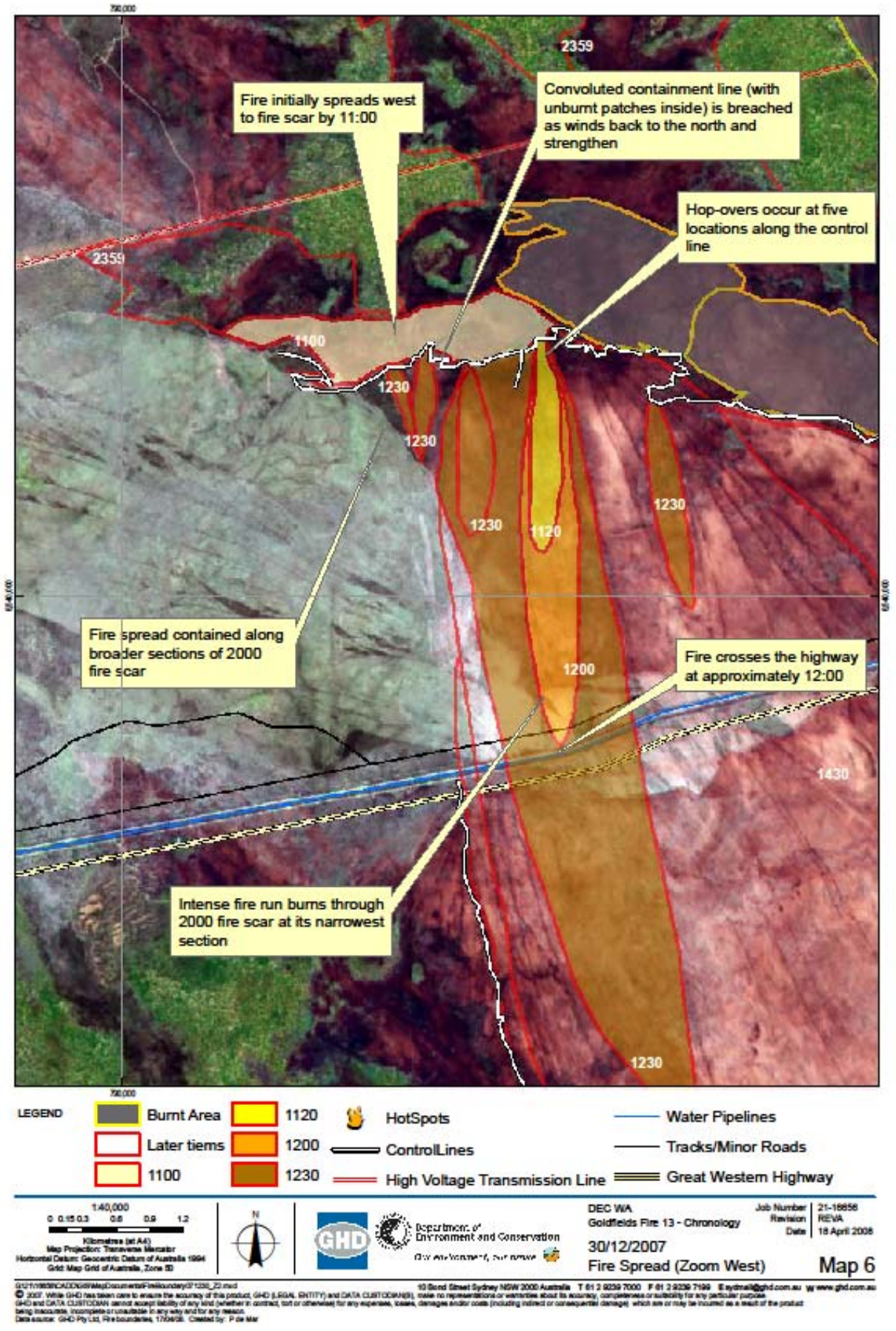



**Figure 10 Fire spread between 1100 and 1230 on 30 December 2007 (from GHD Chronology, June 2008)**

By 4PM on Sunday the fire size had grown to 7,500 hectares and had jumped containment lines to the south of the highway. Northerly winds gusting to 45 kilometres per hour and a 43 degree temperature compounded the suppression difficulties. About 15 power poles were burnt down adjoining the highway. The water supply pipeline and a pump station were threatened.
DEC had 42 staff from the Goldfields, Wheatbelt and Swan Regions involved in the fire, assisted by volunteers from the Shire of Coolgardie. DEC was scaling up its suppression resources with extra trucks and heavy machinery arranged to be brought in on Monday 31 December 2007. Extra bulldozers, heavy fire tankers and additional IMT staff were ordered.

As DEC had no other fire commitments, these preparations were not limited by available resources, although there was an awareness that the weather conditions throughout the southern half of the state were hazardous and the holiday period would constrain the availability of suppression resources from other organisations (Shires, FESA and volunteer brigades).

Warnings were issued (on radio and at roadhouses) to motorists driving on the Great Eastern Highway between Southern Cross and Coolgardie.

**Figure 11 Western roadblock on Great Eastern Highway, Sunday 30 December 2007**

Road blocks had been established at Southern Cross, Coolgardie and at Bullabulling, 20 kilometres west of Coolgardie. WAPOL and DEC vehicles escorted several convoys of trucks and cars from west to east and one from east to west, through the fireground, during the afternoon with the helicopter monitoring fire behaviour from above. Each convoy consisted of a police vehicle in the lead, followed by a DEC fire truck, convoy vehicles and a DEC unit or FESA unit at the rear. The Operations Officer and the Regional Fire Coordinator were authorising and calling the departure of each convoy across the fireground from the helicopter.


**Figure 12 A convoy of vehicles, escorted by a fire truck, travels from west to east across the fire area on Sunday 30 December 2007**

**Figure 13 Vehicles waiting near the western roadblock on Great Eastern Highway on Sunday 30 December 2007**

When the helicopter departed the fire at 7PM (to ensure arrival at Kalgoorlie before last light), the fire behaviour was reported to be quiet with 0.5 metre flame height and the head fire located 7 kilometres south of the highway and obstructed by salt lakes and woodlands.

At around 7.15PM a decision was taken to lift the roadblocks to allow traffic to proceed with escorts. Sentries were placed on each side of the fire on the highway.
At around 7.45PM on Sunday 30 December an unescorted convoy of 15 trucks was permitted to leave a roadblock in Coolgardie to travel west towards Southern Cross.
At around 8.40PM several trucks were engulfed in flames as the fire in the Boorabbin National Park escalated under the influence of a south-westerly wind change.

Three men died and several others were fortunate to escape serious injury or death as they escaped the fire by turning their trucks around or by abandoning their trailers and retreating beyond the eastern edge of the fire.

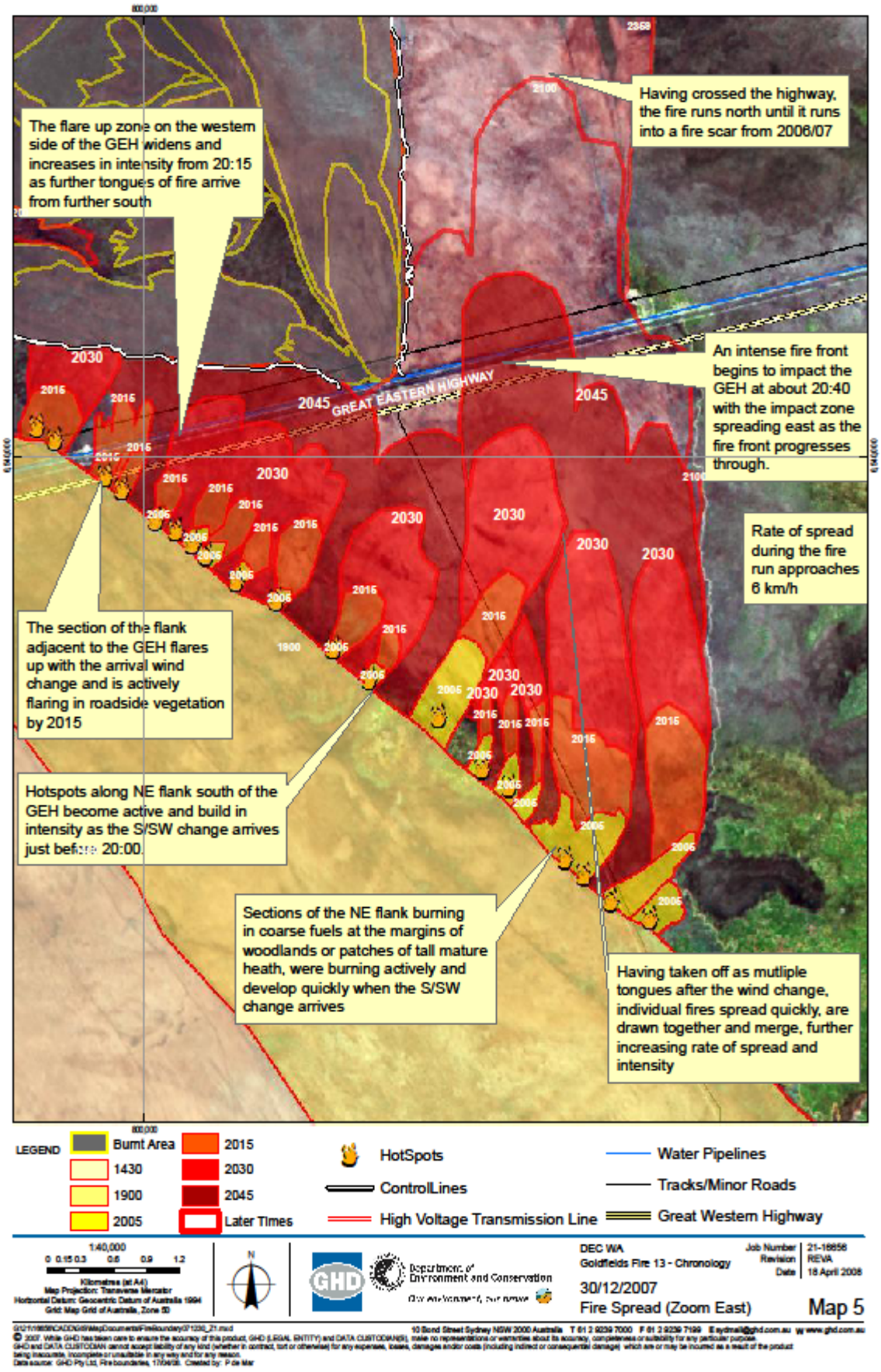



**Figure 14 Fire spread 1430 to 2045 on 30 December 2007 (from GHD Chronology, June 2008)**

By midnight on 30 December 2007 the fire had grown to a size of 21,500 hectares. Suppression of the fire continued until it was fully contained on 8 January 2008. The final fire size was 39,630 hectares (see Figure 15). The Great Eastern Highway remained closed until the fire was declared contained on 8 January 2008.

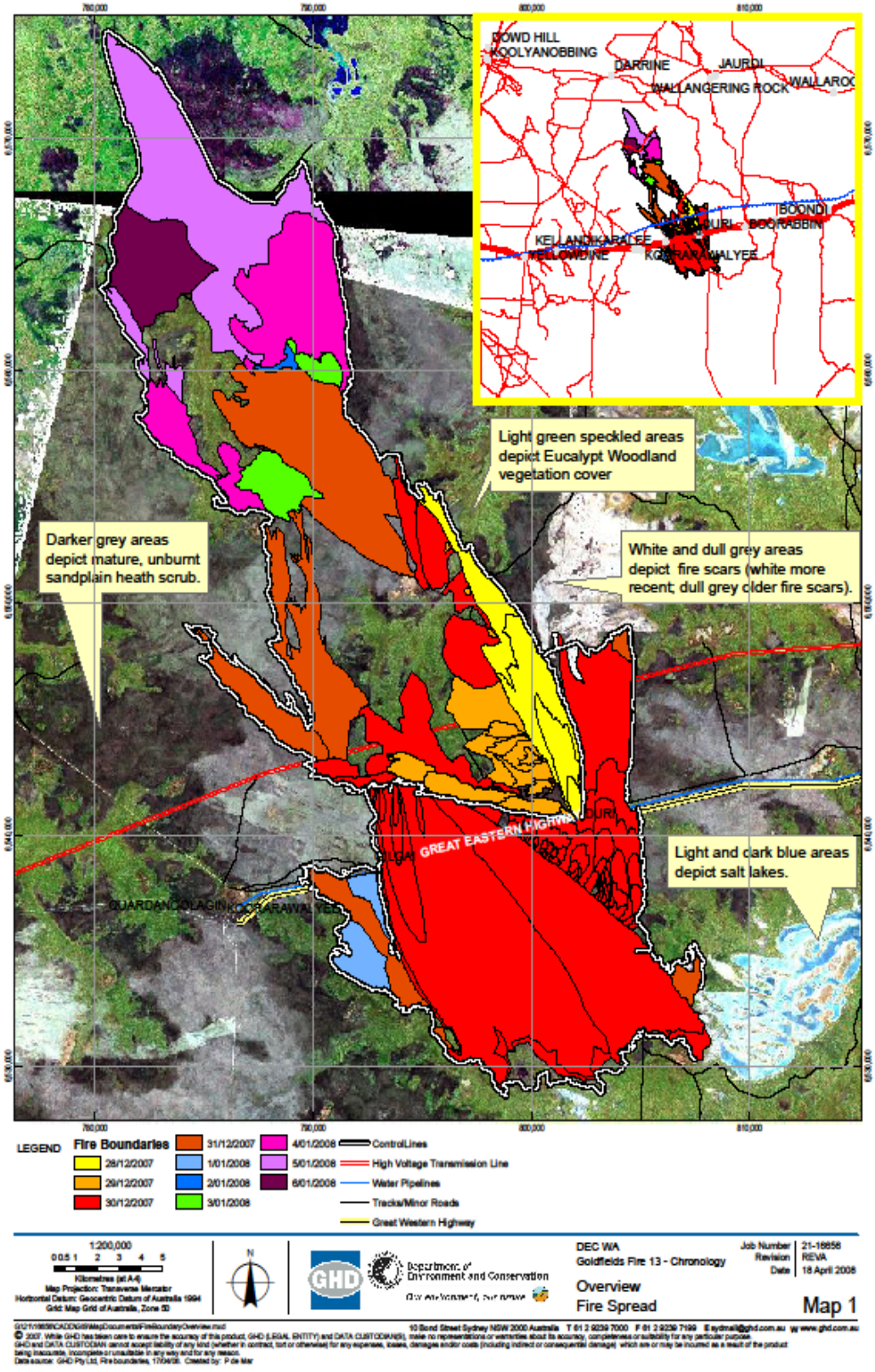



**Figure 15 Fire boundaries from 28 Dec 2007 to 8 Jan 2008 (from GHD Chronology, June 2008)**

## 4 Incident Response Team and Lessons Learned Coordination Group

In January 2008 the Director General of DEC convened an Incident Response Team (IRT) to oversee and coordinate all aspects of the aftermath of the Boorabbin Fire. The IRT was chaired by the Director Regional Services and was structured in the same fashion as an Incident Management Team (IMT), with four scaleable programs – People, Communications, Incident Review and Legal. The IRT met on 23 occasions between January 2008 and July 2009 and 113 actions were implemented by members of the team. Senior DEC officers were seconded to assist the IRT with executive functions and specific projects. Other members of the IRT performed their duties in addition to their routine duties. DEC staff who contributed to the IRT were Peter Dans, Kelly Gillen, Alan Sands, Alan Walker, Bob Chandler, Rick Sneeuwjagt, Terry Maher, Tammie Reid, Nigel Higgs, John Ireland, Peter Burton, Murray Carter, John Tillman and Murray Mitchell. The structure of the IRT is shown in Figure 16.

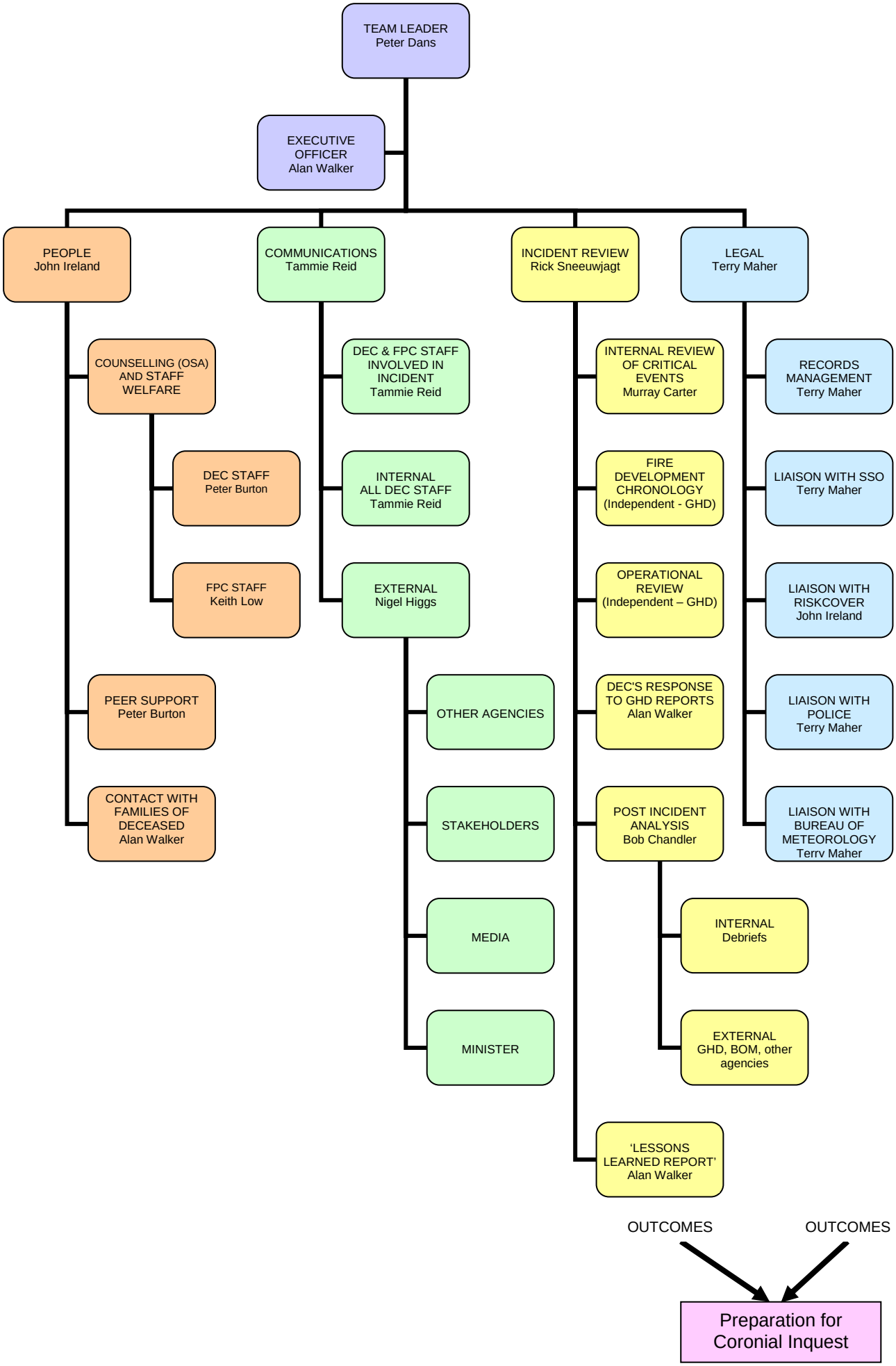
In April 2008 the IRT resolved to form a group of experienced fire managers and incident management practitioners to review key aspects of the outcomes from the debriefs conducted following the incident. The group was to become known as the Lessons Learned Coordination Group (LLCG). Debriefs were conducted within DEC by members of three Preformed Incident Management Teams and by six regions and districts who contributed staff and fire crews to the incident.

The LLCG also examined debriefs and reviews completed by an independent reviewer (GHD Pty Ltd), the Bureau of Meteorology (BOM), the State Emergency Coordination Group and the Operations Area Management Group (OAMG - consisting of representatives of WAPOL, FESA, MRWA, Water Corporation, Telstra, Western Power and Shires) together with reports from the Yilgarn and Coolgardie Shire Councils. The LLCG also reviewed the recommendations from major wildfire incidents managed by DEC since 2004 and several major interstate fire inquiries. Eighty action items were identified as a result of these deliberations.

The LLCG reviewed and approved the Post Incident Analysis report for the Boorabbin Fire and approved and identified 171 recommended actions to be implemented as a result of their deliberations. The LLCG also reviewed the findings and recommendations of the two GHD reports and contributed to DEC's response to the GHD Operational Review.

DEC staff who contributed to the LLCG were Alan Walker, Rick Sneeuwjagt, Terry Maher, Roger Armstrong, Peter Keppel, Bob Chandler, Greg Mair, John Tillman, Tammie Reid, Nigel Sercombe and Kevin Pollock.

## Figure 16 - Boorabbin Fire Incident Response Team Structure



# 5 Incident review processes

## 5.1 A rapid chronology and review of the incident

In order to gain a prompt insight into the circumstances that caused the fatalities, DEC's Director General requested his Principal Policy Officer, Murray Carter, to conduct a rapid chronology and review of critical aspects of the incident.

Mr Carter undertook this task by visiting the site of the incident and conducting interviews with key DEC staff. The review report was presented to the Director General and the IRT in January 2008.

## 5.2 DEC debriefs

DEC conducted debriefs at three levels. Each of the Incident Management Teams (IMT) that worked on the incident conducted a separate team debrief. Each of DEC's regions, districts and sections that contributed fire crews and staff to the incident conducted separate debriefs and a further collective review by key fire crews from all shifts, facilitated by the IRT, was conducted. The IMT leaders for the first four shifts of the incident also met with the IRT to consolidate the information that was collated from the earlier debriefs. A report was compiled for each of the debriefs conducted as listed below:

| | |
|---|---|
| Blue Preformed Team Debrief | 4 January 2008 |
| Black Preformed Team Debrief | 9 and 26 February 2008 |
| Gold Preformed Team Debrief | 29 January 2008 |
| Blackwood District Debrief | 6 February 2008 |
| Wellington District Debrief | 8 January and 6 February 2008 |
| South West Region Debrief | 7 February 2008 |
| Swan Region Debrief | 31 January 2008 |
| Goldfields Region Debrief | 29 January 2008 |
| Esperance District Debrief | 21 February 2008 |
| DEC Radio Communication Section Debrief | 25 January 2008 |
| Collective IMTs and Operation Leaders Debrief | 8 February 2008 |
| IMT Leaders Debrief | 7 April 2008 |

The outputs from the debriefs usually took the form of notes that identified issues, made comment on them and sometimes made recommendations for remedial actions or systems improvements. Photographs taken by staff at the fire in various roles and locations were gathered by this process. The debriefs are the most valuable source of direct personal knowledge of many aspects of the fire as witnessed on site, but individual accounts also need to be put in context as they may come from a limited exposure to the overall scene. The various very detailed observations help to make the bigger picture more coherent when carefully put together. The IRT sorted through the range of accounts and inputs and assessed the many recommendations from all sources. Most debrief observation and recommendations were accepted by the IRT and where there were occasional inconsistencies, they were resolved by the IRT by further interviews or research, or by consulting appropriate fire expertise.

Issues raised during the DEC debriefs covered a wide spectrum of fire mitigation, fire suppression incident management and related topics. The issues were grouped under the headings listed below.

- Fire history in the Goldfields Region
- Fire preparedness
- Staff training before and after the fire
- Incident Preparedness and Response Plan
- Resource detention in remote regions
- Contractor resource availability
- Initial fire response
- Fire detection and notification
- Fire cause investigation
- Fire assessment and appreciation
- Declaring wildfire levels
- Strategic appreciation of the fire
- Fire behaviour prediction
- Fire Operational Guidelines
- Special constraints in the Goldfields Region
- Travel distance times to remote regions
- Use of aircraft
- Use of water in remote region fires
- Vulnerability of tyres
- Communications in remote regions
- Fire weather
- Weather forecasts
- The incident control system
- Incident Action Plans
- IMT resources
- Fire maps

- Information provided to the public
- Preformed team dispatch criteria
- The management of fatigue
- Fire suppression strategies and tactics
- Operations point
- Fire resources support for remote regions
- Adequacy of resources allocated at initial dispatch
- Managing road traffic
- Interagency operations
- Qualifications of staff
- Safety considerations at the fire
- Incident control centre
- Critical incident stress management
- Wildfire Threat Analysis & Fire Prevention Plan

### 5.3 DEC's Post Incident Analysis (PIA)

The process utilised by DEC for reviewing the Boorabbin Fire follows the procedure outlined in DEC's Fire Operations Guideline (FOG) 31 "After Action Reviews and Post Incident Analysis". The IRT convened the LLCG to examine the debrief reports, identify and analyse the emerging issues. The PIA is a record of *what happened*, *why it happene*d and what can be done to *improve the performance* of fire suppression and incident management operations in order to *prevent a recurrence*. The PIA also acknowledges *what went right* and confirms current effective operational practices.

In addition to the DEC debriefs, the LLCG examined two independent reviews by GHD, debriefs conducted by the State Emergency Coordination Group and the Goldfields Operations Area Management Group, reports from the Yilgarn and Coolgardie Shires and a report by the Bureau of Meteorology (BOM) in compiling the PIA.

The Executive Summary of the PIA report can be found in Part 4, Section 11 and the recommendations and actions from the PIA can be found in Part 6, Section 16 of this report.

### 5.4 Reviews conducted by an independent contractor (GHD)

To ensure objectivity and to gain the assistance of additional professional expertise, DEC tendered contracts for two reviews, a Fire Development Chronology and an Operational Review. GHD Pty Ltd was awarded both contracts with the principal consultant being Mr Paul de Mar. The consultants were eminently qualified for the task and the individual consultant officers recognised nationally for their bush fire expertise. The terms of reference for these contracts are found at Appendix 2 and Appendix 3.

GHD was given the assistance they required by DEC including examination of the fire ground, access to staff for interviews, a complete copy of all documentation, satellite imagery, regular consultation with senior DEC staff and fire specialists, participation in DEC's debrief and PIA processes. GHD also liaised with the WAPOL Arson Squad and BOM. Having regard for the confidentiality of the concurrent police investigation the contractor did not have access to the many other witnesses that have been involved in the Coronial investigation and who are not employees of DEC, thus the information available to GHD was sourced from DEC or produced from their own studies. One exception was a report on the weather during the fire produced by BOM.

A more detailed account of the independent reviews conducted by GHD is found in Part 3, Sections 9 and 10 of this report.

## 6 Relationship to WA Police investigation and Coronial Inquest

The reviews of the Boorabbin Fire incident that were initiated by DEC and described in Section 4 above were conducted concurrently with an investigation by the WAPOL Arson Squad on behalf of the State Coroner. Other reviews of specific aspects of the incident were conducted by BOM, FESA, Goldfields Operations Area Management Group (OAMG) and the Shires of Yilgarn and Coolgardie. Each of the reviews had a different focus. The information that was available to the reviewers was variable.

The WAPOL Arson Squad conducted their investigation by obtaining documents, interviewing witnesses and taking statements. DEC provided the police with copies of all of the documents that were generated during the incident (including emails), telephone and facsimile records for the Kalgoorlie office for the duration of the incident, and copies of DEC's operational procedures. Twenty six DEC staff provided witness statements to the Arson Squad.

DEC and DEC's contracted reviewer, GHD, did not have access to evidence collected and obtained by the police from other sources. The information used by GHD was sourced from DEC or DEC staff or was produced from GHD's own studies.

Within the time constraints and restrictions on the availability of some evidence, the LLCG is confident that the findings of its reviews, as presented in this report, are comprehensive and robust and reflect a sound understanding of what happened, why it happened and what steps are necessary to minimise the likelihood of a similar incident happening in the future.

DEC will review its findings and proposed actions following the Coronial Inquest.

# PART 2: BACKGROUND

## 7 Legislative framework

### 7.1 Conservation and Land Management Act 1984

Sections 33(1)(a) and 33(3) of the *Conservation and Land Management Act 1984* (CALM Act) provide for DEC to manage lands to which the Act applies, according to management plans or, in the absence of a management plan, in accordance with the necessary or compatible operations provision of the Act depending on the land category. Fire management activities are subject to these provisions.

The Boorabbin National Park was created in November 1977. There is currently no CALM Act management plan for the park and protection of key values is guided by a set of Interim Management Guidelines and a Wildfire Threat Analysis and Fire Prevention Plan (WTAFPP).

### 7.2 Bush Fires Act 1954

The *Bush Fires Act 1954* (BF Act) applies to land throughout the State including DEC-managed lands. The provisions of the BF Act do not, however, affect the provisions of the CALM Act and DEC is generally not bound by the BF Act.

Section 39 of the BF Act provides wide-ranging powers for a bush fire control officer to take necessary steps to extinguish a fire. If an authorised CALM Act officer is present at a fire on or near any Crown land, the officer may take supreme control of the fire as if the officer were a bush fire control officer appointed by a local government authority. The BF Act also provides other powers to designated DEC officers. Section 56 of the Act imposes a specific duty on an authorised CALM Act officer to take enforcement actions under the BF Act (e.g. to demand the name and address of an offender, to require a person to produce an authorisation to light a fire, and to apprehend an alleged offender without a warrant).

### 7.3 Emergency Management Act 2005

The *Emergency Management Act 2005* (EM Act) came into operation on 24 December 2005, the day after being published in the Gazette. Proclamation of the EM Act allowed some provisions of the Act to come into operation immediately – the remaining provisions require development of regulations and administrative arrangements.

In broad terms, the EM Act formalises the existing Western Australian emergency management arrangements, as established by the State Emergency Management Committee's Policy Statement No. 7.

The key objectives of the EM Act are:

- To establish overarching emergency management arrangements for WA's emergency services, including local governments and support organisations. This will establish a framework for managing emergencies of a large scale or catastrophic nature requiring a significant and coordinated response;
- To provide necessary legislative powers and protection; and
- To improve protection for volunteers.

The EM Act establishes a planning infrastructure based upon the arrangements outlined in Policy Statement No. 7, including:

I. The State Emergency Management Committee (SEMC) – responsible for planning and preparing for an efficient emergency management capability for the State. The EM Act requires SEMC to establish policies and plans.

II. District Emergency Management Committees (DEMC) – established for each emergency management district to assist in the establishment and maintenance of effective emergency management arrangements for its district.

III. Local Emergency Management Committees (LEMC) – established by the respective local government to advise and assist the local government in ensuring that local emergency management arrangements are established for its district.

IV. Hazard Management Agencies (HMA) – responsible for developing and maintaining State emergency management plans for designated hazards.

V. Combat agencies and support organisations, and the activity or function for which they are responsible.

VI. Local governments' responsibilities in relation to local, community-centred emergency management.

The EM Act also establishes an operations infrastructure, including:

a. The State Emergency Coordinator (the Commissioner of Police) – responsible for coordinating the response to an emergency during a declared 'state of emergency', for chairing the State Emergency Coordination Group, and for providing advice to the Minister and the State Disaster Council.

b. The State Emergency Coordination Group (SECG) – which is automatically established if a 'state of emergency' is declared, or may be formed at other times at the request of a HMA. The SECG is responsible for ensuring the provision of a coordinated emergency management response across whole of government.

c. The State Disaster Council (SDC) – which is automatically formed if a 'state of emergency' is declared. The SDC is chaired by the Premier, and includes relevant Ministers and the State Emergency Coordinator. Establishment of the SDC ensures that Government is involved in the management of a declared 'state of emergency', and has the opportunity (via the State Emergency Coordinator) to provide the Government's input to the SECG.

The EM Act provides for a graduated scale of emergencies, via the declaration of an 'emergency situation' (by the respective HMA) or a 'state of emergency' (by the Minister). Different levels of powers are available during an 'emergency situation' or 'state of emergency'. Powers common to each are:

- Power to evacuate persons;
- Power to control or use property, e.g. as an evacuation centre;
- Power to detain and decontaminate persons exposed to hazardous substances; and
- Power to obtain and exchange information e.g. to provide welfare services.

Local governments have additional powers in designated 'cyclone areas'.

Directions may be given to 'public authorities' – in relation to the preparation, review or testing of State emergency management plans, and during a declared 'state of emergency'.

Scope of regulations:

- Regulations prescribe HMAs for each hazard, plus Combat Agencies and Support Organisations;
- Regulations may limit the circumstances, and regulate the manner, in which the powers under the Act may be exercised;
- Regulations will require emergency management agencies to provide insurance cover for volunteers for compensation for injury caused.

Regulations to prescribe the HMA for bushfire hazards on DEC-managed lands, unallocated Crown lands and unmanaged reserves, have not been completed as at June 2009. The HMAs defined in SEMC Policy 7 establish DEC's role as the HMA for these lands in the interim.

# 8 The Department of Environment and Conservation

## 8.1 Role and functions of the Department

The Department of Environment and Conservation is in the portfolio of the Minister for the Environment. DEC has the lead responsibility for protecting and conserving the State's environment on behalf of the people of Western Australia. This includes managing the State's 27 million hectares of national parks, marine parks, conservation parks, State forests and timber reserves, nature reserves, marine nature reserves, marine managements areas and other lands managed for conservation.

DEC is also responsible for fire preparedness and pest animal and weed control on 89 million hectares of unallocated Crown land and unmanaged reserves.

DEC's key responsibilities include broad roles in conserving biodiversity and protecting, managing, regulating and assessing many aspects of the use of the State's natural resources. DEC contributes to the development of environmental protection policies, manages the environmental impact assessment process and carries out regulatory functions to achieve improved environmental outcomes. DEC is also responsible for the management of contaminated sites and responding to pollution incidents.

DEC provides support or assists the following portfolio authorities and boards to carry out their functions, which are integral to DEC achieving its vision and mission:

- Environmental Protection Authority;
- Conservation Commission of WA;
- Keep Australia Beautiful Council;
- Marine Parks and Reserves Authority;
- Swan River Trust;
- Waste Authority; and
- Contaminated Sites Committee.

DEC contributes to national and international programs, including fire management and research programs, through national and international forums such as the Australasian Fire Authorities Council and the Bushfire Cooperative Research Council.

## 8.2 Fire Management Role

DEC has responsibility for managing 25 million hectares of terrestrial national parks, nature reserves, State forest and other lands (almost 10 per cent of the State's terrestrial land area). DEC is also responsible for statewide biodiversity conservation and environmental protection. As part of meeting these responsibilities, DEC undertakes an active fire management program involving fire preparedness and fire prevention operations; the application of fire under prescribed conditions for biodiversity and property protection; and the suppression of wildfires on or near lands managed by DEC.

DEC has a lead role in responding to and suppressing fires on DEC-managed lands in the south-west forest regions, the Midwest and the South Coast regions. In these regions, DEC is supported by officers of the Forest Products Commission and the bushfire brigades of the Local Government Authorities. In other parts of Western Australia, DEC has limited fire management resources and the primary responsibility for fire suppression rests with Local Government. In these regions, DEC provides operational support where fires are burning on or threatening DEC-managed lands. FESA has the role of providing technical and operational support to Local Governments for fire management.

On I July 2003, responsibility for coordinating fire preparedness programs on 89 million hectares of unallocated Crown land and unmanaged reserves was transferred to DEC from the (former) Department of Land Administration. The fire suppression responsibility on these lands remains with the Local Government Authorities through the volunteer bushfire brigades.

One of DEC's functions is to prepare management plans for the lands and waters specified in the CALM Act. DEC's fire management responsibility is derived from its role in managing lands in accordance with management plans. Management plan objectives include the protection of flora and fauna and the restoration of the natural environment, for which fire management is required. In the absence of a management plan, "necessary operations" can be carried out, including works for the protection of people, property, flora and fauna. Fire management is therefore a necessary aspect of DEC carrying out its functions under the CALM Act.

### 8.3 Departmental management structure

The work of the department is carried out through six service (program) divisions and five operational and support divisions. The structure as at December 2007 is depicted in Figure 17. Inputs to the direction of fire management works are provided by three divisions – Nature Conservation; Parks and Visitor Services; and Sustainable Forest Management. Science Division provides research and technical support to fire management programs which are implemented by the Regional Services Division. DEC's Fire Management Services Branch is located within the Regional Services Division, together with the department's nine regions. Fire management programs are developed and carried out collaboratively between regions, Fire Management Services Branch, Science Division and the three service divisions.

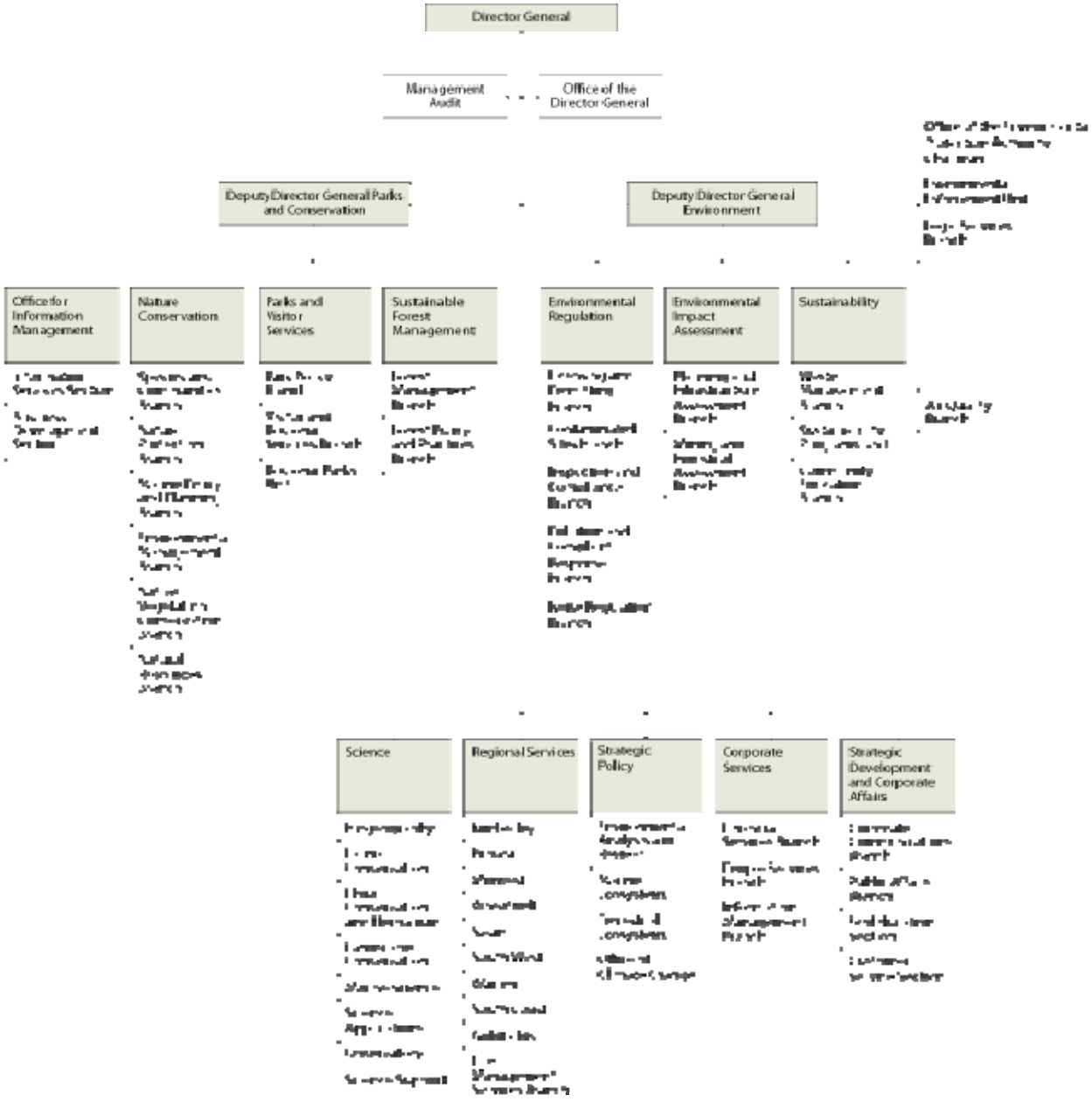



**Figure 17 DEC Organisational Chart as at December 2007**

### 8.4 Goldfields Region

The DEC Goldfields Administrative Region is located within a boundary that covers 107.7 million hectares (34.3 per cent of Western Australia) and includes eight of Australia's 85 biogeographic regions (Central Ranges, Coolgardie, Gascoyne, Gibson Desert, Great Victoria Desert, Little Sandy Desert, Murchison and Nullarbor). These bioregions contain eucalypt woodlands in the south-west, mulga woodlands and spinifex desert to the north and north-east, and bluebush-saltbush steppe in the south-east. DEC's Goldfields Region staff manage 8.3 million hectares of conservation reserves including national parks, conservation parks, nature reserves, timber reserves, State forest and former pastoral leases. DEC's Goldfields Region is also responsible for fire preparedness, control of weeds and feral animals on approximately 40 million hectares of unallocated Crown land and unmanaged reserves. The DEC Goldfields Region is also responsible for regulating the mining industry and support infrastructure in this area that includes two hundred licensed and registered facilities. These facilities are predominately associated with the mining of gold, lead, rare earths, salt, nickel and iron ore. The DEC-managed lands in the Goldfields Region are shown in Figure 19 and the DEC-managed lands between Southern Cross and Kalgoorlie are shown in Figure 18 below.

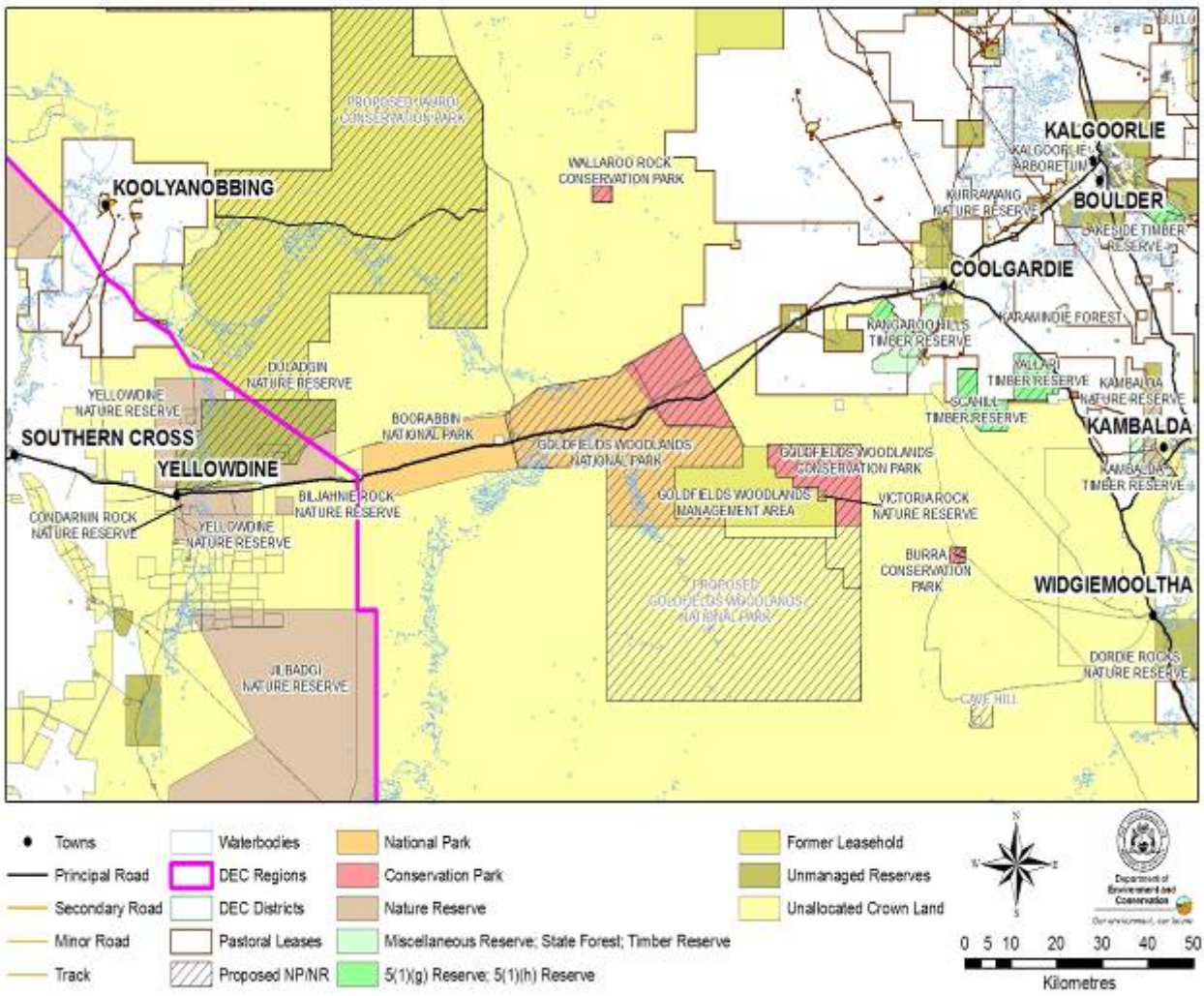



**Figure 18 Map of part of the Goldfields Region between Southern Cross and Kalgoorlie**

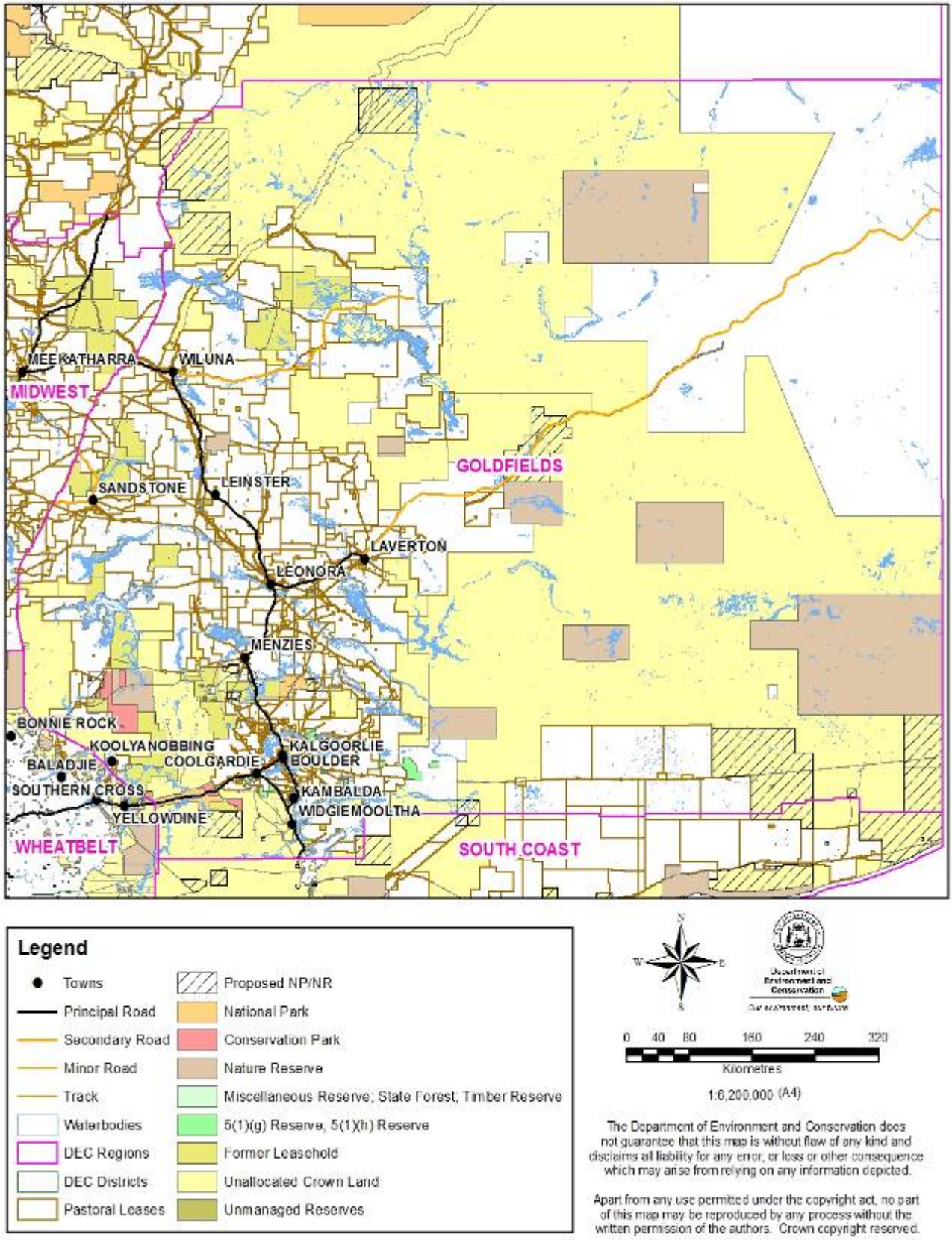



**Figure 19 Map of the Goldfields Region showing DEC-managed lands**

The staff structure of the Goldfields Region as at September 2008 is depicted in Figure 20.

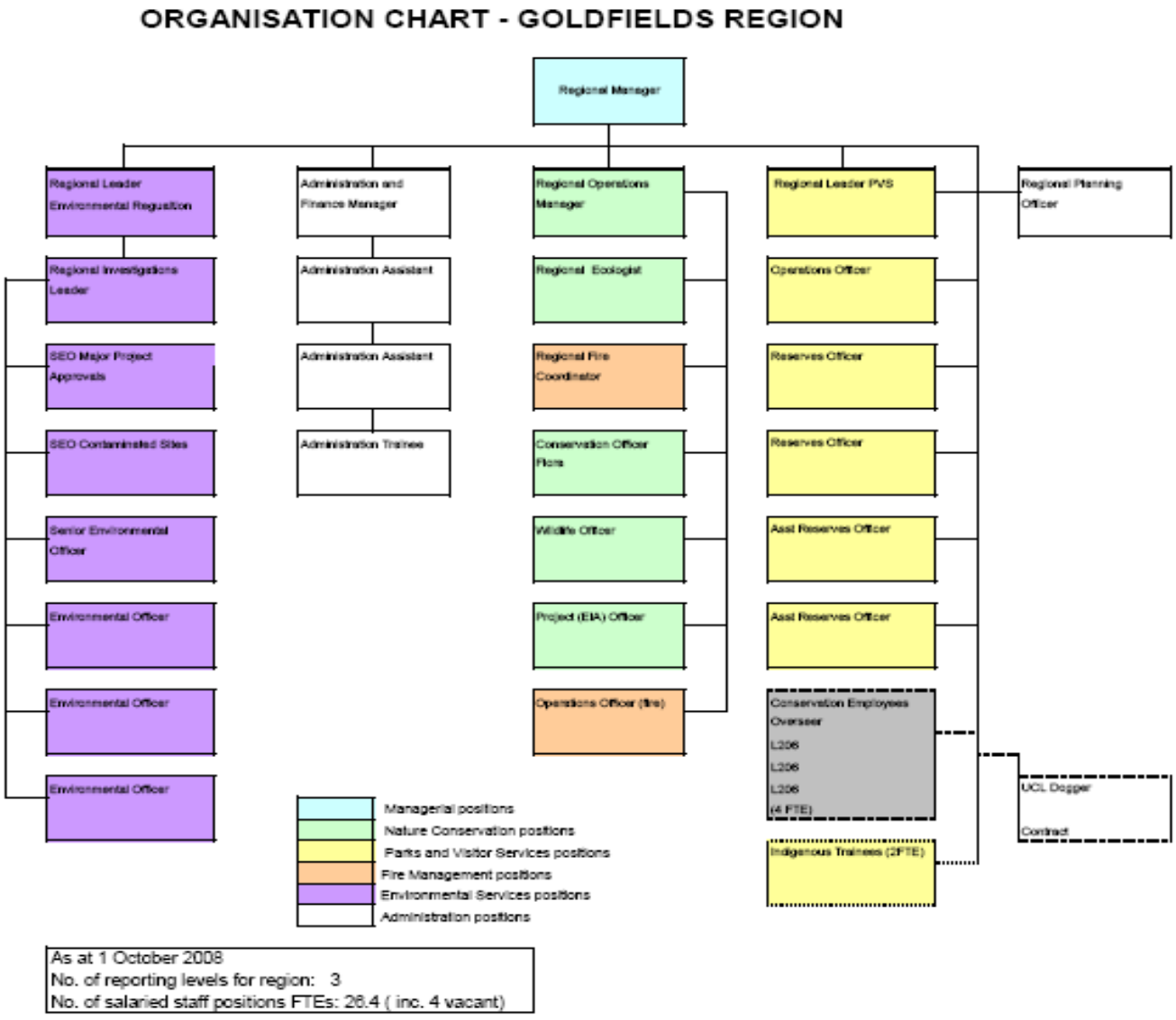



**Figure 20- Goldfields Region organisational chart as at September 2008.**

## 8.5 Fire Management Services Branch

Fire Management Services (FMS) Branch is part of the Regional Services Division and its role is to facilitate the delivery of DEC's fire management business through the department's regional structure. FMS provides policy and procedural guidance; coordination of fire planning and statewide fire mitigation and wildfire suppression operations; information management systems; staff fire training

and development; radio communications and technological support; and fire-related aviation management and coordination.

During major wildfires, FMS provides the centralised, strategic coordination of departmental resources across all regions and facilitates DEC's participation in State Emergency Management processes.

FMS personnel work closely with Regional Managers and their fire management staff in regions and districts to develop and deliver the fire management outcomes of the department. FMS also works closely with personnel representing the desired business outcomes of DEC's service divisions, notably Nature Conservation, Parks and Visitor Services, Sustainable Forest Management and also with Science Division to ensure a holistic approach to the role of fire management towards the achievement of DEC's land management objectives.

FMS staff represent the department in state level inter-agency processes, such as Emergency Management, bushfire mitigation, radio communications, fire weather forecasting, arson prevention and smoke management. FMS staff also represent DEC in national and international fire management forums.

FMS is the custodian of DEC's Code of Practice for Fire Management (see Appendix 4); Fire Management Guidelines (Appendix 5); Fire Management Principles (Appendix 6); Fire Operational Guidelines (Appendix 7); and Fire Training Manuals and Syllabuses.

The staff structure of the Fire Management Services Branch as at September 2008 is depicted in Figure 21 below.

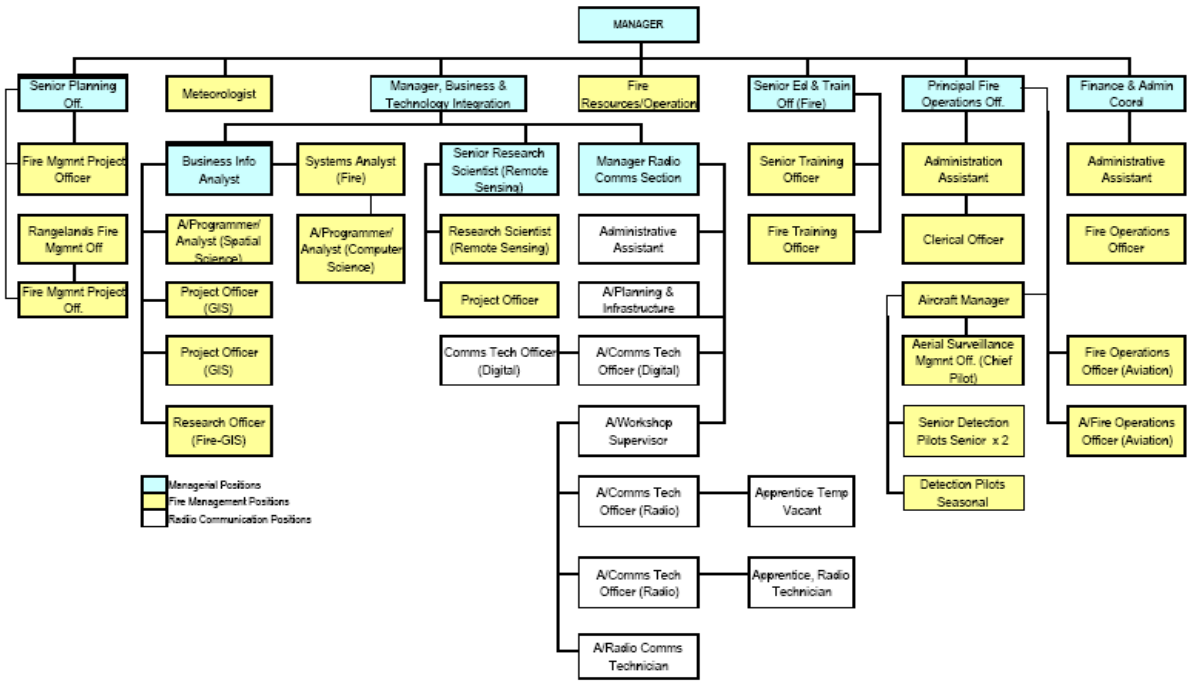



**Figure 21 Fire Management Services Branch structure chart**

### 8.6 Operational readiness for wildfire incidents

As at December 2007, DEC had approximately 300 Conservation Employees trained and available for deployment in fire suppression crews state wide. In addition, DEC had approximately 500 salaried staff that are trained and experienced to fulfil allocated roles in incident management teams. DEC owns 111 fire trucks (medium and heavy tankers), 11 front end loaders, seven bulldozers, and seven fire spotting aircraft. In addition, DEC has around 200 light fire fighting units. Additional heavy machinery and aircraft are available for fire suppression on a seasonally contracted basis.

DEC endeavours to maintain adequate numbers of trained personnel and other fire suppression resources needed to achieve the annual prescribed burning program and to meet the department's fire suppression capability requirements on and near to DEC-managed lands in the south west. The required level of fire fighting resources (both personnel and equipment) is defined in the Fire Cover Model that was implemented in 1996.

In determining the standards for the Fire Cover Model in the three south-west regions, nine fire response cells have been identified. Resources are located within these cells to give an adequate level of suppression coverage over the areas of highest concentration of values and ignition potential. The fire response cells determine the number of fire crews and tankers required to be able to provide a first attack capability supported by resources from adjoining departmental work centres.

During the fire season (usually October to April each year) DEC has permanent and seasonal Conservation Employees and salaried staff on fire emergency availability rosters to enable 24/7 response to wildfire incidents. The number of staff rostered will vary in accordance with the prevailing fire hazard. Fire detention rosters apply to fire crew staff, incident management teams, Duty Officers (State, Region and District level), air crew, aviation support, radio communications and IT support officers. A recent innovation has been the rostering of pre-formed incident management teams (PFT). There are five teams, each with a complement of 64 persons filling various incident management roles. One PFT is rostered each week during the fire season to enable rapid and efficient deployment of a team to an incident. The State Duty Officer is authorised to mobilise the rostered PFT.

Generally, DEC's remote regions (such as the Goldfields Region) have insufficient staff numbers to enable detention rosters to adequately meet the requirements of a large wildfire incident. All of DEC's regions depend on reinforcements from other regions to deal with large or sustained incidents. Usually the additional staff required for incidents in the Goldfields region would be drawn from neighbouring regions (Wheatbelt, South Coast, and Midwest) or from regions in the south-west.

### 8.7 Fire Management Policy and Code of Practice

DEC's fire management business is guided by a comprehensive policy document (Policy Statement No. 19, see Appendix 1). The policy contains the fire management objectives for DEC-managed lands and policy statements pertaining to safety and risk; use of fire; fire suppression; wildfire prevention; liaison; and research. Also included in the policy are a set of Principles for Fire Management and the requirements for policy implementation. The policy was updated in October 2005 following a comprehensive round of public consultation and review by the Environmental Protection Authority.

DEC has also prepared a Code of Practice for fire management which provides a framework for fire management and procedures on lands managed by the Department (DEC-managed lands). See Appendix 4 for the Code of Practice.

### 8.8 Fire Management Guidelines and Principles

DEC has compiled a series of guidelines that outline the fire management requirements for specific ecosystems (seven guidelines), genera/species (12 guidelines), and general activities (four guidelines). See Appendix 5 for details of the guidelines.

A set of Fire Management Principles are applied to all fire management activities (see Appendix 6).

DEC has also compiled a compendium of Fire Operational Guidelines (FOG). These were previously called Fire Protection Instructions. FOGs are developed to inform, guide and direct fire managers on the standards, specifications and procedures to be applied whilst undertaking fire management operations. As at January 2008, there were 81 FOGs that were either current, in draft form or under review. See Appendix 7 for details.

### 8.9 Incident management

The command and control structure used by DEC for responding to all emergency incidents, including wildfires, is the Australasian Inter-service Incident Management System (AIIMS). The AIIMS structure is used by most Hazard Management Agencies (HMA) in Western Australia. AIIMS provides a common management framework to assist with the effective and efficient management of incidents.

The framework can be applied to large or small incidents and can be scaled as required. The structure can be expanded as an incident grows in size and complexity.

The control system of AIIMS consists of four functional areas: Control; Planning; Operations and Logistics. It brings together personnel, procedures, facilities, equipment, and communications to facilitate the efficient management of an incident. A common organisational structure defines the responsibilities for managing the allocation of resources so that stated incident objectives and outcomes are accomplished effectively. The system prescribes delegation to ensure that all vital management and information functions are adequately performed.

The Incident Controller will be engaged in planning strategies, consideration of resources and additional actions to resolve the incident. As the size or complexity of an incident increases, the Incident Controller may delegate some functions to others.

AIIMS operates effectively for any type of incident, including floods, cyclones, search and rescue, earthquakes, fire, wildlife rescue, aircraft accidents, dangerous goods or hazardous substance spillages, outbreaks of disease, transport accidents, and the many other situations in which emergency service organisations will be involved.

The basic AIIMS structure for a level 3 incident is depicted in Figure 22 below.

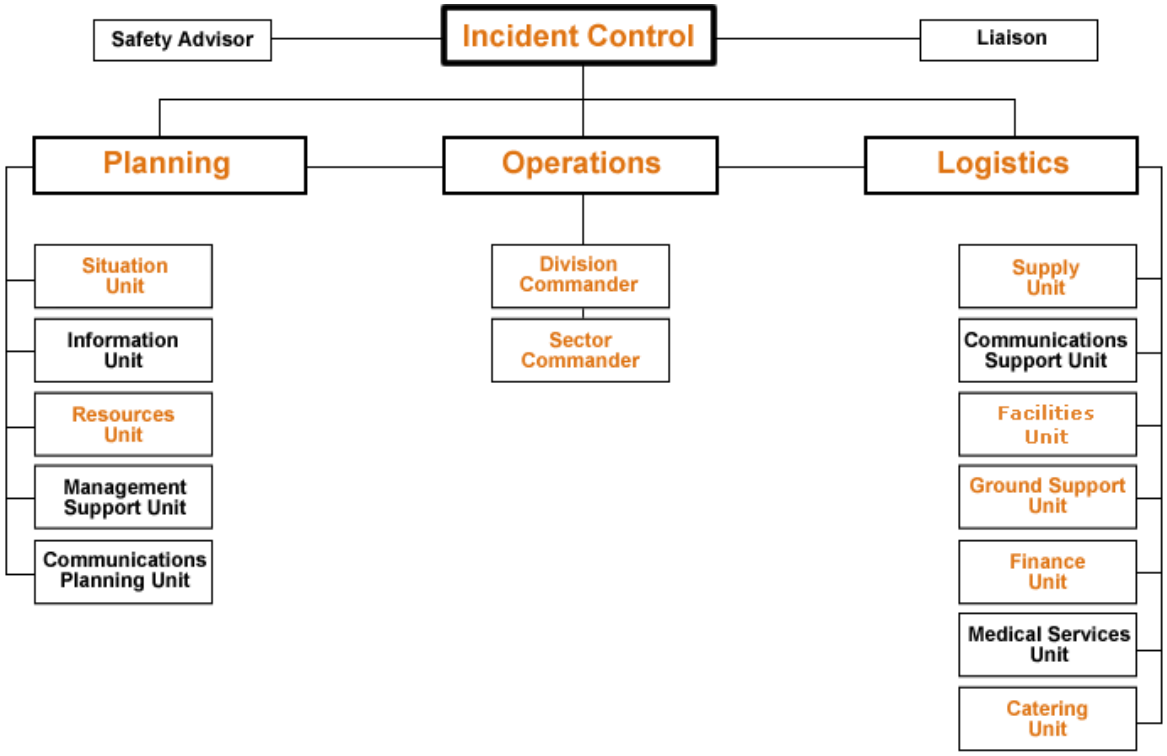



**Figure 22 – AIIMS Structure**

An Incident Action Plan (IAP) containing objectives, strategies, key risk exposures, management arrangements, maps, resources deployments, communications, medical safety and other logistical arrangements is prepared by the Incident Controller for all level 2 and level 3 incidents.

### 8.10 Personnel training and qualifications

DEC's FMS runs a series of training modules for skills relating to fire management. This training may lead to the completion of a nationally recognised award (Unit/s of Competence and/or Short Courses). The units and qualifications are predominantly drawn from the Public Safety Training Package, but other training packages may also be accessed.

FMS training courses are predominantly based on the requirements for each role in incident management.

Firefighters may receive national recognition for their skills and awarded qualifications even if they have not attended a firefighting training course. Their skills or competencies can be assessed in the workplace, by observing that they perform the work as required by the competency unit standard.

During 2007/08 Fire Management Services development and education staff conducted 44 formal fire training courses involving 580 participants. In addition, district and regional staff delivered 16 formal fire training programs to 189 participants.

The formal courses conducted in 2007/08 included Australasian Interagency Incident Management System (AIIMS) Awareness, Introduction to AIIMS, Prescribed Burning, Fireline Construction Using Machines. Basic Wildfire Awareness, Basic Fire Fighting, Fire Fighting Level 1, Fire Fighting Level 2, Structural Fire Fighting, Fire Operations 1, Operational Management, Wildfire Suppression 3, Fire Weather, Information Services Management, Ground Support Unit Management, Management Support, Incident Mapping, Advanced Incident Leadership Program and Fireline Leadership.

Training was also provided for aerial operations personnel including fire detection pilots, aerial suppression support staff, air attack supervisors, Helitorch operators, incendiary machine supervisors and incendiary machine bombardiers. A total of 222 participants ere involved in all aspects of the aerial operations training programs.

Participants were predominantly from DEC, but included personnel from the Forest Products Commission, FESA, local government authorities, contractors, and the department's Bush Ranger WA Cadets. The Advanced Incident Leadership Program included participants from across Australia and New Zealand.

The development and promotion of common fire training programs and course materials continued between DEC and FESA, and with other agencies in Australia and New Zealand. Of particular note is the introduction of Structural Fire Fighting training that is directed at DEC firefighting personnel who, in the course of wildfire fighting, encounter structures on fire or at risk of burning.

A total of 170 staff took part in the Fireline Leadership program in 2007/08, bringing the total over the two years to 299 participants.

### 8.11 Occupational safety and health (OSH)

DEC's approach to ensuring optimum safety, health and welfare for its workforce is set out in a policy statement (Policy Statement 60 – Occupational Safety and Health). DEC and its predecessor agencies have a long and effective record in the achievement of high standards in OSH. Attention to personnel safety is an integral part of every activity performed in the department.

The policy sets out two objectives:

1. For all managers and employees to recognise that the achievement of high OSH standards forms an integral component of the department's core values, and sound work and business practice.

2. To attain the highest achievable departmental standards in meeting the objectives listed in Section 5 of the *Occupational Safety and Health Act 1984*:

    - to promote and secure the safety and health of persons at work;
    - to protect persons at work against hazards;
    - to assist in securing safe and hygienic work environments;
    - to reduce, eliminate and control the hazards to which persons are exposed at work;
    - to foster cooperation and consultation between and to provide for the participation of employers and employees and associations representing them in formulation and implementation of safety and health standards to current levels of technical knowledge and development; and
    - to promote education and community awareness on matters relating to OSH.

Thirteen policy statements are contained in Policy 60, including departmental commitments to consult with the workforce on OSH; provision of information, instruction and training to employees; provision of personal protective equipment; reporting and review of accidents and injuries; and assistance to

personnel to attain and maintain improved physical and mental health and positive lifestyle behaviours.

In support of the policy, DEC maintains a dedicated group of specialist OSH staff who coordinate the preparation of manuals and guidelines for safe work practices and healthy lifestyles and who work closely with OSH coordinators and managers in regions, districts and branches to achieve high standards in OSH.

Safety for personnel involved in fire suppression and fire mitigation operations is a very high priority for DEC's fire managers and incident controllers. Training and awareness of fire safety issues is conducted on an ongoing basis, with an emphasis on safety during pre-season information sessions and during briefings at the commencement of each shift at wildfire incidents. The role of the Safety Advisor (reporting to the Incident Controller) is filled at all level 2 and level 3 incidents managed by DEC.

DEC also has an extensive Visitor Risk Management Policy (Policy Statement 53 – Visitor Risk Management), which sets out the approach to optimising the personal safety and welfare of visitors to DEC-managed lands and waters.

### 8.12 Pre-incident planning

Pre-planning is recognised as a fundamental requirement for effective incident management. As the Hazard Management Agency for the combat of bushfires on DEC-managed lands, the department has set a standard for the preparation and annual review of Incident Preparedness and Response Plans (IPRP) for each of its 16 districts and for the Goldfields Region. A Fire Operational Guideline (FOG 07) outlines the requirements for the development and updating of IPRPs.

The IPRP provides for the following:

- an inventory of all the components of the district organisation, including personnel and equipment employed and owned by DEC. It will also summarise the resources available through the Volunteer Bush Fire Brigades, FESA, private or other organisation resources, machinery availability and support organisation details;
- a summary of the district fire prevention, detection and suppression measures;
- a set of procedures for the management of all incidents for which DEC will take a lead role, particularly the suppression of wildfires, which occur within the district; and
- arrangements for efficient liaison with all stakeholders and with the community.

The IPRP is arranged in two volumes. Volume One provided the user with information on how to implement and organise an AIIMS response to the incident. Volume Two contains the information pertinent to the district and inventories resources and contacts that will be needed to mound an incident response.

The IPRP is updated before 31 October each year, and the Fire Coordinator keeps the plan up to date during the fire season.

The IPRP is an especially valuable resource for people in incident management teams who are unfamiliar with the local area, the district resources, facilities, services and contacts.

### 8.13 Resources for responding to wildfire incidents

As stated in Section 8.6, DEC has a significant suite of human and other physical resources available to respond to wildfire incidents. Only a relatively small number of DEC staff are full time fire "specialists". These specialist staff provide a leadership and facilitation role for the fire management business. The majority of DEC staff who undertake fire fighting and incident management roles are employed on other tasks in their normal duties but swing into their fire management roles when called upon to do so.

Some of DEC's resources that are available for fire mitigation and wildfire suppression are:

| | |
|---|---|
| 500 | (approx) salaried staff for incident management roles |
| 300 | (approx) wages staff for front-line fire fighting |
| 111 | fire trucks (medium and heavy tankers) |

| | |
|---|---|
| 11 | front end loaders |
| 7 | bulldozers (DEC-owned) |
| 4 | bulldozers (seasonal contracts) |
| 8 | heavy machinery transporters |
| 200 | Light fire units |
| 1 | mobile communication centre |
| 5 | communications vans/trailers |
| 7 | aerial detection aircraft |
| 8 | water bombing aircraft (seasonal contract) |
| 1 | helicopter (seasonal contract) |
| 2 | general aviation aircraft (seasonal contract) |

The majority of DEC's fire management resources are based in the south-west but these resources are highly mobile and can be deployed to other regions when necessary. The resources based in DEC's more remote regions (such as the Goldfields Region) are relatively modest and it is anticipated that they will be reinforced from the south-west as required and depending on state wide priorities.

The resources based in DEC's Goldfields Region (as at March 2009) include the following:

| | |
|---|---|
| 22 | salaried staff for incident management and front-line fire fighting roles |
| 6 | wages staff for fire fighting roles (including 2 trainees) |
| 1 | fire truck |
| 2 | light fire units |

DEC also has access to a Forward Control Point Van through the Kalgoorlie SES/FESA, and machinery from Local Government Authorities and local contractors.

## PART 3: THE INCIDENT

### 9 Chronology of fire development

The following is the Executive Summary extracted from the GHD Chronology of Fire Development for the Boorabbin Fire

**Goldfields Fire 13**

(Boorabbin Fire)

**Fire Development Chronology**

Prepared by GHD Pty Ltd

June 2008

Prepared for

The Department of Environment and Conservation, Western Australia

Author: Paul de Mar

**Executive Summary**

On 28 December 2007 a fire started in Boorabbin National Park in the Western Australian Goldfields. Fire suppression operations were initiated by the Department of Environment and Conservation WA (DEC) on 28 December 2007 and operations continued until the fire was declared contained on 8 January 2008. In accordance with fire incident naming protocols, DEC gave the fire the official incident name of "Goldfields Fire 13" (the fire also came to be generally referred to in the public domain as the Boorabbin Fire).

Influenced by the remote location of the fire, the vegetation in which it was burning, and the prevailing weather conditions in the days following the fire's ignition, the fire grew to a final size of approximately 39,634 hectares by 8 January 2008. During the fire's growth and major runs the fire posed significant challenges for containment and control, and impacted high value infrastructure including the Great Eastern Highway (GEH), high and low voltage powerlines, and the goldfields water pipeline. Tragically, on Sunday 30 December 2007, two trucks travelling west along the GEH were overrun by the fire and the three occupants died. A Coronial Inquiry will be conducted into the circumstances of the fire.

This report, prepared for DEC by GHD, provides a chronological account of the development of Goldfields Fire 13. The focus of this report is how the fire developed and spread, not on the operational management of the fire. The fire suppression operations are reviewed separately in the *Goldfields Fire13 - Operational Review* (GHD, 2008).

**Fire location and landscape characteristics**

Goldfields Fire 13 occurred adjacent to the Great Eastern Highway in semi-arid sandplain country between Southern Cross and Coolgardie. The sandplains of WA's Goldfields region are highly fire prone. In sandplain country, fire prone heath-scrub vegetation typically occupies the upland areas of the landscape, with the lowest parts of the landscape occupied salt lakes. The lowland areas adjacent to salt lakes, and in the broad shallow valleys that drain to them, are occupied by Eucalypt woodlands. These woodlands typically have a very sparse understorey, often with large inter-connected patches of bare earth, and therefore do not normally carry fires. A more detailed description of sandplain landscape features, vegetation types and their fire characteristics is provided in chapter 3 of this report.

**Figure 23 Drought-affected sandplain/heath vegetation**

**Weather conditions leading up to the fire**

In the weeks and months leading up to the fire, the eastern goldfields area had experienced a severe and prolonged period of drought. In the Boorabbin National Park area where the fire occurred, the six months leading up to the fire were particularly dry and the vegetation was in a severely drought stressed condition, rendering it even more fire prone than usual. The severe rainfall deficits during the winter and spring months leading up to the fire were exacerbated by the effects of long term drought which had affected the eastern goldfields for at least 3 years. A more detailed description of the seasonal climate conditions leading up to the fire is provided in chapter 5 of this report.

**Fire ignition, initial fire spread and response (phase 1)**

The fire started during the early afternoon on 28 December 2007, in a truck bay on the northern side of the GEH, approximately 80 km west of Coolgardie. A fire cause investigation carried out by a DEC fire investigator identified the fire's point of origin in a strip of roadside vegetation and attributed the cause to either deliberate or accidental ignition by a person or persons unknown. Fanned by S/SE winds the fire spread from the truck bay to mature heath-scrub vegetation adjacent to the goldfields water pipeline and began to spread quickly north. During the afternoon and evening of 28DEC07, the fire spread approximately 17.5 kilometres north. The fire's run was sustained until about midnight, pushed by strengthening southerly winds which averaged above 15 km/h through the evening. By midnight the fire had burnt an area of approximately 2,219 hectares and had a perimeter in excess of 40 kilometres long, posing a significant challenge for containment.

The fire was first reported to DEC's Kalgoorlie office at approximately 15:00 and by 16:00 an initial attack crew was dispatched to locate, reconnoitre and report back on the fire. The initial attack crew departed with overnight provisions and equipment anticipating the requirement for extended operations and a need to commence setting up an operations point for suppression operations. When the initial attack crew arrived at the fire at approximately 18:00 the fire exceeded 200 hectares in size, and was spreading strongly to the north with a large convection column which they had seen from Coolgardie (80 kilometres away). There was no constructive initial attack action that could be taken other than monitoring and reporting on the fire's spread and setting up an operations point for extended suppression operations to commence the next day.

The Incident Controller, operating from the Kalgoorlie office, mobilised earthmoving machinery, fire tankers, fire crews and incident management team resources to commence operations the following day. A more detailed account of the fire's ignition and spread on 28DEC07 and the response actions taken is provided in section 6.1 of this report.

**Fire escalation north of the Great Eastern Highway (phase 2)**

During 29DEC07 the fire continued its growth north of the GEH. During the early hours of 29DEC07 fire behaviour had reduced to creeping and smouldering activity, which continued until about 10:00, after which active fire behaviour began to resume again. E/SE winds averaging around 11 km/h during the day reignited hotspots on the western flank of the fire causing the fire to spread in a W/NW direction. Unexpectedly, between 10:00 and 11:00 a significant 'finger' of fire developed at the heel of the previous days run and ran through heath-scrub to the W/NW during the day at a rate of around 1 km/h. This finger ran approximately 9 km during the day, opening up a significant new flank north of the GEH as it progressed. Heath-scrub areas further north were burnt out from the western flank of the fire, and the burnt area grew to approximately 4,169 hectares by nightfall.

In accordance with suppression strategies planned the previous evening, direct flank attack with earthmoving machinery commenced during the morning as resources arrived at the fire. On the eastern flank of the previous days run, approximately 12 km of containment line was constructed from the GEH to the Merbine track. Approximately 8 km of containment line was constructed along the new SW flank created by the run of the fire to the W/NW during the day.

From approximately 18:00, fire behaviour on the SW flank began to decline becoming patchy and spreading sporadically making it increasingly difficult for earthmoving machinery to conduct direct flank attack. By 19:00, fire spread had become so patchy and sporadic that containment efforts were abandoned leaving approximately 2 km to reach a 2000 fire scar, towards which the fire was heading and was expected to stop at.

At approximately 07:00 on 30DEC07 flank attack operations resumed on the SW flank. Earthmoving machinery attempted to track the convoluted fire edge which had burnt the previous evening. By 11:00 the containment line had been completed through to the 2000 fire scar, however the last 2 km of the containment line wound tightly in and around the meandering fire perimeter, and numerous patches of unburnt vegetation remained within the burnt area. During the late morning, fire began to jump the SW flank containment line. Fire crews were able to contain the first hop-over which occurred at about 09:30, but five subsequent hop-overs that occurred from 10:45 onwards were unable to be contained.

Weather conditions on the 30 DEC 07 were forecast to reach extreme, with strong N/NW winds expected. As it turned out, weather conditions observed on 30 DEC 07 at Southern Cross (which are indicative of the conditions at the fire) recorded the third hottest December day (45.2$^{o}$C) at Southern Cross ever recorded since measurements began in 1908, and a sustained period of extreme fire danger (almost 10 hours continuous) that ranked in the top five for longest duration of extreme fire danger index since FDI records for Southern Cross began in 1999 (BoM, 2008). As far as fire weather goes, it was a very bad day.

At the time the hop-overs occurred around 11:00, the fire danger rating had already reached extreme, and the wind was from the north averaging 24 km/h and gusting to 35 km/h. Under these severe fire weather conditions the hop-overs spread rapidly south toward the GEH at a rate of around 4 km/h and ran through the 2000 fire scar and across the highway. For safety, all suppression operations were abandoned and crews withdrawn to pre-planned safety zones, and roadblocks were established on the GEH immediately east and west of the fire impact zone on the highway.

A more detailed account of the fire's development on 29 DEC 07 and during the morning of 30 DEC 07,and suppression activities undertaken, is provided in sections 6.2 and 6.3 of this report.

**Fire escalation south of the Great Eastern Highway (phase 3)**

Having crossed the GEH at about midday, the fire spread rapidly south in mature heath-scrub. Observed rates of spread approached 9 km/h. By 13:30 the fire had reached a large expanse of Eucalypt woodland about 10 km south of the GEH which halted the fire's southerly spread. During the afternoon, transient changes in wind direction from the NW to the W/NW periodically fanned the eastern flank of the fire creating new fire fronts which ran strongly to the SE when the winds returned to the prevailing NW direction. Periodically, tongues of fire formed in the unburnt heath-scrub north of the GEH and these ran south as narrow fingers to the highway.

Large numbers of vehicles built up at the road blocks during the afternoon, with motorists held at hot, windy and dusty parking bays exposed to mid-afternoon sun with the temperature over 40$^{o}$C, and without access to drinking water or food. Public safety and welfare at the roadblocks became a significant issue. During the afternoon, convoys of traffic were periodically escorted through the roadblocks during periods when fire activity on the highway diminished, with fire activity observed and 'windows of opportunity' identified to ground crews from a helicopter positioned over the highway.

By 19:00 the full width of the southern fire perimeter was contained by a large expanse of Eucalypt woodlands and salt lakes. Fire behaviour along the uncontained eastern flank south of the highway had begun to decline significantly as the wind speed dropped becoming light and variable. This lull in wind speed was due to the influence of an approaching trough which was forecast to bring a gusty S/SW change to the fireground between 19:00 and 20:00.

Just before 20:00 the S/SW change arrived at the fire. With the temperature still above 39$^{o}$C and the relative humidity below 10%, fire behaviour along the eastern flank escalated quickly when impacted by the strong SW winds that arrived with the change. With the passage of the trough across the fire ground, the winds continued to back quickly to the south. Fire behaviour along the highway adjacent to the eastern flank had escalated by 20:15, and a wide fire front that had formed 3 to 4 km south of the highway was running strongly north through Tamma scrub – a low dense highly fire prone form of scrub heath– towards the highway, spreading quickly at a rate of around 4 to 6 km/h.

Between 18:50 and 19:15 (during which time the pre-trough lull in wind speed was occurring), DEC's helicopter conducted a fire reconnaissance flight over the southern extent of the fire. The Air Observer reported that the fire had stopped running, observing that fire behaviour on the eastern flank had reduced considerably (mostly smouldering and low flames around half a metre high, with the most active fire behaviour being at the far southern extent of the flank with flame heights at most of 1 to 2

metres). Upon receiving this report, the Incident Controller ordered the re-opening of the Great Eastern Highway to traffic at approximately 19:20, with sentries to be placed on the highway east and west of the burnt area for the purpose of monitoring fire behaviour and re-closing the highway should the need arise. An unescorted convoy that had departed from Yellowdine (west of the fire) passed through the fire area just before 20:00 without incident. A convoy from Bullabulling (east of the fire) escorted by WA Police passed through the fire area just after 20:00, without incident, and with no escalation in fire behaviour apparent adjacent to the highway at that time.

By approximately 20:25, an unescorted convoy, which had departed from Coolgardie, began to arrive at the fire, by which time fire behaviour had escalated significantly adjacent to the highway. Some vehicles in the Coolgardie convoy drove through the fire affected area getting through to the west, however others, not willing to drive through the burning area, pulled over along the highway east of the fire affected area. The eastern fire sentry went to the aid of a truck which had not stopped, and got into difficulty during its passage through the fire. The eastern sentry became stranded on the western side of the fire, as the fire behaviour escalated to the east of his position, preventing his passage back through to the east of the fire. This left the eastern side of the fire without a sentry to re-close the highway, with vehicles in the Coolgardie convoy continuing to arrive at the fire.

Four trucks, which had attempted to proceed through the burning area, did not make it through. Tragically, two of these trucks were impacted by fire during their attempt to drive through the fire (between 20:35 and 20:45) at the time the main fire front was arriving at the highway from the south. The fire front which impacted the two trucks was intense and fast moving. The three occupants of the two trucks died when the truck cabins in which they were sheltering became engulfed in flames. The fire crossed the highway and continued spreading to the north until it ran into a 2006/07 fire scar late in the evening

During the extreme fire weather conditions of 30 DEC 07, the fire expanded from 4,169 hectares to 21,502 hectares. A more detailed account of the fire's development during the afternoon and evening of 30 DEC 07, is provided in sections 6.4 to 6.6 of this report.

**Fire growth and containment after 30 December 2007 (phase 4)**

Having undergone major growth on 30 DEC 07, the entire 21,502 hectares of fire was uncontained. Fire spread to the south from the southern perimeter of the fire was restricted by the large expanse of Eucalypt woodlands and salt lakes however the northern, eastern and western sections of the fire perimeter were not contained by natural features. Detailed accounts of the fire's development and suppression activity undertaken on each day from 31 DEC 07 to 8 JAN 08 are provided at sections 6.7 to 6.15 of this report. The fire development and suppression activity during the period 31 DEC 07 to 08 JAN 08 is summarised below:

- On 31 DEC 07, SE winds averaging more than 15 km/h during the day resulted in significant expansion of the fire, most notably from the western flank south of the GEH and the NW perimeter of the fire north of the GEH. The burnt area expanded to 28,705 hectares, and an additional 80 km of fire perimeter were added to the already substantial uncontained fire perimeter. Suppression activity was negligible during the day in the aftermath of the fatalities the previous evening and the need to re-close the highway.

- On 01 JAN 08, winds were predominantly from the E/SE and relatively light averaging around 12 km/h during the day. Fire growth was modest (654 hectares) during the day, with the greatest area of growth being on the western flank south of the GEH. Containment line construction commenced north and south of the highway on the eastern flank and south of the highway on the western flank.

- On 02 JAN 08, winds were from the NE and relatively light averaging around 10 km/h. Fire growth was relatively small (about 74 hectares), with mostly patchy fire activity on the NW perimeter of the fire. Fire containment on the eastern and western flanks of the fire south of the highway was completed through to the woodlands which naturally contained the southern perimeter of the fire.

- On 03 JAN 08, winds were predominantly from the N/NE, fresh during the morning (averaging 15 km/h) and becoming lighter in the afternoon, averaging less than 10 km/h. Fire growth activity was confined to the uncontained NW perimeter of the fire, with the fire burning about 831 hectares during the day. Suppression activity was focussed on consolidating the containment work achieved over the past two days and commencing containment line construction along the southern perimeter of the fire to link the containment lines on the eastern and western flanks.

◗ On 04 JAN 08, fresh SE winds averaging above 15 km/h fanned the fire throughout the day. The fire made significant runs from the uncontained NW perimeter, expanding by approximately 2,254 hectares during the day. Much of this spread was through heath-scrub burnt approximately 12 years earlier. Containment activity along the southern fire perimeter was completed and work commenced to extend containment lines on the NE and SW flanks north of the highway, along flanks, which had burnt on 28 DEC 07 (NE flank) and 31 DEC 07 (SW flank).

◗ On 05 JAN 08, fresh SE winds (averaging around 14 km/h) again fanned the fire through the day. The fire made another significant run to the NW mostly through long-unburnt mature heath-scrub, and some areas of 12 year old heath-scrub. At the north west extent of the fire's run, it ran into a large expanse of woodland which halted further westerly spread of the fire. The fire expanded by about 3,893 hectares during the day, making it the second largest day of fire growth. Containment activity was focussed on extending containment lines along the SW flank, and on scrub rolling operations under the 220 kV powerlines to reduce the potential fire to reach the GEH should NE winds eventuate in future days.

◗ On 06 JAN 08, winds veered to the east and reduced in strength from the previous two days, averaging less than 10 km/h for much of the day. Fire growth was confined to an area of long unburnt heath-scrub on the western flank of the fire, with the burnt area growing by approximately 1,504 hectares during the day. Containment lines along the NE and SW flanks of the fire were extended significantly during the day.

◗ On 07 JAN 08, the wind was predominantly from the east, averaging around 12 km/h in the morning, and reducing to less than 10 km/h in the afternoon. Fire spread was negligible, restricted to some small pockets of vegetation burning out well inside the containment lines. Containment lines along the SW flank were completed all the way through to the woodlands at the western extent of the fire leaving about 10 km of containment work to be completed on the far northern extent of the fire.

◗ On 08 JAN 08 there was no further fire growth and containment lines around the entire fire perimeter were completed.

**Fire behaviour analysis**

Analysis of the fire behaviour that occurred during Goldfields Fire 13 can lead to improved understanding of sandplain scrub-heath fire behaviour. Chapter 7 of this report provides a detailed, operationally focussed analysis of fire behaviour and identification of potential operational implications. Chapter 8 of this report provides conclusions, chiefly relating to fire behaviour and implications for operational practice. These are summarised below:

◗ Wind speed was a most significant factor contributing to the growth of Goldfields Fire 13. The major fire runs occurred on days when the wind speed was near or above 15 km/hr. These conditions occurred on 5 of the 12 days during the fire but accounted for more than 87% of the area burnt during the fire. On days when the average wind speed was 10 km/hr or less, fire growth appears to have been restricted to areas containing mature heath, rates of spread were low, and burning patterns patchy.

◗ Fire scars were found not to limit fire spread to the extent previously thought by experienced local fire management practitioners. Under extreme conditions, fire spread through a 7 year old fire scar. In conditions when wind speeds were close to or exceeding 15 km/hr, fire spread was sustained through areas burnt 12 years before.

◗ Mature Eucalypt woodlands serve as a barrier to fire spread in sandplain landscapes, where their dimensions are sufficiently large. Fire penetrated through isolated woodland patches, and through narrow sections of woodland and areas where woodland and heath components occurred together.

**Figure 24 Salmon Gum woodland vegetation**

◗ Time of day is not a reliable indicator of fire behaviour in the vegetation of the Goldfields region (or anywhere else). The potential behaviour of fires in heath-scrub fuels in the Goldfields is determined by their fuel moisture content, the wind speed, and the structure of the vegetation (particularly the arrangement of near-surface fuels). Slope is not usually a significant factor in the landscapes of the Goldfields.

◗ Head fires continued to run well into the night, to at least as late as midnight, when fuel moisture conditions and wind speeds provided conditions conducive to fire spread.

◗ The flanks of heath-scrub fire runs remained active whilst fuel moisture conditions supported active combustion (FMC of 8% or less used in the Mallee-heath model is likely to be relevant for the Goldfields). Flank fires commenced spreading as head fires as transient shifts in wind direction affected the fire. This was particularly evident along the eastern flank during the southerly run of the fire during the afternoon of 30 December 2007.

◗ Flank fire activity extending through the night (smouldering) occurred where coarse fuels were present (>25mm diameter), and in some locations where large dead branches and logs were available, fire activity extended to several days.

◗ At approximately 20:00 on 30 December 2007, the NE flank of the fire, which had only an hour earlier been observed to have low, declining fire behaviour during near-still wind conditions, was impacted by a S/SW wind change with significantly increased wind speeds, and became active along its length, developing quickly into a fast moving fire front.

◗ Table 3 of DEC's fire behaviour guidelines for Mallee-heath in southern Western Australia appears to provide reasonable fire behaviour predictions for mature heath-scrub in the Goldfields. It appears likely the Mallee-heath model will over-predict rates of spread for younger age classes of heath-scrub, and under-predict rate of spread through Tamma Scrub (and potentially other heath scrub assemblages) which has different vegetation structure characteristics than Mallee-heath. Adaptation of the Mallee-heath model for use in Goldfields scrub-heath vegetation is worthy of consideration.

◗ Fire containment activity was most successful in limiting fire growth where machines could be used to closely track the edge of wind driven sections of fireline. Along the western end of the SW flank of the 29 DEC 07 fire run, where the fire was not wind driven and left a convoluted fire edge with a mosaic of burnt and unburnt patches inside the containment line, a standard single pass control line was not effective, particularly as it was subject to severe northerly fire winds.


**Figure 25 Bulldozer, supported by a fire tanker, rolling vegetation beneath a powerline**

## 10 Operational review

The following is the Executive Summary extracted from the GHD Operational Review, July 2008.

**Goldfields Fire 13**

(Boorabbin Fire)

**Operational Review**

Prepared by GHD Pty Ltd

July 2008

Prepared for

The Department of Environment and Conservation, Western Australia

Author: Paul de Mar

**Executive Summary**

On 28 December 2007 a fire started in Boorabbin National Park in the Western Australian Goldfields. Fire suppression operations were initiated by the Department of Environment and Conservation WA (DEC) on 28 December 2007 and operations continued until the fire was declared contained on 8 January 2008. In accordance with fire incident naming protocols, DEC gave the fire the official incident name of “Goldfields Fire 13” (the fire also came to be generally referred to in the public domain as the Boorabbin Fire).

Influenced by the remote location of the fire, the vegetation in which it was burning, and the prevailing weather conditions in the days following the fire’s ignition, the fire grew to a final size of approximately

39,634 hectares by 8 January 2008. During the fire's growth and major runs the fire posed significant challenges for containment and control, and impacted high value infrastructure including the Great Eastern Highway (GEH), high and low voltage powerlines, and the goldfields water pipeline. Tragically, on Sunday 30 December 2007, two trucks travelling west along the GEH were overrun by the fire and the three occupants died. A Coronial Inquiry will be conducted into the circumstances of the deaths.

This review titled *Goldfields Fire 13 - Operational Review* (GHD, 2008), prepared for DEC by GHD, reviews DEC's management of the fire. The review has been completed with the objective of providing:

- An accurate and discriminating account of the operational management of the fire to identify the causes and contributing influences that resulted in the significant fire outcomes, and

- The report will identify 'Identified Learning Points' arising from the operational management of the fire, that link to a set of recommendations.

In meeting the above review objectives, the review covers the *Prevention, Preparedness, Response and Recovery* phases of fire management, and is in the context of Australian Inter-service Incident Management System (AIIMS) used as the operating system for fire management in Western Australia.

**Fire location and landscape characteristics**

Goldfields Fire 13 occurred adjacent to the Great Eastern Highway in semi-arid sandplain country between Southern Cross and Coolgardie. The sandplains of WA's Goldfields region are highly fire prone, and support fast moving wind driven fires. In sandplain country, fire prone heath-scrub vegetation typically occupies the upland areas of the landscape, with the lowest parts of the landscape occupied by salt lakes. The lowland areas adjacent to salt lakes, and the broad shallow valleys that drain to them, are occupied by Eucalypt woodlands. These woodlands typically have a very sparse understorey, often with large inter-connected patches of bare earth, and therefore do not normally carry fires.

Typically, fires in these sandplain landscapes burn through areas of heath-scrub, moving quickly when the wind speed is sufficient to drive the fire forward, and then stop when they run into a large expanse of Eucalypt woodland, salt lakes or recent fire scars where there is insufficient fuel to continue carrying the fire. When wind speeds are light and variable, fires in heath-scrub spread sporadically, and relatively slowly, often leaving a patchy mosaic of burnt and unburnt vegetation. Fires can burn for many days or weeks, spreading through the areas of sandplain heath-scrub, with their expansion promoted by the natural variability in wind direction and speed. On hot, dry, windy days, fires can cover large areas, creating very large fire perimeters, which pose significant problems for containment. Fire containment in the Goldfields region is undertaken when fires are burning in proximity to fire vulnerable assets and transport routes.

**Weather conditions leading up to the fire**

In the weeks and months leading up to the fire, the eastern goldfields area had experienced a severe and prolonged period of drought. In the Boorabbin National Park area where the fire occurred, the six months leading up to the fire were particularly dry and the vegetation was in a severely drought stressed condition, rendering it even more fire prone than usual. The severe rainfall deficits during the winter and spring months leading up to the fire were exacerbated by the effects of long term drought which had affected the eastern goldfields for at least 3 years.

**DEC's fire management responsibilities and operating context**

DEC as the major public land manager in WA, has extensive bushfire responsibilities requiring a robust and effective fire management capacity. At State, regional and local level DEC plays a very significant role in the management of bushfire in WA. With land management responsibility also comes statutory obligations to protect people and property from bushfire damage, and manage appropriate fire regimes across WA's extensive area of public lands. In practice, managing bushfires and applying appropriate fire regimes necessitates having the operational capacity to plan and safely conduct prescribed burning operations and to contain and extinguish unwanted fires and those that

may threaten community and environmental assets. DEC has bushfire prevention, mitigation, preparedness response (suppression) and recovery responsibility across the estate it manages.

The career and volunteer fire brigades managed by local Governments and WA's Fire and Emergency Services Authority (FESA) provide the capacity for fire management across private lands and play a vital role in protecting communities from fire. Local Government, FESA and DEC support each other in cooperative fire management, and this is no more evident than at the urban-bushland interface where fires frequently move between public and private land tenures. The roles of DEC, local Government and FESA are complementary (not duplicated).

DEC plans and conducts the largest prescribed burning program of any land and fire management agency in Australia, and probably the world. DEC is recognised among Australian fire and land management agencies as running the most pro-active prescribed burning program in the country, and is recognised by its peers as a leader in the field of fire management. The same resources that implement DEC's extensive prescribed burning program outside the bushfire danger period, are mobilised and respond to the many bushfires that start on or move onto public lands each year.

With a larger volume of fire management operations (prescribed burning and fire suppression) to conduct than any other land and fire manager in Australia, DEC's fire crews and incident management teams are among the most experienced and competent in the country.

DEC's national and State level operating context and fire management capacity are outlined at sections 3.1 and 3.2 of this report.

Goldfield Fire 13 occurred within DEC's Goldfields region, the largest in WA covering 84,285,534 hectares (34% of WA). For perspective, the DEC Goldfields region covers an area larger than the State of NSW. Within the Goldfields region there are 8,589,047 hectares of conservation reserves and areas managed for conservation. There are just 30 full-time DEC staff in Goldfields region to undertake the full range of DEC land and conservation management responsibilities across the estate, and off-estate regulatory functions. At the time of the fire, 14 were trained and available for firefighting operations (all but one have other primary responsibilities). These resourcing levels mean that it is routine for Goldfields region to supplement locally available resources with resources mobilised from other DEC regions when a fire requiring extended attack occurs.

At local level, the fire management operating environment in Boorabbin National Park, where the fire occurred, is demanding. Summer daytime conditions are typically hot and dry. On days when NE to NW wind flows influence the weather pattern, temperatures are typically over 40$_{o}$C and extremely dry with relative humidity below 10%. Sustained physical activity in the heat and sun in such conditions is physically and mentally challenging. The remoteness, lack of facilities, constant and persistent flies adds to the challenging operating conditions. These were the conditions firefighters and other personnel at the fire were operating in on 30 DEC 07.

**Operational review: Fire prevention program planning and implementation**

DEC in partnership with local Governments and FESA had prepared a Wildfire Threat Analysis and Fire Prevention Plan (WTA&FPP) for Crown Lands between Southern Cross and Coolgardie. This plan was acclaimed by incident management personnel to be a most valuable resource for identifying and prioritising assets requiring protection from fire, the fire risk assessments it contained were very useful for decision support in determining appropriate fire response, and raising awareness among asset owners/managers of the threats bushfires pose to their assets. A number of out-of-area firefighters felt that it would be highly beneficial to conduct the Wildfire Threat Analysis process in their own area. This WTA&FPP won an Australian Safer Communities Award in 2005.

Pursuant to implementing the WTA&FPP, DEC's Goldfields region sought and obtained significant funding enhancements in 2006, and at the time Goldfields Fire 13 occurred, implementation of the WTA&FPP strategies and actions was ahead of schedule.

The WTA&FPP for Crown Lands between Coolgardie and Southern Cross is now the best practice benchmark for fire prevention and preparedness planning in WA, and many other higher fire risk areas than the Goldfields do not have any comparable inter-agency multi-tenure plan. This is a shortcoming and potentially a significant risk exposure for DEC, local Governments, FESA and the WA Government in the event of adverse consequences fires occurring in such areas. This issue is

addressed in more detail at section 4 of this report. Recommendations 2 to 6 address this issue and other fire prevention improvements that can be made in WA.

**Operational review: Fire Preparedness**

DEC's Goldfields region had in place a Fire Preparedness and Response Plan (FPRP) which was acclaimed as a useful document and was used by incident management team personnel, particularly the logistics unit. There are some minor enhancements that can be made to the plan, to pick up learning points from Goldfields Fire 13, which are subject of recommendation 7.

The major preparedness issue affecting Goldfields Fire 13 was its occurrence during the traditional Christmas - New Year holiday period when a high proportion of businesses and providers of services in Kalgoorlie were closed down. This made obtaining goods and services for Goldfields Fire 13, and gaining assistance from other public sector departments and their contractors difficult. Recommendation8 is made to improve preparedness during the traditional Christmas – New Year holiday period.

**Operational review: Response – Reporting of the Fire and Initial Attack (Phase 1)**

The fire started during the early afternoon on 28 December 2007, in a truck bay on the northern side of the GEH, approximately 80 km west of Coolgardie. A fire cause investigation carried out by a DEC fire investigator identified the fire's point of origin in a strip of roadside vegetation and attributed the cause to either deliberate or accidental ignition by a person or persons unknown. Fanned by S/SE winds the fire spread from the truck bay to mature heath-scrub vegetation adjacent to the goldfields water pipeline and began to spread quickly north. During the afternoon and evening of 28 DEC 07, the fire spread approximately 17.5 kilometres north. By midnight the fire had burnt an area of approximately 2,219 hectares and had a perimeter in excess of 40 kilometres long, posing a significant challenge for containment.

The fire was first reported to DEC's Kalgoorlie office at approximately 15:00. By 16:00 an initial attack crew was dispatched to locate, reconnoitre and report back on the fire. The initial attack crew departed with overnight provisions and equipment anticipating the requirement for extended operations and a need to commence setting up an Operations Point for suppression operations. By the time the initial attack crew arrived at the fire, it had already spread more than 8 km north of the Great Eastern Highway and continuing to run N/NW. There was no constructive initial attack action that could be taken other than monitoring and reporting on the fire's spread and setting up an operations point for extended suppression operations to commence the next day. The IA crew had taken a computer, communication equipment, maps, fire planning and contact information, resource boards and other equipment necessary for extended operations with them, and established a functional Operations Point and staging area during the first shift.

DEC's initial attack response to the fire was well executed with a prompt and thorough initial response which anticipated the need for extended operations. Some learning points and improvements have been identified which could further improve fire reporting and preparedness for initial attack (see recommendations 9 to13). The setting up of an Operations Point was well executed, and facilitated prompt and productive commencement of operations during the second shift. Some system improvements can be made, to further improve outcomes for establishing Operations Points (see recommendations 16 and 17).

DEC assessed early that the fire would require extended attack operations and promptly mobilised out-of-area (from the wheat belt and coastal districts) IMT, fire crews and equipment, and aerial fire reconnaissance resources. These were tasked, prepared and underway within 2 to 3 hours of the fire being reported and the helicopter was dispatched at first light. This was a strong, prompt and very well executed mobilisation of firefighting resources noting the timing within the traditional Christmas/New Year holiday break. Some procedural matters relating to fire classification and declaration can be improved and are the subject of recommendations 14 and 15.

**Figure 26 Operations Point at its initial location at Koorarawalyee Retreat**

**Operational review: Response – Fire escalation north of the Great Eastern Highway (Phase 2)**

During 29 DEC 07 the fire continued its growth north of the GEH. E/SE winds averaging around 11 km/h during the day reignited hotspots on the western flank of the fire causing the fire to spread in a W/NW direction. Unexpectedly, between 10:00 and 11:00 (Western Daylight-Saving Time (WDT)) a significant 'finger' of fire developed at the heel of the previous days run and ran through heath-scrub to the W/NW during the day at a rate of around 1 km/h. This finger ran approximately 9 km during the day, opening up a significant new flank north of the GEH as it progressed.

In accordance with suppression strategies planned the previous evening, direct flank attack with earthmoving machinery commenced during the morning as resources arrived at the fire. On the eastern flank of the previous days run, approximately 12 km of containment line was constructed from the GEH to the Merbine track. Approximately 8 km of containment line was constructed along the new SW flank created by the run of the fire to the W/NW during the day.

From approximately 18:00, fire behaviour on the SW flank began to decline becoming patchy and spreading sporadically making it increasingly difficult for earthmoving machinery to conduct direct flank attack. By 19:00, fire spread had become so patchy and sporadic that containment efforts were abandoned leaving approximately 2 km to reach a 2000 fire scar, towards which the fire was heading and was expected to stop at.

At approximately 07:00 on 30 DEC 07 flank attack operations resumed on the SW flank. Earthmoving machinery attempted to track the convoluted fire edge which had burnt the previous evening. By 11:00 the containment line had been completed through to the 2000 fire scar, however the last 2 km of the containment line wound tightly in and around the meandering fire perimeter, and numerous patches of unburnt vegetation remained within the burnt area. During the late morning, fire began to jump the SW flank containment line. Fire crews were able to contain the first hop-over which occurred at about 09:30, but five subsequent hop-overs that occurred from 10:45 onwards were unable to be contained.

Weather conditions on the 30 DEC 07 were forecast to reach extreme, with strong N/NW winds expected. As it turned out, weather conditions observed on 30 DEC 07 at Southern Cross (which are indicative of the conditions at the fire) recorded the third hottest December day (45.2$^{o}$C) at Southern Cross ever recorded since measurements began in 1908, and a sustained period of extreme fire danger (almost 10 hours continuous) that ranked in the top five for longest duration of extreme fire danger index since FDI records for Southern Cross began in 1999 (BoM, 2008). As far as fire weather goes, it was a very bad day – a worst case scenario.

At the time the hop-overs occurred around 11:00, the fire danger rating had already reached extreme, and the wind was from the north averaging 24 km/h and gusting to 35 km/h. Under these severe fire weather conditions the hop-overs spread rapidly south toward the GEH at a rate of around 4 km/h and ran through the 2000 fire scar and across the highway. For safety, all suppression operations were abandoned and crews withdrawn to pre-planned safety zones, and roadblocks were established on the GEH immediately east and west of the fire impact zone on the highway.

Fire suppression operations functions at Goldfields Fire 13 in general were very well executed, despite the very challenging physical conditions and the communications difficulties that arose from the remote location of the fire. A feature of the operational management at Goldfields Fire 13 was the efficiency with which operations were executed, and their productivity, and above all the proactive and well executed attention to firefighter safety throughout the incident. A range of learning points have been identified to further improve the implementation of operations functions at fires which are the subject of recommendations 28 to 33.

**Operational review: Response – Fire escalation south of the Great Eastern Highway (phase 3)**

Having crossed the GEH at about midday, the fire spread rapidly south in mature heath-scrub. Observed rates of spread approached 9 km/h. By 13:30 the fire had reached a large expanse of Eucalypt woodland about 10 km south of the GEH which halted the fire's southerly spread. During the afternoon, transient changes in wind direction from the NW to the W/NW periodically fanned the eastern flank of the fire creating new fire fronts which ran strongly to the SE when the winds returned to the prevailing NW direction. Periodically, tongues of fire formed in the unburnt heath-scrub north of the GEH and these ran south as narrow fingers to the highway.

Large numbers of vehicles built up at the road blocks during the afternoon, with motorists held at hot, windy and dusty parking bays exposed to mid-afternoon sun with the temperature over 40$^{o}$C in the shade, and without access to drinking water or food. Public safety and welfare at the roadblocks became a significant issue. Consideration of traffic management issues, and operational tactics devised to manage and control traffic, involved extensive consultation between DEC, WA Police and FESA staff present at the fire. During the afternoon, DEC, WA Police and FESA units working cooperatively, periodically escorted convoys of traffic through the roadblocks during periods when fire activity on the highway diminished, with fire activity observed and 'windows of opportunity' identified to ground crews from a helicopter positioned over the highway.

By 19:00 the full width of the southern fire perimeter was contained by a large expanse of Eucalypt woodlands and salt lakes. Fire behaviour along the uncontained eastern flank south of the highway had began to decline significantly as the wind speed dropped becoming light and variable. This lull in wind speed was due to the influence of an approaching trough which was forecast to bring a gusty S/SW change to the fireground between 19:00 and 20:00.

Between 18:50 and 19:15 (during which time the pre-trough lull in wind speed was occurring), DEC's helicopter conducted a fire reconnaissance flight over the southern extent of the fire. The Air Observer reported that fire behaviour on the eastern flank had reduced considerably (mostly smouldering and low flames around half a metre high, with the most active fire behaviour being at the far southern extent of the flank with flame heights at most of 1 to 2 metres). Upon receiving this report, the Incident Controller made his final assessments considering the issue of re-opening the highway. Applying his local knowledge and experience of fire behaviour in the Goldfields, and aerial observations of fire behaviour between 18:50 and 19:15 along the highway and the eastern flank of the fire (as reported by the Air Observer), the Incident Controller assessed that:

- Current fire behaviour observed on the highway and eastern flank at the time he was considering opening the highway, posed no immediate risk to the highway,

- Fire behaviour along the eastern flank for a distance of about 8km from the highway was benign, and he considered was declining to a 'dead edge' which he assessed was very unlikely to become active again during the night,
- The most active section of the fire was 8 to 10 km south of the highway, contained to the north east by woodlands and sufficiently far away from the highway that it did not pose a risk.
- The S/SW wind change was not due until approximately 21:00 (IC's assumption) and therefore the currently benign fire behaviour situation would decline even further by the time the change arrived, with significant fire behaviour escalation not expected to result from the wind change.

On this basis, the Incident Controller reached the conclusion that it was safe to re-open the highway with contingency arrangements put in place to monitor safe passage of traffic convoys through the burnt section of highway and effect a re-closure of the road if fire behaviour escalated requiring such action. The Incident Controller considered that the likelihood of fire behaviour escalating to a level that required a re-closure of the road that night to be low, and did not expect to have to re-close the highway.

Significantly, the assumption that the wind change was not due until 21:00 was incorrect. The incorrect assumption arose from the Incident Controller having read the tabulated "*Forecast Conditions*" section of the spot weather forecast but not the accompanying "*Significant Wind Change*" section text which specifically indicated the S/SW change would arrive between 19:00 and 20:00, bringing strong and gusty wind conditions, and may be preceded by a lull in wind speeds during the hour before the change. The Operations Officer, with whom the Incident Controller consulted regarding arrangements for opening the highway, had not received or seen the spot forecast and was not aware of the timing of the change.

A critically important factor in the events which took place at Goldfields Fire 13, and which underpinned decision making regarding re-opening of the Great Eastern Highway during the evening of 30 DEC 07, was the local knowledge and understanding of fire behaviour in sandplain heath-scrub vegetation.

At the time Goldfields Fire 13 occurred, there was no scientific or physical attributes based fire behaviour prediction model available for sandplain heath-scrub. In the absence of locally developed fire behaviour prediction models, fire appreciation and decision making during fire suppression operations (historically and during Goldfields Fire 13) had been made on the basis of historical operational knowledge. This knowledge, not being well documented, is passed on orally through the firefighting workforce, and is often expressed as generalisations. While fire behaviour generalisations may be valid for a certain range of conditions, there are also a range of conditions for which they are not valid. The most commonly expressed generalisations of Goldfields fire behaviour knowledge include:

- *Except in extreme conditions, fires do not spread through Eucalypt woodlands,*

- *Fires in heath-scrub are benign overnight; active fire behaviour can expected to resume between 10:00 and 11:00AM,*

- *Heath-scrub fires are wind driven and can be expected to make high intensity runs during the day if there is sufficient wind, spreading in mature heath at rates up to or exceeding 5 km/h in extreme conditions*

- *As sunset approaches, fire behaviour begins to decline and by nightfall, fire behaviour becomes benign such that it is difficult to visibly detect the active fire edge and therefore fireline construction at night is impracticable.*

- *Fire will not propagate through fire scars up to 8 years old; it can be expected that running fires will stop when they reach fire scars less than 8 years old.*

During interviews held with both local DEC Goldfields staff and staff from other DEC regions, these generalisations were consistently provided in answer to questions about how fires behave in the Goldfields region.

Of particular interest is the assessment of fire behaviour potential around the time of the S/SW wind change, which occurred just before 20:00 on 30 December 2007. From interviews held, it appears

that staff making assessments of the fire situation may have subconsciously been looking for fire behaviour cues that fitted the local 'generalised model' (often referred to as rules of thumb) that fire behaviour begins to decline in the hour before sunset, becoming benign as darkness falls and thereafter. Fire observations were made (from the air) along the north east flank between 18:50 and 19:15. Mild and declining fire behaviour was reported, in near-still wind, not running, with half a metre flame height, and 1 to 2 metre flame heights at far southern extent of fire (8 to 10 km south of GEH). These observations may have served to reinforce any perception that observed fire behaviour was following the local 'generalised model'.

Under normal diurnal weather patterns occurring in average or close to average weather conditions, the approach of darkness is frequently associated with increasing humidity, decreasing temperature, and very often a decrease in wind speed in the absence of any topographic effects. With a relatively small change to any of these parameters, but particularly declining wind speed, a significant decline in fire behaviour often occurs which is readily apparent to on site observers. Even though very low fuel moisture content may continue to prevail, this by itself, in the absence of a threshold wind speed, may not be sufficient to sustain free burning and spread in patchy discontinuous fuel types such as sandplain heath-scrub.

In the case of 30 DEC 07, weather conditions were not average or close to average. The actual conditions leading up to the S/SW wind change were (using 20:00 data):

- Temperature: 39ºC (and had been above 40ºC since midday)
- Relative Humidity (RH): Less than 10% (and had been below 10% since midday)
- These temperature and RH conditions generate very low Fuel Moisture Content (FMC)conditions of around 3%

These conditions are significantly dryer and hotter than the average conditions (on which rules of thumb are frequently based) for this time of evening, at this time of year.

The reduction in wind speed observed at the fireground and reported by the Air Observer at 19:15 was not associated with the normal diurnal weather cycle, it was associated with the movement of the forecast trough which would later bring about a rapid and significant change in wind direction and speed. This lull in wind speed was that forecast by the BoM in their 17:09 spot weather forecast for the fire.

However, because of the pre-trough lull's timing in the early evening, when such reductions in wind speed often occur under normal conditions and diurnal weather cycles, and in the absence of having read the significant wind change notes in the spot forecast, it is likely that many firefighters and IMT members would have associated the reduction in wind speed as signalling reduced wind speeds for the remainder of the evening, as frequently occurs in the Goldfields (and as occurred the previous evening). As they now know, this reduction in wind speed was only transient, and was to precede a period of the strongest wind speeds for the day, and from a direction that would change the long, uncontained NE flank into a head fire.

The forecast 30 km/h S/SW winds, with gusts to 50 km/h, arrived just before 20:00 and fanned active fires burning quietly in fuels on the NE flank. This resulted in an immediate return of the fire danger index to the extreme range. Using the forecast post-trough wind speeds with the DEC Mallee-heath fire behaviour model, a rate of spread approaching 5 km/h with flame lengths greater than 14 metres are predicted which turns out to be very close to the actual post-wind change fire behaviour which occurred. This fire behaviour at this time of day certainly surprised many of the people who had prior experience with Goldfields fires, whose understanding of heath-scrub fire behaviour was from the 'rules of thumb' reference points that had been passed down to them, and may have been reinforced by their personal experience at fires they had attended in less severe weather conditions. None of the personnel GHD interviewed who were at the fire or in the IMT had ever seen or experienced sandplain heath-scrub fires burning near the upper limits of fire behaviour possible in that vegetation type, at that time of day. Unfortunately, these personnel can probably now state that the fire behaviour of this fire exceeded their prior experience with fires in these vegetation types.

**Figure 27 Intense fire behaviour in sandplain/heath vegetation**

It is equally clear that the weather experienced on 30 December 2007 fell into the very upper levels of severity, and this particular day ranks as one of the more severe fire days recorded for the locality – 3rd hottest December temperature, 5th longest duration of extreme fire weather period (ca. 10 hours).

The foregoing analysis underlines the importance of using fire behaviour models based on physical fuel and weather attributes for predicting fire behaviour potential. Generalised time-based approaches are usually only valid when fuel and weather conditions are close to average, but become increasingly deficient as conditions depart further from average conditions.

Informed by his local 'generalised model' or 'rules of thumb' based understanding of fire behaviour in the Goldfields, the Incident Controller approved the re-opening of the Great Eastern Highway to traffic at approximately 19:20, with sentries to be placed on the highway east and west of the burnt area for the purpose of monitoring traffic passage and fire behaviour, and re-closing the highway should the need arise.

Just before 20:00, when the S/SW change arrived at the fire, fire behaviour along the eastern flank escalated quickly. With the passage of the trough across the fire ground, the winds continued to back quickly to the south. Fire behaviour along the highway adjacent to the eastern flank had escalated by 20:15, and a wide fire front that had formed 3 to 4 km south of the highway was running strongly north through Tamma scrub – a low dense highly fire prone form of heath-scrub – towards the highway, spreading quickly at a rate of around 4 to 6 km/h.

The traffic convoys that had been released from Yellowdine and Bullabulling at approximately 19:20 when the GEH was re-opened, were approaching the burnt area at the time the S/SW wind change was arriving at the fire. The Coolgardie convoy was approximately 20 minutes behind the Bullabulling convoy. The unescorted convoy that had departed from Yellowdine (west of the fire) passed through the fire area just before 20:00 without incident. The convoy from Bullabulling (east of the fire) escorted by WA Police passed through the fire area just after 20:00, without incident, and with no escalation in fire behaviour apparent adjacent to the highway at that time.

By approximately 20:25, the unescorted convoy, which had departed from Coolgardie, began to arrive at the fire, by which time fire behaviour had escalated significantly adjacent to the highway. Some vehicles in the Coolgardie convoy drove through the fire affected area getting through to the west,

however others, not willing to drive through the burning area, pulled over along the highway east of the fire affected area. The eastern fire sentry went to the aid of a truck which had continued into the fire, and got into difficulty during its passage through the fire. The eastern sentry became stranded on the western side of the fire, as the fire behaviour escalated to the east of his position, preventing his passage back through to the east of the fire. This left the eastern side of the fire without a sentry to re-close the highway, with vehicles in the Coolgardie convoy continuing to arrive at the fire.

Four trucks, which had attempted to proceed through the burning area, did not make it through. Tragically, two of these trucks were impacted by fire during their attempt to drive through the fire (between 20:35 and 20:45) at the time the main fire front was arriving at the highway from the south. The fire front which impacted the two trucks was intense and fast moving. The three occupants of the two trucks died when the truck cabins in which they were sheltering became engulfed in flames. It appears that the two trucks in which the fatalities occurred had seen that it was untenable to continue their passage west through the fire, and it is likely they were in the process of turn-around manoeuvres when the main fire front arrived at their position on the highway. The fire crossed the highway and continued spreading to the north until it ran into a 2006/07 fire scar late in the evening.

During Phase 3 of the fire, no constructive fire suppression operations were able to be undertaken due to the major fire runs in extreme conditions. The major operational activity undertaken was road closure, opening and traffic management. Road closure, opening and traffic management became the key issue of Goldfields Fire 13. It is an area already identified by WA authorities as requiring significant attention to improve planning and procedures for future incident management operations. The identified learning points relating to traffic management are among the most important learning points arising from Goldfields Fire 13. Detailed discussion of traffic management issues and the decision to re-open the Great Eastern Highway is provided at sections 7.3.2 and 7.3.3 of this report. Recommendations 35 to 40 are made in support of improvements to road closure/opening and traffic management.

**Operational review: Response – Operations after 30 December 2007 (Phase 4)**

Having undergone major growth on 30 DEC 07, the entire 21,502 hectares of fire was uncontained. Fire spread to the south from the southern perimeter of the fire was restricted by the large expanse of Eucalypt woodlands and salt lakes however the northern, eastern and western sections of the fire perimeter were not contained by natural features. Daily outlines of suppression activity undertaken on each day from 31 DEC 07 to 8 JAN 08 are provided at section 6.6 of this report.

Operations were in general well executed throughout phase 4 of the fire. Areas for improvement arising from the After Action Review process are discussed at section 7.4 of this report.

**Operational Review: Incident Control and Coordination**

The Incident Control System being applied at the fire was consistent with the national AIIMS model. It was clear within the command structure that the Incident Controller was in charge of incident management operations. Functional delegations (Control, Planning, Operations and Logistics) within the IMT followed a conventional AIIMS ICS structure. Fundamental incident management processes such as preparation of an Incident Action Plan for the approval of the Incident Controller were undertaken in accordance with routine DEC practice.

The firefighting component of Incident Management at Goldfields Fire 13 was well handled with a robust and aggressive “safety first” approach. Firefighter safety management was a strength throughout the operation. Initial liaison and coordination functions were conducted in a timely and pre-emptive manner with the appropriate range of stakeholder agencies. Although this initial liaison was appropriate, subsequent liaison and coordination actions needed to be more persuasive and forceful (and OAMG activation triggered) when it became apparent that some authorities were reluctant or unable to commit appropriate resources to the incident.

Whilst control of the firefighting component was generally proactive and well executed, incident management attention to potential ‘consequences management’ was more reactive, and without adequate planning for the ‘worst case scenario’. With the remote location, local resource shortages, and fast developing nature of the incident that changed from a fire control incident to a consequences management incident (traffic management and asset protection), this rapidly overwhelmed the Incident Control resources. Some of the higher priority incident management learning points arise from these matters of inter-agency liaison, and the importance of consequence management and

worst case scenario planning. Recommendations 18 and 19 are made with respect to these incident control and coordination matters.

**Figure 28 Operations Point at its final location at Yellowdine**

# PART 4: ANALYSIS OF THE INCIDENT

## 11 Post Incident Analysis (PIA)

The following is the summary and conclusions of DEC's PIA report

### 4.1 PIA Process

The Department of Environment and Conservation's Fire Operational Guideline (FOG 31) sets out a procedure for conducting After Action Reviews (AAR) and Post Incident Analyses (PIA) of significant incidents. The Boorabbin PIA follows the Guideline and is tailored to the special circumstances of the incident. As an analytical process it is the link between the facts gathered from the actual events and the conclusions drawn about the outcomes from the incident.

The PIA was also guided by an instruction from the Director General of the Department of Environment and Conservation (DEC) to thoroughly investigate the Boorabbin fire incident to discover what happened, why it happened and to implement appropriate measures to guard against a recurrence of anything that DEC can control that might have influenced the tragic outcome.

The PIA was but a part of a comprehensive review of the incident conducted at a number of levels that included a thorough investigation by a qualified independent expert contracted from GHD Pty Ltd. The reviews sponsored by DEC were limited to those information sources accessible to the Department, comprising mostly DEC staff and documents. The Police Arson Squad acting on behalf of the State Coroner investigated other sources of information outside of DEC's authority. The PIA therefore presents DEC's account of the incident and makes recommendations for changes and improvements to the Department's Incident Management System (IMS). Collaboration with other agencies on common systems is also occurring.

The AAR/ PIA commenced immediately after the tragedy on 30 December 2007 and was continuous for the following year, 2008. A group of DEC staff titled the Incident Response Team (IRT) was dedicated to the comprehensive review process and evolved into the Coordination Group (CG) as the investigation phase became an action implementation process.

The early fact finding work employed group debrief sessions, individual interviews and a detailed study of documents. Witness Statements by DEC staff for the Arson Squad were also very informative.

The IRT's analysis referred to DEC's Standard Operating Procedures (SOP) documented as Fire Protection Instructions and Fire Operational Guidelines that are applied in the context of the Australian Inter-service Incident Management System (AIIMS) and customized into DEC's IMS (previously called Incident Control System (ICS)). Many other components of DEC's extensive operational fire procedures and practices were also considered in the analysis and the term SOP is intended to include them. The formal SOPs were used by the IRT as a benchmark to objectively assess the management of the Boorabbin incident.

The IRT also assessed the more subjective aspects of the incident that relate to the experience and judgment exercised by the Incident Management Team and crew leaders that cannot be easily quantified and compared with a SOP. The 'unwritten' components of fire leadership and management required the IRT to come to a professional judgment about the actions and decisions the IMT made. The IRT's views on subjective issues are submitted with the qualification that they come with the advantage of 'hindsight'.

The IRT identified many issues of which thirty three were considered especially significant. These were analysed in depth and produced recommendations for improvements to DEC's FOGs, IMS and supporting fire programs and training. Some require an interagency effort to achieve common guidelines and procedures. The IRT and CG also noted that the IMT and fire crews were mostly compliant with SOPs and did many things very well, reflecting their extensive experience and training as firefighters. The positive things have been noted and serve to reaffirm existing best practice, but it is the nature of investigations to particularly focus on things that need attention so lessons can be learned and improvements made. The PIA adopts this emphasis. DEC has also responded to the very thorough GHD reviews and accepts their findings. The GHD Reports and DEC's PIA were independently derived, but are in accord on all matters of fact and the major conclusions and recommendations.

The essential conclusion of the PIA is that the tragic outcome of the Boorabbin fire resulted from the unfortunate conjunction of a number of specific circumstances, some unique to the context of the Boorabbin incident and others more generic within DEC's IMS. Some relate to interagency IMS functions.

Three dominating causes of the incident outcomes have been highlighted in this summary. They are; the expectation of fire behaviour in shrubland fuels at night, the procedures for managing road blocks, and thirdly, the strategic assessment of the fire's potential.

These three causes are summarised below:

**4.2 Night Time Fire Expectations**

The most critical contributing factor was the unfamiliarity of the IMT with the extremes of fire behaviour that are possible in the conditions prevailing on the night of 30 December 2007 at Boorabbin. The extensive fire experience of the members of the IMT did not include fighting fires at night in those fuels and weather conditions, exacerbated by drought. Consequently, the expectation of all members of the IMT was that the 'normal' pattern of Goldfields fires dying down at night due to rising relative humidities, declining temperatures and lower wind speeds would prevail. This 'standard expectation' was reinforced by what was presumed to be 'normal' behaviour of the Boorabbin fire during the nights of Friday 28 December and Saturday 29 December. The same was expected on Sunday evening (30 December 2007) and through that night.

The technical expertise that this IMT would routinely apply to interpreting fire behaviour parameters in the south west forests was not fully transferable to Goldfields fires that are considered essentially diurnal. The simple behaviour expected of Goldfields fires is that they are dominated by the flammability of the few main fuel types and their intensity and rate of spread is determined by temperature and wind direction. The most critical factor is wind strength and direction that obviously predicts where the extensive elongated fire runs will go. Long runs or extensive areas of fire are invariably arrested by the many large areas of low or no fuels such as woodlands or salt lakes. Important constructed assets are usually not at risk.

It was mentioned at the time within the IMT that Goldfields fires might continue to run in extreme conditions, but this seems to be a somewhat abstract thought that did not displace the standard concept of daytime-only fire runs. Thus the extreme condition represented by the technical parameters in the Sunday night weather forecast was not linked to extreme fire behaviour.

The most significant decision the IMT made was to presume the diminishing fire behaviour comprehensively observed and reported as dusk fell on Sunday was confirmation of their prior expectations that the fire would be quiescent overnight and any invigoration caused by the south west change in the weather would be minor. This confidence sanctioned the overnight road traffic convoy system.

It has been publicly reported that the IMT was deliberately squeezing convoys through a narrow window created by the lull between the prevailing daytime wind from the north and the south west change overnight that would bear down on the highway and the tragedy was caused when they got the timing wrong. The fact is that notwithstanding the apparent warning of unpredictable fire behaviour in the DEC press releases and the IMT oversight of part of the forecast, they were not expecting the fire to escalate to any significant degree and therefore were not working to any compelling concept of a 'window of opportunity' that had to be precisely executed. In fact they thought it would get easier to run convoys during the night and they would only require two sentries and a small escort contingent.

DEC's review of the fire has examined the technical tools and operational experience available to the Boorabbin IMT to predict fire behaviour. The two methods of predicting fire behaviour are technical fire behaviour tables and the experience of the officers. At the Boorabbin fire both were lacking. The undoubted technical skill of the IMT in using fire behaviour prediction tools in south west forest fires was not transferable to Goldfields fires as there was no history of using such tools in Goldfields fires. Practical experience can substitute for a 'scientific' quantified methodology, but as explained, the Goldfields experience of the team was conditioned by the traditional expectation that shrubland fires usually die down at night and this is what they observed on Friday and Saturday nights. They expected the same on Sunday night and so the night time weather parameters of very low dew point, low relative humidity, continued elevated temperature and predicted strong gusting winds with the

south west change remained somewhat cryptic and unrecognized as the talisman of *'blow-up'* fire conditions.

DEC's review has also recognized the fact that a fire prediction table for mallee heath fuels for the south coast area was available at the time of the Boorabbin fire but as it was developed for the south coast environment it had not been used in other mallee heath areas of the State such as the Midwest Region or the Goldfields. An examination of the table by DEC fire research staff shows that although there are some differences between the south coast area and the Goldfields, the table can be used to give reasonably accurate fire behaviour predictions for Goldfields shrubland fires. Putting the weather parameters of 30 December 2007 near Boorabbin into the table produces a prediction of extreme fire behaviour with rates of spread in excess of 2500 m/h. The prediction is independent of the time of day or night and therefore would dispel traditional concepts of low night time fire behaviour in extreme conditions in these fuel types.

DEC has looked at why the south coast mallee heath fire prediction table has not become standard operating procedure in the Goldfields Region. The primary reason is that the fire management program in DEC's Goldfields Region is in a development phase from historically only monitoring large fires in remote areas to a new era of an active fire planning and operational program. The well developed fire suppression organization traditionally centered on the south west forests is increasingly being deployed to the outlying regions. The Boorabbin fire response is an example and was the largest of its kind to date. The Wildfire Threat Analysis and Fire Prevention Plan for the Boorabbin area is another example and even captures some elements of the south coast mallee heath fire prediction tables, but the full use of the table had yet to become standard operating procedure. The evolving process of improving DEC's fire suppression capacity in the Goldfields was one of the unique conjunctions that contributed to the outcome at the Boorabbin fire.

**4.3 Road Blocks**

The IMT did not have an interagency standard operating procedure for managing roadblocks, and the DEC guideline was not comprehensive. In the absence of a well defined guideline the IMT and supporting agencies improvised a system that moved from an open highway on Friday and Saturday to a complete blockage of traffic initially on Sunday 30 to a partial road block on Sunday afternoon and evening that allowed escorted convoys through when considered safe to do so. In retrospect DEC believes this was a reasonable decision considering the fire situation, the severe conditions endured by travellers at road blocks and the strategic importance of the Great Eastern Highway (GEH). Although the road blocks and later convoys worked, they were not without their problems that mostly resulted from the limited resources and unfamiliar operational procedures needed. Both of these problems would have been relieved by the IMT requesting more support from outside the region, preferably by invoking the established mechanism of an Operational Area Management Group that would coordinate outside and interagency support. The IMT did not do so probably because of the reasonable prospect on Saturday that they might prevail in stopping the fire north of the highway, the rapid pace of development of the incident on Sunday and unfamiliarity with the process of calling an OAMG. The formation of the OAMG is usually triggered by the SDO or Level 3 ICs in very large fires and may have been outside of the experience of the L2 IC. As the SDO was not aware of the rapidly evolving road block innovations he did not trigger the OAMG in his own right until the next day.

The critical question DEC has examined is what influence did the road block system have on the tragic outcome?

It may be possible that had there been more resources at the roadblocks on Sunday evening then the eastern road block would not have been left unattended and there would have been more capacity to escort convoys and block the road when the fire escalated. It may also be possible that extra resources such as police, DEC, FESA and MRWA contractor units at the road blocks might have prevented drivers entering the danger area and could assist them in making a safe withdrawal from the fire zone. Extra resources would themselves have been in trouble at the eastern road block if they did not realize that the fire was approaching on a wide oblique front with extreme fire behaviour. The absence of the Air Observer at night to give a warning was a critical factor.

Notwithstanding the significance of resources and operational procedures available at the road blocks, the most decisive element was the risk assessment process that determined if the road blocks should be opened and also where they should be located in relation to the risk of a fire run. As previously described, the risk management process dependent on fire behaviour prediction was flawed by the presumption that overnight fire behaviour would not pose a serious risk to the highway.

**4.4 Strategic Assessment of the Fire**

The IC and SDO realized when the fire started that it could become quite large and was a threat to GEH traffic. As a fire within an extensive area of shrubland in hot dry conditions it was recognized as having the usual elements of a Goldfield Region fire, with the added complexity of the proximity of the GEH and infrastructure corridor. In hindsight, this initial appraisal did not foresee the full potential of the fire to become an extended suppression campaign that could compromise the GEH for a lengthy period. The assessment of the fire on Friday 28 was consolidated on Saturday 29 with the adoption of the strategy to try and keep the fire north of the GEH. Impressive progress on fire containment line construction on Saturday on sector A and sector C gave the IMT the reasonable expectation that the strategy might succeed. Planning for Sunday 30, both formal (IAP) and informal (IMT discussions) identified the strategic 'hinge point' of containing the fire on sector C to avoid it threatening the GEH and greatly expanding to the south. This was a new and unexpected contingency caused by a narrow run of the fire to the north west from near the point of origin. It made sector B obsolete, the current strategy irrelevant and reduced the chance of containment as it threatened a breakout much closer to the GEH and presented a flank fire that would become a head fire with the onset of the very strong northerly winds and high temperatures forecast. On Sunday 30 the strategic attention to sector C gave way to an evacuation from an intense fire breakout and a focus on making the GEH traffic safe. The potential to lose the fire from sector C was recognized beforehand and in a strategic sense it was understood it would mean another large fire run through shrubland away from the GEH just like that on Friday and Saturday; but to the south. Although there was no formal documented plan prepared on Saturday or Sunday for dealing with a fire breakout from sector C, the IC, OO and PO realized that it would simply require a response similar to that already adopted, that is, a direct flank attack when fire intensity allowed. The crucial strategic issue turned out to be the anticipation of the next major hinge point, caused as before, by a change in wind direction and strength. Unfortunately this critical inflexion point was not appreciated because one of the background strategic concepts influencing the IMT was that the fire would not progress much at night when the wind change was due. This strategic conception was founded on the general history and experience of fire behaviour in these fuels in this region, wherein fires usually did become quiescent overnight. This expectation would also be a repeat of their actual fire experience on Friday and Saturday. They saw no reason to expect anything different and the cryptic warning in the spot forecast was not translated into a quantified projection of fire behaviour as a GFR shrublands fire behaviour table did not exist and the possible surrogate, the South Coast Mallee Heath Fire Behaviour Table, was not recognised by DEC or the IMT as being applicable in this setting. The planning response was therefore to prepare an IAP on Sunday evening for Monday 31 December that discounted the influence of the overnight south westerly wind change but took account of it becoming south easterly during the day that would actually assist their strategies for containment on sectors X and Y.

The deployment of resources was matched to the initial fire condition but as it turned out not to its full longer term strategic potential. Similarly, the difficulties associated with amassing large numbers of travellers at remote road blocks were not fully envisaged. Solutions such as escorted convoys evolved locally rather than being anticipated, planned and shared with central agencies. The response to the fire was conventional in that it deployed what was considered adequate at the time with the option of scaling up as required. In doing so it was already a more substantial response to Goldfields fires than is customary. A small scaling up on Saturday was followed by a decision on Sunday afternoon for a full preformed team deployment the following day. Unfortunately the tragedy intervened before this was in place.

DEC's review has decided that the response to the fire by the IC and SDO was conventional and justifiable, but was in retrospect inadequate for the strategic potential demands of the fire. There are many influences that contributed to this situation that are described in detail in the PIA, the main one being the 'standard' concept of Goldfields fires largely self extinguishing when they inevitably run into low fuel areas. Although such fires are large and damaging to the mallee heathlands, there are usually few important constructed assets threatened and so it is simply a matter of catching up with the extensive fire perimeter and steering the head fire in the most advantageous direction. At Boorabbin there was a critical exception to the usual fire situation, and that was the traffic on the Great Eastern Highway and the service infrastructure parallel to the highway. The potential impact on these assets was also underestimated because the early strategic assessment of the fire only predicted two runs, one north away from the highway on Saturday and the other south across the highway on Sunday if it was not arrested by the suppression strategy. The third fire 'run' on Monday (presuming daylight only active fire behaviour) was recognized in the Sunday IAP as a south easterly wind influence on sectors X and Y that would be helpful to the containment strategies. The strategic

assessment of the fire was done in detail in daily timeframes for the next shift, rendering it more tactical in nature with the night time period discounted based on the diurnal fire model. What was required to fully assess the strategic potential of the fire from the outset was a very simplistic vectoring of the fire runs based on the four day forecast using little more than wind direction. It is unlikely that such a prognosis would have determined the exact timing of the fire runs or have picked up the flaw in the night time fire behaviour expectation for the reasons previously explained, but it might have set the scene for an early full preformed team deployment and perhaps alerted the agencies to a potentially more prolonged impact on the highway. It is possible that other benefits might have flowed from a strategic analysis of this kind, such as a more experienced IC triggering the OAMG on Saturday and the planning team being more focused on fire prediction and longer term planning.

### 4.5 Conclusion

DEC appreciates there are lessons to be learned about 'standard fire models' in the GFR shrubland environment, quantitative technical fire prediction, risk assessment, planning and management processes and road traffic management. The concept of scalable and discriminating fire responses and commensurate resourcing remains, but should be subject to better and more formal strategic assessment and shared decision making. It is essential that hazard management agencies (HMA) and their supporting agencies work to agreed guidelines on common tasks. The management of roadblocks at fires evidently needs improved and better documented procedures and training. HMAs and supporting agencies all need to be familiar with the common guidelines and capable of working together to bring them into full effect at incidents. Vehicle Control Point Guidelines have been prepared by relevant agencies and are being applied at recent incidents.

There are a number of other unique aspects of the Boorabbin fire that in combination contributed to the tragic outcome. However for summary purposes the three critical factors described above are considered to be the primary issues and the main lessons to be learned.

DEC has thoroughly examined all known aspects of the Boorabbin fire. There are many aspects of the incident that have produced important changes and improvements to DEC's standard operating procedures for fighting wild fires, particularly in remote regions in shrubland fuels. The details are captured in the PIA and the Findings and Actions documents. The GHD Fire Development Chronology and Operational Review reports have objectively corroborated and extended DEC's findings. DEC has worked with other authorities to improve interagency guidelines such as the Draft Vehicle Control Point Guideline and will continue to do so for the coming fire seasons. DEC will implement the relevant recommendations of the Coroner.

## 12 GHD Operational Review

Chapter 9 of the GHD Operational Review outlined 46 "Identified Learning Points" that were extracted from the preceding discussion of strengths, areas for improvement and issues that were contained in Chapter 7 of the review.

DEC has reviewed these "identified learning points" and the 55 associated recommendations through consideration by the Lessons Learned Coordination Group. DEC's full response to the recommendations is found in Section 16 of this report.

Analysis of the GHD Operational Review has identified a number of strategic issues for DEC's fire management and incident management responsibilities as well as key areas for improvement to operational practice and inter-agency liaison that are summarised below:

- Continuation of an active program of fire behaviour research, relating to all fire-prone ecosystems in Western Australia, (in partnership with other research institutions, land management and emergency services organisations if possible) is vital.
- The possibility that uncontained wildfires will threaten the users of major roads and highways, as well as rail transport corridors, is present during the bushfire danger period every year in Western Australia. An inter-agency process to develop a comprehensive program of education and information is needed for road users, in relation to bushfire awareness and prevention, as well as improved infrastructure protection and bushfire mitigation programs in high risk areas. Signage to improve the prompt and accurate reporting of wildfires is also needed.

- An inter-agency, all-tenure risk based planning approach to bushfire prevention, mitigation and preparedness (based on the successful WTA&FPP process) is required.
- DEC's Incident Preparedness and Response Plans can be enhanced by the inclusion of greater detail about communications plans, assistance from key service providers during holiday periods and access to resources from other government and emergency services agencies during holiday periods for activities such as road closures, infrastructure protection and provision of information and assistance.
- The initial reporting of wildfire incidents in DEC, through the network of Regional and State Duty Officers, can be improved by prompt and effective situational awareness and strategic assessment of fire potential. A user-friendly system of documenting this appraisal process, as part of the ICS system, is needed.
- Regular and thorough assessment of the status of all wildfire incidents by Regional and State Duty Officers is required, including the implications for the resourcing of incidents in remote regions of the state. The assessment process needs to give attention to the possible consequences of the incident, including the "worst case scenario".
- Pre-incident planning to identify suitable locations for Operations Points during extended wildfire incidents is required. This planning needs to consider the desired location of the full IMT in a forward position as well as the prospect that key personnel may be accommodated at a field camp near the Operations Point.
- The Situation Unit of the IMT must be sufficiently resourced and fully focussed on developing predictions for fire development and the consequences for incident management for the current shift and future shifts of the incident.
- The availability of weather forecasts is paramount to the safety of incident personnel and the protection of the general public. A new procedure for the ordering, access, receipt, distribution, interpretation and acknowledgement of forecasts by Duty Officers, the IMT and field-based personnel is required.
- A review of flank attack tactics for heath-scrub fires that are not wind driven is required. Closely following the fire edge during construction of containment lines is a safe procedure but it can result in a meandering and patchy fire edge when heath-scrub fires are not wind driven. Alternative tactics include: parallel flank attack, with multiple machine passes to create a straight and wide containment line; fuel modification adjacent to (inside) a new or existing containment line; and indirect attack by burning out fuels from an existing containment feature.
- Arrangements are to be made with Water Corporation for fire suppression agencies (DEC, FESA, and local government authorities) to gain access to water from water supply pipelines in rural areas during wildfire emergencies.
- Shortage of accommodation and long distances between the fireground and accommodation facilities for fire suppression staff can lead to delays, loss of productivity and fatigue management problems. An investigation of the costs, benefits and disbenefits of field-based accommodation for DEC fire crews and IMT staff is required.
- Traffic management during wildfire incidents requires a well resourced unit within the IMT that is dedicated to the task as well as clearly documented inter-agency procedures to implement this important responsibility. The procedures must include decision making processes and operational procedures for road closure and re-opening as well as traffic regulation. Managing the welfare and safety of members of the public must also be documented and responsibility assigned for this task.
- Improvements to DEC's capability to aerially map fire boundaries and then to electronically download maps to Operations Point and ICC locations are needed. The acquisition of thermal imaging technology will also improve DEC's fire suppression capability in remote areas. A business case to acquire these technologies is required.
- The Emergency Management arrangements that are prescribed in WESTPLAN-BUSHFIRES are not generally well understood, nor are they properly implemented by emergency services organisations in WA. Training and awareness raising is required to improve operational procedures across all agencies.
- The numerous actions to be implemented by DEC, that have been identified during the internal and external reviews of the Boorabbin fire, have generated changes to procedures

that will require an extensive and well coordinated program of training and information sessions to be delivered to relevant staff.

- The fatalities that occurred during the Boorabbin incident resulted in a range of DEC staff suffering different levels of critical incident stress. Improved procedures for dealing with and understanding Critical Incident Stress Management are needed.

## 13 Operations Area Management Group (OAMG) Review

A review of the Boorabbin fire OAMG process that operated during and following the incident was undertaken at meetings held in Kalgoorlie on 20 February 2008 and 29 July 2008.

Participating agencies included WA Police, DEC, FESA, MRWA, Water Corporation, WestNet Rail, Western Power, and the Shires of Kalgoorlie–Boulder, Coolgardie and Yilgarn.

The review identified a range of actions to be implemented including:

- agencies to obtain a better understanding of the procedures prescribed in the Emergency Management Act 2005;
- the need to update the Wildfire Threat Analysis and Fire Protection Plan for Crown lands between Southern Cross and Coolgardie;
- works programs to improve the protection of infrastructure assets from bushfires;
- the need for integrated communications arrangements through the WAERN system;
- a review of the issues that arose during the closure of the Great Eastern Highway;
- develop improved arrangements for contacts and the provision of resources for mutual assistance in the event of a wildfire incident requiring road closure;
- the provision of more crossings over the water supply pipeline and access points to water from the pipeline during bushfire emergencies;
- conduct training courses in firefighting for machine operators from shires and key contractors in the Goldfields; and
- the provision of improved information and education signage for motorists travelling on the Great Eastern Highway.

All agencies have subsequently undertaken works programs to implement the actions identified in the review and further actions are ongoing.

## 14 Inter-agency review processes

### 14.1 Traffic management guidelines

In January 2008, soon after the Boorabbin incident, an inter-agency process to review the operation of road closures during wildfire incidents was initiated. WAPOL, together with DEC, FESA, MRWA and Local Government Authorities, developed the first draft of a new set of guidelines for this purpose during February 2008. The guidelines were drafted to provide guidance to HMAs and support agencies that may be required to manage or operate vehicle road closures during wildfire emergencies. The draft guidelines were based initially on a similar set of guidelines developed in Victoria following fatalities during a bushfire in the Grampians in 2007.

The new guidelines were refined and amended during the first half of 2008 with the aim that they would be completed in readiness for the commencement of the 2008/09 fire season. During discussions on the adoption of the guidelines by the relevant agencies in Western Australia there was a view presented that the traffic management guidelines should apply to “all hazards”, not just bushfires. Whilst agencies acknowledged that this was a sound plan for the long term, it was decided that the guidelines must be available for bushfire incidents in 2008/09. WAPOL, DEC and MRWA posted the draft guidelines on internal websites and carried out the necessary staff training and awareness. The guidelines were used successfully during wildfire incidents in January 2009.

The interagency group will continue to develop the guidelines with the aim of adoption for all hazards when completed.

The principles contained in the current draft guidelines are:

1. WAPOL, DEC, FESA, WALGA and MRWA, have developed these guidelines to assist in the control and management of road closures in the vicinity of the scene of a fire.

2. WAPOL, DEC, FESA, WALGA and MRWA all acknowledge the overriding interest in the operation of traffic, both pedestrian and vehicular, in the vicinity of the scene of any fire is the safety of both emergency services personnel and the public.

3. WAPOL, DEC, FESA, WALGA and MRWA acknowledge that, for a number of reasons, travel through a fire area is dangerous and potentially fatal. Therefore, such travel should be controlled and minimised.

4. However, WAPOL, DEC, FESA, WALGA and MRWA also acknowledge that there are certain circumstances where the impact of fire on the community can be reduced by allowing certain categories of people to travel on roads in the vicinity of the scene of a fire, including both before the fire impacts and after the fire has past.

5. Each organisation undertakes to implement appropriate procedures and training to give effect to the guidelines.

6. Vehicle Control Points (VCP) can be established under the following legislation: *Emergency Management Act 2005, FESA Act 1998, Fire Brigade Act 1942, Bush Fires Act 1954* and *Criminal Investigation Act 2006.*

7. Nothing in these guidelines limits or derogates from the independent discretion that is available to police officers in the exercise of their duties and functions.

8. The welfare of people who are affected through closure of roads needs to be a consideration of the HMA, in consultation with WAPOL and the Department of Child Protection (DCP).

9. Short term welfare and minor inconvenience issues may be dealt with by the HMA by utilising resources for short term relief (i.e. incident water/food).

10. For extended term and major welfare issues, consideration by the HMA, in consultation with WAPOL and DCP, should be given to the establishment of a Welfare Centre or Welfare point (i.e. community centre or roadhouse location), or other agreed arrangements.

11. DCP has responsibility for the coordination of services provided under WESTPLAN-Welfare in relation to the welfare needs of those affected.

The guidelines also cover the operation of full road closures, partial road closures, critical decision recording, communication protocols, activation and operation of VCPs and communications to the general public.

**Figure 29 Traffic held at a roadblock on Great Eastern Highway**

### 14.2 Fire awareness information to motorists on Great Eastern Highway and other major roads and highways in Western Australia

Two of the Identified Learning Points and two recommendations contained in the GHD Operational Review (Recommendations 2 and 3) related to fire awareness and prevention signage and the network of parking bays, facilities, turn around points and surrounding vegetation along the Great Eastern Highway and other major highways.

The GHD report recommended that DEC initiate an inter-agency working group (with MRWA, FESA and Local Government) to examine these issues. DEC has initiated the formation of the working group which has now developed Terms of Reference for its deliberations and work has commenced on the development of appropriate actions in response to the recommendations.

### 14.3 Bushfire mitigation works in the Yilgarn and Coolgardie Shires

Following the Boorabbin Fire a review was conducted by the Operations Area Management Group (OAMG) that was convened during the incident to help management interagency processes at the local level. The review identified a range of bushfire mitigation activities along the Great Eastern Highway that would improve protection for travellers using the highway and for assets adjoining or near the highway. The OAMG decided that the best way to progress these actions was to form a sub-committee of the District Emergency Management Committee (DEMC), to be chaired by DEC's Regional Manager. The DEMC sub-committee met on 18 November 2008 in Kalgoorlie. Agencies represented on the sub-committee were DEC, FESA, MRWA, WAPOL, Water Corporation, WestNet Rail, Shire of Yilgarn, Shire of Coolgardie, City of Kalgoorlie-Boulder.

Bushfire mitigation actions undertaken along the Great Eastern Highway by agencies during 2008 and early 2009 include the following:

- Additional water access points and pipeline crossings (Water Corporation);

- Shoulder reconditioning, verge vegetation management, assessment of parking bays and turnarounds, signage improvements in conjunction with Shires (MRWA);
- Vegetation clearing (80m wide) on the south side of the railway line between Koolyanobbing and Wallaroo and on the north side between Wallaroo and Jaurdi. Wooden sleepers replaced with concrete sleepers (WestNet Rail);
- Vegetation clearing around power poles on the 32kVA line south of the highway (Western Power);
- Fuel modification works in DEC-managed lands and UCL (DEC); and
- Exchange of information between agencies on resources, contacts and communications.

**Figure 30 Fuel modification work (chaining) in sandplain/heath vegetation**

# PART 5: FACTORS CONTRIBUTING TO THE FATALITIES

## 15 Contributing factors relating to the fatalities

The Lessons Learned Coordination Group undertook a strategic analysis of the major factors contributing to the fatalities that occurred on 30 December 2007. The analysis considered all of the information available to the Coordination Group from the debriefs, the PIA, Statements made to the police, the GHD reports, interviews with DEC staff who attended the fire and discussions with the author of the GHD reports, Paul de Mar. The GHD reports are chronological and structured according to the functional roles defined by the Australian Inter-service Incident Management System (AIIMS), whereas the Coordination Group's strategic analysis presents a specific focus on cause and effect. DEC's analysis was sent to WAPOL in November 2008.

The Coordination Group's analysis can be used to interpret the GHD reports by highlighting the main contributing factors to the fatalities and it was anticipated that this approach would be useful to the Coroner. The relative importance of each of the contributing factors has been assigned subjectively by the Coordinating Group and faithfully reflects the inputs from the sources above that have been found to be consistently in agreement. The analysis has concluded that there were many complex, interacting contributing factors and extenuating circumstances that affected everyone involved in the incident.

**Analysis of contributing factors to the cause of the fatalities during Goldfields Fire 13 (the Boorabbin Fire).**

A total of 20 individual factors have been identified as most likely to have contributed to the circumstances that lead to the fatalities. Additional factors may have contributed, but these 20 factors have been most prominent in the review processes. The 20 factors have been grouped into five categories:

- Factors relating to fire prediction and escalation of fire behaviour;
- Factors relating to the transmission, interpretation and importance of weather forecasts;
- Factors relating to incident management;
- Factors relating to traffic management on the Great Eastern Highway; and
- Human factors.

Each of the 20 factors is discussed briefly together with an indication of the relative importance of each factor.

### 15.1 Factors relating to fire prediction and escalation of fire behaviour

#### 15.1.1 Reliance by the Incident Management Team (IMT) on "rules of thumb" relating to fire behaviour in certain vegetation types in the Goldfields region

Because there is no specific fire spread prediction model for scrub/heath vegetation types in the Goldfields region, based on scientific fire behaviour research, the IMT relied primarily on local, generalised, anecdotal knowledge and understanding of fire behaviour in the Goldfields. The most commonly expressed generalisations of Goldfields fire behaviour knowledge are outlined on page viii of the Operational Review.

One of these local, generalized understandings (referred to by GHD as "rules of thumb") is that as sunset approaches, fire behaviour begins to decline and by nightfall, fire behaviour becomes benign. The observations of fire behaviour from the air and on the ground along the north east flank of the fire at around 19:00 on 30 December 2007 were of mild and declining fire behaviour. These observations may have reinforced the perception that observed fire behaviour was following the "rule of thumb".

In the case of 30 December 2007, the weather conditions were much more extreme than average just before 20:00. The temperature was 39°C, the relative humidity was

below 10% and fuel moisture content would have been around 3%. The strong south/south west wind change caused a rapid escalation of the fire behaviour on the north east flank and when the wind backed to the south a wide front advanced rapidly towards the highway engulfing four trucks that were proceeding through the burning area.

The reliance on “rules of thumb” relating to fire behaviour is considered to be a major contributing factor.

### 5.1.2 Reliance by the IMT on the fire behaviour observations just prior to the escalation in fire behaviour

As outlined in 1.1, fire behaviour observations were made from the helicopter along the north east flank between 18:50 and 19:15. Fire behaviour was reported as mild and declining, in near-still wind, not running, with a flame height of 0.5M and 1-2 M at the southern extent of the fire (which was 8-10 km south of the highway).

DEC officers and crews working on the Great Eastern Highway also reported decreasing fire behaviour and no problems near the highway at around 20:00. These observations were consistent with the pattern of fire behaviour that had been observed at the fire on the two previous days and consistent with the experience of DEC officers in the IMT.

The reliance on fire behaviour observations just prior to the escalation in fire behaviour that occurred just after 20:00 on 30 December 2007 is considered to be a major contributing factor.

### 15.1.3 Fire behaviour model for Goldfields scrub/heath vegetation

As stated in 1.1 there is currently no specific fire spread prediction model for scrub/heath vegetation types in the Goldfields region, based on scientific fire behaviour research.

The Wildfire Threat Analysis and Fire Prevention Plan for Crown Lands between Southern Cross and Coolgardie (WTA and FPP) contains some guidance in relation to rates of head fire spread in sandplain scrub/heath vegetation but is only an indication of potential fire behaviour, not an operational fire prediction tool. This information is based on the McCaw et al *“Guidelines for Fire Behaviour Prediction in Mallee-heath in southern Western Australia”* 1989, and provides a reasonable approximation for the expected range of fire spread in this vegetation type but has not been in general use outside of the coastal heath regions for which it was designed.

In the absence of a specific fire behaviour model for Goldfield scrub/heath vegetation, the IMT was operating on its experiential ‘model’ of fire behaviour in that environment and on observed fire behaviour at the incident. The rates of headfire spread of Goldfields Fire 13 that were observed during previous runs of the fire (up to 10 km/hr) also provided an indication to the IMT of the possible rates of spread that could be expected under extreme conditions during the worst daytime conditions. The experiential model, apparently supported by observation at the fire predicted that fire behaviour would decline at night to low intensities and low rates of spread.

If the Mallee-heath fire model had been applied, it would have indicated that the fire behaviour that had been observed to decline considerably in the early evening would have escalated rapidly at about 20:00, following the S/SW wind change. It was predictable that this escalation would have posed a severe threat to the highway.

The absence of a specific fire behaviour model for Goldfields sandplain scrub/heath is considered to be a major contributing factor.

## 15.2 Factors relating to weather forecasts

### 15.2.1 Transmission of the spot weather forecast to the Operations Officer

Information provided by relevant DEC officers indicates that spot forecasts (for the area of the fireground) that were requested by the IMT in Kalgoorlie at around 09:00 and 16:55 on 30 December 2007 were supplied promptly by the Bureau of Meteorology (BOM) duty forecaster. A report by the BOM states that two spot forecasts were issued for 30 December 2007, at 9:13 and 17:09 WDT. The details of the forecasts are included in the BOM report.

The Operations Officer reported that at approximately 10:30 on 30 December 2007 an email was received at the Operations Point with a spot forecast attached. When opened it was identified as the general forecast for the Goldfields region. The Operations Officer had previously accessed the general forecast from the BOM registered users website. It appears that the spot forecast that was issued by the BOM at 17:09 was not transmitted to the Operations Point until about four hours after it was received at the Kalgoorlie office.

The Operations Officer had received and read the general forecast for the Goldfields and Eastern Wheatbelt that was issued by BOM at 16:25 on 29 December 2007 which contained the following information:

> *"Fine. Very hot tomorrow. Moderate E/SE winds tending NE overnight and becoming fresh and gusty in the morning. Winds easing and becoming NW in the afternoon ahead of a fresh southerly change over the southern half in the evening. Fire Danger: Extreme."*

The forecast including the southerly change in the evening was noted and written up on a whiteboard at the Operations Point.

The spot forecast provides more detailed information specific to the location and can give an experienced fire officer a better idea of likely fire behaviour than the general forecast. Whether this information would have alerted the Operations Officer to a significant change in fire behaviour cannot be determined in retrospect.

Notwithstanding this uncertainty, the failure to promptly transmit the two spot forecasts, that were issued by the BOM on 30 December 2007, to the Operations Point and for the spot forecast information to be disseminated to Operations staff, is considered to be a minor contributing factor.

### 15.2.2 Interpretation of the spot forecast information by the IMT

Information provided by DEC officers to GHD indicated that all key personnel who had received the spot forecasts, issued on 30 December 2007, "missed" the *Significant Wind Change* notes contained in the forecasts. (See GHD report pp 81-82). It is also evident that the failure to recognise the importance of the combination of several key elements of the forecast weather as an indicator of a potential significant escalation of fire behaviour had great implications for the decision to re-open the Great Eastern Highway to traffic.

The combination of continuing high temperature (39°C at 20:00); very low relative humidity (less than 10%); and the extremely low Dew Point (-5) meant that the air mass over the fire ground would remain very hot and dry in the early evening. Fuel moisture content of the vegetation was predictably extremely low (3%) because of the prolonged drought conditions and hot weather experienced in the area before the fire. Furthermore, the forecast gusty S/SW wind change would bring hot dry air, transported away from the fire earlier in the day, back over the fire ground.

The key IMT personnel might have been alerted to the potential escalation of the fire by comprehending the extreme conditions predicted in the forecast and matching that to their experience of such conditions. Alternatively, had a fire prediction model been available, they could have 'computed' the change in fire behaviour. In the absence of

both relevant experience of extreme night time fire behaviour and the absence of a scientific fire prediction model, they were not alert to the danger and these deficiencies were then compounded by overlooking the wind warning.

DEC agrees that the failure to read the entire forecast or register the significance of the forecast weather to fire behaviour is a serious matter of concern that requires a suite of prompt remedial actions. Other factors and extenuating circumstances that affected the IMT personnel are also outlined in 3.1, 3.6, 5.1 and 5.3 below.

The lack of attention/interpretation of the spot forecast information by the IMT is considered to be a major contributing factor.

### 15.3 Factors relating to incident management

#### 15.3.1 The size of the IMT

The Goldfields Region has only a small number of trained and experienced staff capable of undertaking key roles in more complex (Level 2 or Level 3) incidents. The local resources needed to be supplemented from outside the region. The factors involved in the decisions that were taken pertaining to the deployment of an IMT on 28 December 2007 are outlined in the GHD report (pp 56-57). Rather than dispatching a full Pre-Formed IMT, the decision was taken to deploy Planning and Logistics Unit resources to support locally experienced Control and Operations personnel.

DEC acknowledges that, in hindsight, there were factors relating to incident complexity, values at risk and inter-agency liaison that warranted the deployment of some additional IMT personnel. In particular, the Planning Unit was understaffed in the performance of its Situation, Information, Resources and Communications functions. It was also evident that the Operations Officer required a higher level of assistance than was provided at the Operations Point (GHD report p 62). Whilst the deployment of a full Pre-Formed Team of 60+ personnel was not warranted, an increased staffing level in key functions would have improved the overall management of the incident, once it escalated to a Level 3 classification.

As it can take more than 12 hours to transport additional IMT staff from the south-west to remote locations such as the Goldfields, any decision to increase the IMT staff contingent would have needed to be made on the previous day.,

The size of the IMT is considered to be a major contributing factor.

#### 15.3.2 The qualifications/competencies of the key IMT members

The decision not to send a full Pre-Formed IMT to Goldfields Fire 13 meant that some roles were filled, during the initial phases, by staff who were not accredited for those roles in a Level 3 classification incident. Those staff may have performed previously in Level 3 incidents, but not in the assigned role for this incident. An illness to the Incident Controller (IC) of the Blue Pre-Formed Team also meant that there was a delay in dispatching a replacement IC to the incident.

The State Duty Officer, who discussed the proposed deployment of the IMT to the incident with the Regional Duty Officer/Incident Controller, took into consideration the valuable recent experience and knowledge of Goldfields fires held by several members of the proposed IMT, including the Planning Officer and Logistics Officer. The Operations Officer was selected from the neighbouring Wheatbelt Region. He had considerable experience in managing wildfire incidents in similar landscapes and was a member of the Project Team for the WTA and FPP for Crown Lands between Southern Cross and Coolgardie.

Whilst DEC agrees with the GHD recommendation that the process for decision-making in relation to sending full or part IMTs should be based on a documented situational analysis, for Goldfields Fire 13 the qualifications/competencies of the IMT

members who were assigned key roles in the initial phases of the fire is considered to be a minor contributing factor.

### 15.3.3 The quantum of Operations resources

An outline of the initial and extended (Phase 1) attack resource organised on is provided in the GHD report (pp 55-58). Reference is also made to operational resources during Phases 2 and 3 of the suppression activity (pp 61-87).

The "organization" of fire fighting resources during the initial attack and extended attack phases were described as "rapid and well organized". Resources required for fireline construction and containment, ground and aerial reconnaissance, communications, catering and staging were considered to be adequate and well handled.

During periods of intense headfire activity and breakaways from containment lines, it would have been unsafe to attempt direct attack and so no amount of additional resources would have made a difference to the containment of the fire. When the fire escalated south of Great Eastern Highway (Phase 3) on 30 December 2007, operations units were essentially taking refuge in safety zones as the fire was well beyond the limits of control. During this period, operations resources assisted with highway monitoring, convoy escort roles and managing public welfare in difficult conditions at roadblocks.

The quantum of operations resources is considered to be a minor contributing factor.

### 15.3.4 Senior/Central support to the IMT

The GHD report makes reference to several discussions between the Regional Duty Officer (RDO) and the State Duty Officer (SDO) during the initial stage of the incident on 28 December 2007 and the "transitional" stage on 29 December 2007 (pp 18-22 and p 56). Discussions included resourcing requirements, attack strategy and incident management objectives. The SDO assisted by the Fire Operations Officer (FOO) arranged for the deployment of IMT and operational resources, aerial support, communications technicians and radio technicians and the FESA communications van. The FOO also requested spot forecasts for the fire area from BOM. Goldfields Region personnel were not represented on the morning conference call on 29 December 2007.

The weather forecast for the Goldfields was discussed during the morning conference call on 30 December 2007. The IC and the Planning Officer were present on the conference call. No additional resources were requested at that time, although a previous request for planning and administration resources was queried. The earlier request had been acted upon by the SDO.

There is no record of any discussions between the SDO and the IC in regard to strategies and tactics for fire suppression or traffic management on Great Eastern Highway on 30 December 2007. This may have been due to the tempo of the incident during this period.

The IC also contacted the Goldfields Regional Manager (RM) on three occasions on 28, 29 and 30 December 2007. The RM was not on duty and the IC was keeping him informed about the incident. The RM offered his assistance to the IC on each occasion.

The GHD report has highlighted the need for greater attention to situational analysis and risk-based assessment of strategy options for Level 2 and Level 3 incidents. This can be achieved through improved documentation, prompt reporting, strategic review and endorsement of the selected strategy at SDO level.

The level of senior/central support to the IMT is considered to be a minor contributing factor.

### 15.3.5 Consequence risk management

The GHD report (pp 68-69; 116-117) highlights the point that the scope of activities to be managed by the IMT extend well beyond the suppression of the fire. During Goldfields Fire 13 there were many significant fire impact consequences to prepare for and manage. In remote areas the resources for consequence management need to be mobilized in timeframes that allow for adequate preparation for the potential consequences.

By placing a greater emphasis on consequence risk assessment and management, the planning and implementation of the road closure and re-opening processes (and required resourcing for this function) would have reduced the risk to motorists from the escalating fire.

DEC acknowledges that its incident appraisal processes should be reviewed to include a more comprehensive assessment of risks and potential consequences and due consideration given to worst case scenario requirements.

The insufficient attention to consequence risk management is considered to be a major contributing factor.

### 15.3.6 The workload and tempo pressure of the incident on the IMT

The GHD report (pp 83-84; 116; 120; 122) makes several references to the escalating complexity, workload and tempo pressure on the IMT during Phase 3 of the incident on 30 December 2007. The fast developing nature of the incident changed it from a fire suppression incident to a consequences management incident (traffic management and asset protection), which rapidly overwhelmed the incident control resources. The need for effective communication within the IMT is greater than normal during a rapidly escalating incident tempo. During Goldfields Fire 13 the cohesiveness of the IMT diminished when the tempo of the incident increased on 30 December 2007.

Research undertaken by the Bushfire Cooperative Research Centre (Dr Mary Omodei) and other researchers in Australia and the USA on the diminution of cognitive capacity of IMT members under stress, and its subsequent impacts on decision-making and performance, are relevant to the Boorabbin incident. It has been demonstrated that the human brain is limited in the amount of information it can store and work with at any given time. The increased tempo of operations, the limited resources available to the IMT to deal with that increase and the resulting levels of stress on each IMT member is known to result in a narrowing of cognitive focus to issues that are recent and urgent. This results in a loss of cohesion among the IMT due to reduced communication opportunities, a loss of strategic situational awareness and a propensity to focus on short term tactical issues, particularly those issues that are familiar to the individual's experience. It also results in a diminished capacity to assimilate, analyse and make meaning of incoming information, particularly when the volume of that information is large.

DEC acknowledges that whilst the tempo of the incident cannot be "controlled", the resourcing of key functions, regular attention to a strategic overview of the incident, effective communications within the IMT and liaison between the IC and the SDO to gain assistance and resources external to DEC, will enable the tempo pressure to be partially relieved.

The circumstances in which operational tempo and individual stress levels were elevated resulting in a loss of strategic situational awareness of some risk management issues associated with managing the incident are considered to be a major contributing factor.

### 15.3.7 Remoteness, time and distance influences

The GHD report (pp ii, iv, vi, xiii, 1, 8, 10, 61, 93-95) notes the remote regional context of the Boorabbin fire and the effect this had on the detection and assessment

of the fire, fire crew response times, logistical supply of resources, limited access around the fire, travel time between the Incident Control Centre and Field Operations Point, travel time for crews to accommodation (and the associated consequences for fatigue management), limitation of work time on the fireline, situational awareness by the IMT, and general remoteness from DEC's fire fighting resources based in the south-west of the State.

The distance between towns and/or facilities on the Great Eastern Highway was also problematic for the management of road traffic and the options for the management of road blocks over an extended period of time.

The IMT and the SDO recognised these challenges from the outset and generally managed them very well, but these parameters did increase the difficulty of managing the fire and influenced the time needed to deliver upgraded resources when the fire escalated to a Level 3 incident. For instance there was a delay in placing an Incident Controller, who was qualified and sufficiently experienced to manage a Level 3 incident, in the IMT in Kalgoorlie.

The distance factor is considered to be a minor contributing factor.

## 15.4 Factors relating to traffic management on the Great Eastern Highway (GEH)

### 15.4.1 External pressure to re-open the GEH

Information provided by DEC officers, authorized in the GHD report (p 75), indicates that a number of calls were received at the Incident Control Centre and at the Operations Point on 30 December 2007, from Main Roads WA, members of the public and businesses seeking to re-open the GEH to traffic.

There was also extensive feedback and general concern by DEC staff for the welfare of the occupants of vehicles that were being held at road blocks under very trying conditions with insufficient shade, water and food. Several escorted convoys were successfully given passage through the fire area from the west in order to relieve some of this pressure.

The Incident Controller resisted the pressure to re-open the GEH during the afternoon but initiated discussions with the Operations Officer between 18:30 and 19:00 regarding the arrangements that would need to be put in place to provide for safe passage of traffic through the fire area. These arrangements included a reconnaissance flight, placement of sentries on the highway on each side of the fire and escorts for vehicle convoys. The IC authorized the removal of eastern and western roadblocks at 19:20 when the arrangements had been put into place. (See also 4.4 and 4.5).

The external pressure to re-open the GEH is considered to be a major contributing factor.

### 15.4.2 The currency and content of DEC's Guidelines on Closure of Roads at Wildfires (FOG 75), and inter-agency traffic management guidelines

At the time of Goldfields Fire 13 DEC's Guidelines on Closure of Roads at Wildfires (FOG 75) aimed to inform DEC officers involved in wildfire suppression operations of the powers, responsibilities, road closure types, notification requirements and mechanisms available to close roads during wildfire suppression operations.

The GHD report (pp 76-81) outlines the strengths and weaknesses of FOG 75 and recommends its replacement with comprehensive inter-agency procedures which address agency roles; risk assessment; traffic management planning guidelines; decision processes and operational procedures for planned and unplanned road closures and traffic regulation through vehicle control points; managing public safety and welfare; the decision process for road re-opening; and operational procedures for road re-opening.

DEC acknowledges the need for improved guidelines and processes as recommended.

The currency and context of DEC's FOG 75 is considered to be a minor contributing factor. The absence of comprehensive inter-agency guidelines for traffic management during wildfire incidents is considered to be a major contributing factor.

### 15.4.3 The quantum and capability of inter-agency resources to effectively manage their traffic management responsibilities

As outlined in 4.2, the absence of any inter-agency guidelines for the management of traffic during wildfire incidents meant that the IMT was required to initiate the arrangements for the closure of the GEH with the road management authority (Main Roads WA) and their contractor (MacMahon) and with the WAPOL. The difficulty of putting these arrangements into effect was compounded by the absence of key personnel on leave, lack of contact information and competing demands on the resources of the other agencies.

The GHD report (pp 72-81) outlines the difficulties encountered by the IMT in establishing and maintaining roadblocks at suitable locations on the GEH, on both sides of the fire, and for escorting duties for convoys of vehicles permitted to travel through the fire area.

There was considerable inconvenience and delays caused by not having pre-planned traffic management guidelines in place. There were several occasions when the resources requested by DEC were not made available. MacMahon advised DEC that they were unable to establish a roadblock at Yellowdine as requested on 30 December 2007. MacMahon also refused to escort the convoy that left Coolgardie, stating that they were only able to put in place and maintain a roadblock. WAPOL resources to assist with traffic management west of the fire were reduced when two of the four police officers at the fire left to process a traffic offender. Coolgardie Police also advised the IC that they were unavailable to assist with escort duties due to other priorities.

The quantum and capability of inter-agency resources to effectively implement traffic management responsibilities is considered to be a minor contributing factor.

### 15.4.4 Reliance by the IMT on the expected convoy escort to protect the convoy that was impacted by the fire

The GHD report (pp 74–76) outlines the circumstances relating to the fate of the convoy of vehicles which left Coolgardie at approximately 19:20 on 30 December 2007 to travel west through the fire area. It was planned that a WAPOL vehicle would escort the convoy from Bullabulling through to the west and then return to the east of the fire to escort the advancing Coolgardie convoy through to the west.

The Bullabulling convoy proceeded under the WAPOL escort west through the burnt area without incident before any appreciable increase in fire behaviour. By the time the WAPOL unit attempted to return east at about 20:15 to meet the west-bound convoy from Coolgardie, the fire behaviour had escalated significantly adjacent to the highway preventing the passage of the Police vehicle to the east.

The authorisation by the IC for roadblocks to be lifted was made following reports of benign fire behaviour and with the expectation that convoys of vehicles moving in both directions across the fire area would be escorted and that sentries would be placed on each side of the fire to monitor fire behaviour and re-establish a roadblock if necessary. The convoy escorts would serve a number of purposes but could not have been expected to provide absolute protection and safety for every vehicle in the convoy.

The reliance by the IMT on the expected escort of the Coolgardie convoy to protect the convoy is considered to be a minor contributing factor.

### 15.4.5 Reliance on sentinels placed on each side of the fire on GEH to protect the convoy that was impacted by the fire

The GHD report (pp 74–76) outlines the circumstances relating to the fate of the convoy of vehicles which left Coolgardie at approximately 19:20 on 30 December 2007. It was planned that "sentinels" would be placed on each side of the fire on GEH to monitor fire behaviour and re-establish a roadblock if fire behaviour escalated. One DEC light unit took up a position on the western side of the fire as a sentinel and one FESA light unit took up a position as a sentinel on the eastern side of the fire. This was done by approximately 19:40.

The FESA unit on the eastern side was in the path of the headfire after the S/SW wind change and, after providing emergency assistance to a truck which had come from Coolgardie at approximately 20:30, became stranded on the western side of the fire leaving the eastern side unattended, with more vehicles arriving from the Coolgardie convoy.

As stated in 4.4, the placement of sentinels was one of several precautionary arrangements made by the IC and the Operations Officer before the roadblocks were lifted. The placement of sentinels was an important contingency but they could not have been expected to provide absolute protection and safety for every vehicle in the convoy.

The reliance on sentinels placed on each side of the fire on GEH to protect the convoy is considered to be a minor contributing factor.

## 15.5 Human factors

### 15.5.1 Fatigue

Reference is made in 3.6 to the effect that the increased tempo of the incident that occurred during the afternoon and evening of 30 December 2007, may have had on the stress levels and the cognitive focus of IMT members.

The GHD report (pp 91-95) outlines the issues relating to fatigue management during Goldfields Fire 13. Fatigue is discussed in relation to shift length, "on task" and "off task" duties, travel time and tour of duty.

For most of the DEC personnel deployed to Goldfields Fire 13, the shift on which they were working on 30 December 2007, when the fatalities occurred, was their second shift. For a few staff it was their third shift, but for those staff their first shift on 28 December 2007 was relatively short and not physically demanding.

Most personnel who commenced on the second shift worked (inclusive of travel time) longer than the recommended maximum 16 hours and did not have a 10 hour rest break at the end of the extended shift. Factors that contributed to this were the extended travel time for personnel traveling from Perth or other work centres to Kalgoorlie or to the fire; setting up the ICC in the Kalgoorlie DEC office; setting up communications at the Operations Point; and obtaining initial situational awareness at the fire.

DEC has acknowledged the need to establish monitoring of and compliance with fatigue management guidelines as part of a suite of actions to address fatigue management during wildfire incidents.

Fatigue is considered to be a minor contributing factor.

### 15.5.2 Stress caused by weather and conditions

Information obtained from DEC staff indicated that the environmental conditions in which operational staff were required to work on 29 December and 30 December 2007 (and subsequent days) were amongst the worst that they had experienced. The GHD report (pp vi, 75) makes reference to the extreme heat (30 December was the

third hottest December day, 45.2°C, ever recorded at Southern Cross); lack of shade; strong winds; and a plague of bushflies that would have affected the operational effectiveness of field crews and staff at the Operations Point.

Stress caused by weather and conditions is considered to be a minor contributing factor.

### 15.5.3 Conditions were outside the range of experience of those managing the fire

The GHD report (pp ix, 105) makes reference to the weather conditions and fire behaviour experienced on 30 December 2007 at around 20:00 being significantly hotter and drier than average conditions (on which “rules of thumb” are frequently based). None of the DEC personnel interviewed by GHD had ever experienced sandplain heath/scrub fires burning near the upper limits of possible fire behaviour at that time of day. Reliance on local, generalised anecdotal knowledge-based understanding of fire behaviour in the Goldfields proved to be deficient as the conditions experienced on 30 December 2007 were outside the range of experience of those managing the fire.

The circumstance in which conditions were outside the range of experience of those managing the fire is considered to be a major contributing factor.

**Conclusion to Part 5**

The GHD report "Goldfields Fire 13 (Boorabbin Fire) Operational Review, July 2008" has been reviewed by DEC. DEC accepts the documentation of events contained in the report as an accurate representation of what took place. DEC agrees or conditionally agrees with each of the 46 Identified Learning Points and 55 Recommendations included in the Operational Review. These are summarized in Part 6 of this report. Many actions have already been initiated by DEC in response to the Recommendations, in line with the "Lessons Learned" approach.

The GHD report recognises that there were many complex, interacting contributing factors and specific contingencies that affected those involved in managing the incident. DEC understands and accepts the lessons learnt from GHD’s comprehensive review of the incident. DEC's aim is to ensure that the lessons learned from the experience result in improvements to the Department's wildfire incident management processes and capability in order to minimise the chance of such a tragedy ever happening again.

## PART 6: IDENTIFIED LEARNING POINTS AND ACTIONS TAKEN BY DEC IN RESPONSE TO REVIEWS AND RECOMMENDATIONS

### 16.1 DEC’s response (as at June 2009) to the Learning Points and Recommendations contained in the GHD *Operational Review of Goldfields Fire 13 (Boorabbin Fire), July 2008*.

**Identified Learning Point GHD 9.1 Research**

Fire spread model for Mallee – heath needed for Goldfields vegetation types.

**GHD Recommendation 1**

DEC should examine the potential for Table 3 of the *Guidelines for Fire Behaviour Prediction in Mallee-heath in southern Western Australia* to be used for fire behaviour prediction in sandplain heath-scrub types. The scope of work for this activity should include identification of scrub-heath fuel types or attributes for which the model may not be applicable or requires correction factors, and to develop an operational and scientific research program to validate the applicability of the model if it is used.

Note: DEC should determine whether current heathland fire behaviour research being conducted under the Bushfire Cooperative Research Centre (CRC) has application to sandplain heath-scrub fuel types.

**DEC's response to GHD Recommendation 1**

Agree: DEC has completed work to develop new guidelines for fire behaviour prediction in shrublands in WA and this was available for use in the 2008-09 fire season. DEC has also developed operational guidelines for application in the prediction of fire behaviour in hummock grasslands (Spinifex). DEC has also commenced the validation and implementation of the Project Vesta forest fire behaviour prediction system

DEC is also actively involved with the Bushfire Cooperative Research Centre to facilitate a national mallee heath fire behaviour model that can be applied in WA when it becomes available

DEC has developed information on the distribution of major fuel types in WA and the associated fire behaviour models. This information will be rolled out to DEC staff during 2009.

**Identified Learning Point GHD 9.2 Prevention**

The Great Eastern Highway needs fire awareness and fire prevention signage to reduce unlawful fire use.

**GHD Recommendation 2**

DEC should initiate an inter-agency working group (DEC, FESA, MRWA, Local Government) to consider and develop a system of bush fire awareness and prevention signage along the GEH aimed at reducing unlawful and careless fire ignition. DEC should investigate the extent to which this recommendation is relevant to other major highways such as the Eyre and Brand Highways.

**DEC's response to GHD Recommendation 2**

Agree conditionally: The recommendation is relevant to all major highways in WA. Responsibility for the management of highway roadside signage rests with Main Roads WA (MRWA) and Local Government Authorities (LGAs). DEC has initiated the process recommended by GHD through the Emergency Services Sub-committee of the State Emergency Management Committee (SEMC) and also by direct contact with responsible road management authorities.

DEC has participated in an interagency working group to develop and implement bushfire mitigation measures (including bushfire awareness and prevention signage on the GEH between Southern Cross and Kalgoorlie.

**Identified Learning Point GHD 9.2 Prevention**

Parking bays along Great Eastern Highway (and other highways) are not designed and maintained to minimise the risk of bushfires.

**GHD Recommendation 3**

DEC should work with MRWA, local Government, and FESA to review the current network of parking bays along the GEH to identify opportunities to relocate fire prone area parking bays to less fire prone areas, and to establish fire prevention maintenance standards for parking bays and adjacent vegetation. Further consideration should be given to the provision of constructed camp/cooking fire places, with appropriate signage, within designated parking bays.

In addition to parking bay location, consideration should be given to designating truck turn around points at appropriate locations, with signage that they are turn around points to be kept clear and not to be used for parking or camping.

**DEC's response to GHD Recommendation 3**

Agree conditionally: The recommendation is relevant to all major highways in WA. Responsibility for the management of roadside facilities adjoining highways rests with Main Roads WA and LGAs.

DEC has initiated the process recommended by GHD through direct contact with Road Management Authorities.

In the context that the probable cause of the Boorabbin fire was a roadside campfire, the issue of the management of roadside campfires during the prohibited burning period and/or on days of extreme fire danger has been referred by DEC to MRWA and WALGA (representing LGAs) with a recommendation that signage be erected at all travel stops providing information to travellers regarding fire prohibition.

**Identified Learning Point GHD 9.2 Prevention**

The Wildfire Threat Analysis (WTA) and Fire Prevention Plan (FPP) developed for the Goldfields (Southern Cross to Coolgardie) represents best practice, and should be migrated and applied to other parts of Western Australia.

**GHD Recommendation 4**

DEC should review the WTA&FPP process used for Crown Lands between Coolgardie and Southern Cross, consider what improvements could be made (e.g. coverage of communications capacity) to the process and format.

**DEC's response to GHD Recommendation 4**

Agree: DEC has commenced a review of the existing WTA&FPP. DEC has also commenced a project to extend the WTA to the adjoining areas within the Yilgarn and Mt Marshall Shires

**GHD Recommendation 5**

Given the current lack of an inter-agency, all-tenure risk based planning approach to bush fire prevention, mitigation and preparedness in WA, it is recommended that DEC in partnership with FESA, seek the support of the WA Government to develop and initiate an inter-agency risk management based approach (based on DEC and FESA's acclaimed WTA&FPP) to fire planning in high fire risk areas of WA (prioritised to areas where high values and fire likelihood and consequence intersect). This will require consideration of the required legislative and policy frameworks, planning standards and resources, and audit processes to monitor and report on plan implementation. Models currently in use in NSW and Victoria are worthy of examination in developing a WA approach.

**DEC's response to GHD Recommendation 5**

Agree: DEC, in association with FESA, has completed a "bushfire threat analysis" across all land tenures in the South West Land Division and more widely in the southern half of WA. DEC will use this information to identify high risk corridors and then apply the appropriate mitigation measures.

The recommendations made by the Community Development and Justice Standing Committee Inquiry into FESA legislation include a requirement that Fire Management Plans be prepared for all land tenures. It is understood that this requirement will be included in proposed amendments to the legislation.

**GHD Recommendation 6**

In considering a roll out of the WTA&FPP process to other parts of WA, DEC and partner agencies need to identify a process for ensuring the necessary resourcing to implement WTA&FPP work programs.

**DEC's response to GHD Recommendation 6**

Agree: Resourcing for Bushfire Mitigation works will be addressed through State agency and Local Government Authority budgets and in partnership with the Commonwealth Government's Bushfire Mitigation Programme.

The work completed during 2008-09 in the Goldfields Region provides an example of such a funding model.

**Figure 31 Fuel modification (scrubrolling) work carried out during the summer of 2008/09 to provide improved fire prevention and fire suppression capability in the Boorabbin area.**

**Figure 32 Prescribed burning of scrubrolled vegetation, carried out during autumn 2009, on the south side of the Great Eastern Highway between Southern Cross and Coolgardie.**

**Identified Learning Point GHD 9.3 Preparedness**

Incident Preparedness and Response Plan (IPRP) for Goldfields was a very useful document. It can be enhanced to improve pre-incident planning on communications, and response to road closures.

**GHD Recommendation 7**

DEC should review the Incident Preparedness and Response Plan for the Goldfields Region, consider what improvements could be made to the format and range of pre-incident planning coverage, and update the plan to incorporate lessons learnt from Goldfields Fire 13.

**DEC's response to GHD Recommendation 7**

Agree: DEC completed a review of the IPRP for the Goldfields prior to the 2008-09 fire season. DEC will extend this recommendation to all regions. Fire Operational Guideline 07 (Guidelines for the preparation of Incident Preparedness and Response Plans (IPRP)) will be reviewed and updated.

**Identified Learning Point GHD 9.3 Preparedness**

Unavailability of goods, services and support services to DEC during Christmas/New Year holiday break.

**GHD Recommendation 8**

It is recommended that prior to each Christmas – New Year period, all DEC regions contact their key fire goods and services suppliers and partner agencies to determine levels of availability and record these for use by Duty Officers (as is presently done in the DEC's south-west region).

**DEC's response to GHD Recommendation 8**

Agree: All DEC Regions implemented this recommendation during the 2008-09 fire season.
This recommendation is also applicable to other holiday periods such as Easter and long weekends.

**Identified Learning Point GHD 9.4 Response**

**9.4.1 Reporting and Notification of the Fire**

Motorists on the Great Eastern Highway require information on the location to make accurate fire reports.

**GHD Recommendation 9**

A fire prevention and education signage system (see recommendation 1) along the GEH should incorporate location information on signs to facilitate members of the public to make accurate fire location reports.

**DEC's response to GHD Recommendation 9**

Agree.

**Identified Learning Point GHD 9.4 Response**

The recommendation is relevant to all major highways in WA. Responsibility for the management of roadside signage on highways rests with MRWA and LGAs. DEC has initiated the process recommended by GHD through the Emergency Services Sub-committee of SEMC and by direct contact with responsible road management authorities.

**9.4.1 Reporting and Notification of the Fire**

There are system failures for 000 calls reporting fires that could have potentially serious consequences.

**GHD Recommendation 10**

DEC and FESA should investigate the 000 call notification procedures implemented for Goldfields Fire 13 to identify the reason that DEC was not notified of the fire. From this investigation, corrective action should be taken to ensure that all fires burning on or near DEC managed lands are reported to DEC.

**DEC's response to GHD Recommendation 10**

Agree: DEC has investigated this issue and has determined that DEC was not notified of this fire. DEC is working with FESA to ensure that timely, accurate and reliable 000 contacts are made to DEC concerning reported fires on DEC-managed lands.

**Identified Learning Point GHD 9.4 Response**

**9.4.1 Reporting and Notification of the Fire**

A map-based Initial Fire Report format which facilitates visualisation of potential fire development may be a better way of conveying current and potential fire information.

**GHD Recommendation 11**

DEC should review current procedures for initial fire reports and reporting of Level 1 incidents, and consider a one page SITREP plus fire map style format for fires that are likely to take longer than one shift to control.

**DEC's response to GHD Recommendation 11**

Agree: DEC has implemented a standard process to declare the potential for all incidents. This declaration procedure requires initial intelligence and risk assessment to be gathered for those incidents considered to have the potential to extend past the first shift (Level 2 or 3 incidents). This intelligence is provided to Regional and State Duty Officers to ensure adequate situational awareness and analysis is maintained at a strategic level and that resourcing and risk management decisions can be made based on the best information possible.

**Identified Learning Point GHD 9.4 Response**

**9.4.2 Initial Attack**

Whilst the initial attack crew did a good job in setting up an Operations Point, there are some improvements that can be made to pre-incident planning for remote Operations Point establishment.

**GHD Recommendation 12**

DEC should consider what are the key requirements for the initial establishment of an Operations Point, with particular consideration of remote area fires, and assemble an operations point 'grab kit', and manifest of additional required items not in the kit, that can be quickly gathered by an initial attack crew tasked to respond to a fire. Pre-incident preparedness for establishing an Operations Point should also be covered in the Incident Preparedness and Response Plan.

**DEC's response to GHD Recommendation 12**

Agree: DEC has developed criteria for the establishment of an Operations Point to ensure that all regions identify suitable Operations Points in advance of incidents, for inclusion in IPRPs.
DEC has successfully applied these procedures at major fires during 2008-09 fire season.

A manifest of grab kit items has been developed for implementation during the 2008/09 fire season.

**Identified Learning Point GHD 9.4 Response**

**9.4.2 Initial Attack**

Initial attack staff can assemble important incident information at the scene of the fire. Current mobile phone technology enables pictures of such information to be taken and transmitted.

**GHD Recommendation 13**

DEC should consider the potential for mobile phones to transmit valuable visual fire information by initial attack crews, and consider what mobile phone functionality and plans are best suited for initial attack crew personnel.

**DEC's response to GHD Recommendation 13**

Agree: DEC is examining all options for the effective transmission of visual and other information from the fire ground to the IMT, including images transmitted by mobile telephones.

DEC has developed a process to authorise limited enabling of the Next G mobile phones for key fire staff to give access to data transmission and web functionality.

Next G mobile services are not available in all parts of the State so the DEC initial attack staff currently have access to handheld/portable voice and broadband data mobile satellite communications devices to transmit digital information (fax, email, internet) from the field.

**Identified Learning Point GHD 9.4 Response**

**9.4.3 Fire Category Declaration and Out-of-Area Resource Response**

Fire Operations Guideline 83 promulgates the requirements for incident declaration. Any fire that will require out-of-area resources and will take longer than one shift to contain cannot be correctly classified as a Level 1 incident. A relatively simple incident (low complexity and low numbers of field resources) that may take longer than one shift to contain, but does not warrant dispatch of a pre-formed IMT cannot be correctly classified as a Level 2 incident. Therefore, particularly for remote regions, there are a range of fires that will take longer than one shift to control but do not require a pre-formed IMT that do not fit within the current fire classifications (for further detail refer to section 7.1.4 of this report).

**GHD Recommendation 14**

DEC should review Fire Operations Guideline 83 to provide greater clarity for fire status classification, and improved decision triggers (risk and incident complexity level related) for personnel responsible for classifying fire status. The role of the State Duty Officer in fire status classification should also be clarified.

**DEC's response to GHD Recommendation 14**

Agree: DEC has amended FOG 83 as recommended. This guideline was applied in the 2008-09 fire season.

**Identified Learning Point GHD 9.4 Response**

**9.4.3 Fire Category Declaration and Out-of-Area Resource Response**

Fire situations arise, particularly in remote regions where local resources available for incident management are not sufficient, but where the dispatch of a full pre-formed incident management team is not warranted. Guidelines to assist decision-making regarding IMT supplementation are needed.

**GHD Recommendation 15**

DEC should review the decision making process for selecting which IMT resources to send to a fire to supplement local resources, and document procedures developed from the review. The review should

identify the suite of positions (and competency levels) that are essential for effective IMT functioning, and those that are risk or situation complexity triggered. DEC may wish to consider whether there is a case to have a different (different from the standardised pre-formed IMTs used for complex, coastal region fire incidents) IMT composition for remote region fires.

**DEC's response to GHD Recommendation 15**

Agree: DEC is developing a rule set for the deployment of Pre-Formed Teams (PFTs) and concurrent IMTs. The rule set to be included in FOG 91 will identify the suite of positions (and competency levels) that are essential for effective IMT functioning, and those that are triggered by risk or situation complexity.

**Identified Learning Point GHD 9.4 Response**

**9.4.4 Establishing the Operations Point**

It is important that personnel at the Operations Point have ready good access to good maps and information about the area where the fire is located.

**GHD Recommendation 16**

DEC review current procedures for making operations maps and spatial data for map-generation available at the Operations Point from the time it is established. Options for consideration include production of hardcopy fire map atlases, and external hard-drives (or DVD's containing regional spatial information relevant for fire management (that can be plugged into an Operations Point laptop computer), that are taken to the fire by an Initial or Extended Attack crew as part of an Operations Point grab kit.

**DEC's response to GHD Recommendation 16**

Agree: DEC currently utilises hard copy map atlases and external hard drives with GIS map information pre-loaded for use at Operations Points. These resources are available as part of the standard equipment mobilised with an Operations Point communications bus. DEC will review the availability of these resources to ensure that the establishment of an Operations Point (with or without a communications bus) has access to sufficient map products.

**Identified Learning Point GHD 9.4 Response**

**9.4.4 Establishing the Operations Point**

The Operations Point is the communications hub for fire suppression operations. Incident communications arrangements require planning and mobilisation from the outset of an incident. The communications planning needs a special suite of skills and knowledge.

**GHD Recommendation 17**

DEC should review the knowledge and skills requirements required for communications planning and identify the most appropriate means generating improved communications planning capacity within IMTs. Consideration should be given to the position being Operations Point based.

**DEC's response to GHD Recommendation 17**

Agree partially: DEC has ensured that each Region/District IPRP includes a default communications plan suitable for application at initiating fires. DEC has also put in place arrangements to ensure that communications planning is undertaken early during every incident. All level 2 and 3 incidents will also be provided with a fully equipped mobile communications facility. A communications technician will also be mobilised to ensure that ICC and Operations Point communication are effective.

DEC does not agree that communications planning is best located at the Operations Point but that technical support for Operations Point communications is desirable.

**Identified Learning Point GHD 9.4 Response**

**9.4.5 Incident Management – Control and Coordination**

IMT Resources for consequence management in remote areas need to be mobilised in timeframes that allow adequate preparation of assets and communities for fire impacts, and managing the consequences of the fire impacts.

**GHD Recommendation 18**

DEC's (and other agencies) incident appraisal process used for determining IMT resourcing requirements should be reviewed to ensure appropriate attention is given to the consequences management component of incident control, and due consideration is given to worst case scenario requirements.

**DEC's response to GHD Recommendation 18**

Agree: DEC's incident classification procedures have been amended to ensure that adequate information is available to decision makers to support informed risk analysis and determination of potential consequences.

**Identified Learning Point GHD 9.4 Response**

**9.4.5 Incident Management – Control and Coordination**

The WA State Bushfire Emergency Management Plan (WESTPLAN-BUSHFIRE) provides a high degree of discretion to an Incident Controller as to when an OAMG should be convened. At the Boorabbin fire, the early activation of an OAMG may have served to improve commitment by support agencies to the timely supply of local and out-of-area resources.

**GHD Recommendation 19**

DEC should establish appropriate trigger points for their Incident Controllers and IMT staff for future fire events; if it is then it is recommended that a Fire Operations Guideline on OAMG trigger thresholds be developed. Alternatively, a process of jointly developing improved OAMG appointment triggers with FESA, for incorporation into WESTPLAN – BUSHFIRE, may be worthy of consideration.

**DEC's response to GHD Recommendation 19**

Agree: DEC will develop a new FOG, in consultation with FESA, to define appropriate triggers for the establishment of an OAMG and other processes prescribed in WESTPLAN-BUSHFIRE. SEMC is currently reviewing the policy regarding the arrangements for multi-agency incidents. DEC's FOG will align with this revised policy.

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

There is a need to review the Situation Analysis component of the Incident Action Plan and to improve the focus on predicted and potential fire development before deciding incident objectives and strategies.

**GHD Recommendation 20**

It is recommended that the Situational Analysis IAP forms (ICS 1.1 – 05/05 and ICS 1.2 – 9/01) and the Fire Behaviour Forecast (ICS 1.8 – 05/05) be reviewed and an improved incident objective and strategy development process that takes account of predicted fire development and incorporates a more robust, risk-based assessment of the factors which may cause the strategy to fail, and provide contingency planning for the possibility that preferred strategies fail.

**DEC's response to GHD Recommendation 20**

Agree: DEC has completed a review of the relevant ICS forms and decision support tools and methodology associated with the initial risk assessment and strategy definition process and the ongoing review of these processes as an incident progresses. This was implemented during the 2008-09 fire season.

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

The Planning Unit within the IMT needs to deal with incident planning at a range of different time horizons. The current IAP format is focused on the "next shift" timescale, with the potential that the incident planning staff may not appropriately consider the shorter and longer term timescales.

**GHD Recommendation 21**

Improvements to DEC's IAP template should be considered which may assist in avoiding the potential for Incident Action Planning to be overly focused on the 'next shift'. ICS 1.1 "Situation Analysis – Background and Objectives" could be enhanced by the provision of timescale prompts that encourage the planning unit to undertake incident potential projections for times both within and beyond the next shift (e.g. consider prompts for 12, 24, 48 and 72 hours ahead). These would be particularly relevant to the Values at Risk, Safety Risks and Hazards, Weather and Incident Behaviour sections.

**DEC's response to GHD Recommendation 21**

Agree: The completed review of the ICS forms and methodology associated with risk and strategy definition and monitoring, as addressed in Recommendation 20, has encompassed this recommendation.

DEC has given greater emphasis in its 2008/09 and ongoing training programs to the need for IMTs to undertake sufficient forward projection of the incident to ensure that appropriate strategies are developed for both the short term and the medium term.

**GHD Recommendation 22**

To promote planning unit attention to current timescales, it is recommended that DEC review current procedures and training for the conduct of IMT meetings and planning unit meetings to ensure that appropriate planning attention is given to current shift situation, objectives and strategy implementation.

**DEC's response to GHD Recommendation 22**

Agree: See response to Recommendation 21

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

As high quality incident maps and community information maps are required as early as possible during the development of an incident, personnel with appropriate GIS map production competence are required during the initial scaling up of an incident from initial to extended attack.

**GHD Recommendation 23**

For IMTs in which the Situation Unit Leader does not possess appropriate GIS map production competence, a specialist 'Situation Unit Mapper' should be assigned to all incidents escalating beyond initial attack.

**DEC's response to GHD Recommendation 23**

Agree conditionally: DEC already makes available a GIS mapper to fires where the mapping task is significant and requires the development of complex map products. . The GIS mapper at large fires is also supported by a State level mapping team. Each of DEC's Pre-Formed Teams contains two competent GIS mappers – See also the response to Recommendation 15.

**GHD Recommendation 24**

IMTs need to have mapping redundancy arrangements in place for situations where as GIS qualified situation mapper is not available or when power or IT network failures prevent GIS map production.

**DEC's response to GHD Recommendation 24**

Agree: DEC has given greater emphasis in its 2008/09 training programs to the need for prompt preparation and transmission of incident maps to Regional Duty Officers and State Duty Officers, including in the absence of GIS capacity.

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

A rapidly escalated incident tempo, which typically can arise following a significant change in the incident situation, has the potential to disrupt the flow of incident planning processes. The need for good communication between the four functional units of the IMT (and with providing incident support) is even greater during such periods. A systemised approach to incident planning needs to be maintained through such periods.

**GHD Recommendation 25**

DEC review its incident planning process and tools (e.g. Incident planning meeting schedules and agenda formats) with a view to providing system triggers that ensure planning and incident information communication processes are maintained through high-tempo operational periods (HTOP).

**DEC's response to GHD Recommendation 25**

Agree: DEC will develop a 'checklist of impact points' for immediate consideration and decision by an IMT which can then be cascaded down through the AIIMS structural units to ensure work undertaken is contributing to incident objectives. IMT training and exercising will also be undertaken to address responding to HTOP.

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

Important "significant wind change" forecast information was missed by the IMT personnel who received the spot weather forecast. There is a need to put in place a more systematic approach to weather forecast interpretation, dissemination and acknowledging receipt of routine and spot forecasts.

**GHD Recommendation 26**

DEC should develop a new Fire Operations Guideline specifically addressing BoM spot weather forecast ordering, access, receipt, distribution, interpretation and acknowledgement aspects, with appropriate emphasis given to ensuring forecasts are distributed to field operations locations in a timely manner. New procedures should emphasise the importance of reading the whole forecast and considering the implications of weather for fire behaviour. Any changes to procedures will need to be incorporated into relevant DEC training.

**DEC's response to GHD Recommendation 26**

Agree: DEC has developed a Fire Operations Guideline (Draft FOG 18) before the 2008/09 fire season that addresses the acquisition, dissemination and acknowledgement of forecasts (particularly spot forecasts) during wildfire incidents.

DEC will provide training to key IMT staff on the use and interpretation of weather forecasts in strategic planning and risk management. DEC will ensure that training programs will provide sufficient number of skilled fire behaviour analysts.

**Identified Learning Point GHD 9.4 Response**

**9.4.6 Incident Management - Planning**

For fires that have the potential to impact key infrastructure, communities or industries, there is likely to be a demanding workload on the Situation and Planning Officer in projecting the location, scale and timeframes for these potential impacts and planning for their management.

**GHD Recommendation 27**

It is recommended that for fires that have the potential to impact key infrastructure, communities or industries, an Information Officer should be mobilised to perform Information Unit functions.

**DEC's response to GHD Recommendation 27**

Agree conditionally: DEC agrees that consideration should be given to the staffing of an Information Unit in the circumstances described. This resourcing will be undertaken on a judgment of need. Each DEC Pre-Formed IMT contains a staffed Information Unit.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

The Operations Officer at high tempo fire emergencies are kept very busy managing operational resources, monitoring performance of tasks and tactical situations, dealing with operational problems, and making changes to resource deployments as situations change. Remote fire operations require additional measures to be taken to overcome the challenges that arise with distance from the fire and lack of radio communications.

**GHD Recommendation 28**

It is recommended that at all level 2 and 3 fires, the Operations Officer in the field be provided with assistance at the Operations Point (with operational experience) to assist with maintaining good information flow between the operations point and the IMT, and carry out operations support functions.

**DEC's response to GHD Recommendation 28**

Agree: DEC has developed for the 2008/09 fire season a range of structural models for how the Operations function will operate at wildfire incidents. Adequate administrative support for the Operations Officer, when located forward, has been provided in the structure.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

Staging areas will often need to provide sufficient room for prime movers with low loaders to turn in, around, and out. In Goldfields Fire 13, long vehicle turn around issues arose when the crew transport bus was manoeuvring to depart for Kalgoorlie and became stuck on an obstruction delaying the departure of crews.

**GHD Recommendation 29**

It is recommended that when establishing staging areas, turn in, turn around and turn out alignment and dimensions be considered and any necessary improvements made early during establishment of the staging area.

**DEC's response to GHD Recommendation 29**

Agree: This requirement was implemented at several major fires during the 2008-09 fire season.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

Significant problems were encountered attempting to implement fireline construction on the flank of heath-scrub fire which had not been wind-driven leaving a meandering and patchy fire edge.

**GHD Recommendation 30**

It is recommended that a review of flank attack tactics in sandplain/heath fuel types be conducted which takes account of the improved fire behaviour knowledge arising from Goldfields Fire 13.

**DEC's response to GHD Recommendation 30**

Agree: Key staff have workshopped approaches to flank attack tactics in shrubland fuels. These approaches include the use of multiple machines working in echelon; and the use of chaining to widen containment lines. A clearing chain has been purchased by DEC for this purpose.
Wider training and awareness of these tactics will be needed for DEC staff.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

Water is a very scarce resource in the Goldfields region and substantial travel distances may be involved for tankers needing to replenish their water tanks. Tanker replenishment may be required relatively frequently where tankers are working in support of earthmoving machinery conducting direct flank attack operations along the flanks of actively running fire.

**GHD Recommendation 31**

It is recommended that whenever extended operations with light and heavy tankers are envisaged, large bulk water tankers also be deployed to each staging area.

**DEC's response to GHD Recommendation 31**

Agree: The use of bulk water tankers is standard practice for DEC. IPRPs contain contact and availability details for water resources including standpipes, tankers and water points.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

Heavy and light tanker tyre punctures became a significant problem at Goldfields Fire 13. It can be expected that similar problems may be encountered at any fires where flank attack through heath-scrub vegetation is involved due to occurrence of hard, sharp woody stakes left during line construction.

**GHD Recommendation 32**

It is recommended that light and heavy units deploying to Goldfields fires deploy with extra spare tyres, and the logistics unit give early consideration to the potential for frequent tyre punctures during fires in sandplain heath-scrub.

**DEC's response to GHD Recommendation 32**

Agree: A cache of spare tyres and wheels has been established for distribution to wildfire incidents as required.

**Identified Learning Point GHD 9.4 Response**

**9.4.7 Incident Management - Operations**

On 31 DEC 07, the Operations Point was relocated from Koorarawalyee to Yellowdine. This required the preparation of an Operations Point relocation plan. Personnel planning the relocation identified that a relocation plan was not something they had done before and expressed that an Operations Point relocation planning template or checklist would be useful for the future.

**GHD Recommendation 33**

It is recommended that DEC develop a procedure incorporating a planning template or checklists or both, for use when relocating Operations Points during fires.

**DEC's response to GHD Recommendation 33**

Agree: DEC has developed a planning template and checklist for establishment of Operations Points. The template was utilised during 2008-09 fire season.

DEC has procured and developed facilities and communications systems for a well resourced field Operations Point. These have been utilised successfully at large fires in 2008-09.

**Identified Learning Point GHD 9.4 Response**

**9.4.8 Incident Management - Logistics**

Fire camps offer a means of reducing travel times at fires, and are likely to have significant benefits for fatigue management at remote fires. Making the necessary investment in fire camping capability requires policy decisions and frameworks to be established to support it.

**GHD Recommendation 34a**

It is recommended DEC complete a feasibility analysis considering the pros and cons of field fire camps for remote fires, and develop policy and guidelines identifying the appropriate circumstances and standards (relevant for WA conditions) for accommodating crews in the field at remote area fires. These standards could then provide the basis for developing mobile fire camp infrastructure specifications, enabling the development of a 'business case', with appropriate cost estimates, for investment in mobile fire camping infrastructure.

**DEC's response to GHD Recommendation 34a**

Agree: DEC has commenced a feasibility study for accommodating personnel at remote fires and other emergency incidents. This process commenced prior to the Boorabbin fire due to the difficulty identified during previous large wildfire incidents in accessing accommodation for fire personnel during the holiday season. See also the response to 33 above.

**GHD Recommendation 34b**

Subject to the feasibility analysis and business case supporting an investment in mobile fire camping capacity, it is further recommended that DEC seek the support of the WA Government to invest in and build mobile fire camping capacity appropriate for WA conditions, recognising that it may have significant potential for use in response to other (non-fire) remote area emergency response operations.

**DEC's response to GHD Recommendation 34b**

Agree: See response to Recommendation 34a.

**Identified Learning Point GHD 9.4 Response**

**9.4.9 Road Closure/Opening and Traffic Management**

Traffic management at wildfires can become a complex and potentially hazardous activity that requires inter-agency planning and response. Accordingly, personnel from appropriate agencies (WAPOL, DEC, FESA, Main Roads and their contractors) need to be made available to participate in the IMTs process of developing an incident traffic plan.

**GHD Recommendation 35**

For all fire events which are assessed to have the potential to impact roads and/or traffic within the next 72 hours, the Incident Controller should contact the relevant road manager, WAPOL and FESA, requesting their attendance at the ICC to assist with the preparation of an Incident traffic management plan. This request should be made as soon as practicable after it becomes apparent that fire has the potential to impact roads and/or traffic. This requirement should be incorporated in inter-agency fire and emergency incident road and traffic management procedures.

**DEC's response to GHD Recommendation 35**

Agree: DEC has participated in an inter-agency process to develop new traffic management guidelines for wildfire incidents (*Guidelines for the Operation of Road Closures during Bushfires)*. The new guidelines were used successfully at several wildfire incidents during the 2008-09 fire season. DEC has also participated in a multi-agency review of the implementation of these guidelines. This review will inform DEC in the preparation of a FOG and associated training materials.

**Identified Learning Point GHD 9.4 Response**

**9.4.9 Road Closure/opening and Traffic Management**

DEC's Fire Operations Guideline 75 provides guidance to DEC staff on their powers and the exercise of these in the emergency closing of a road in a fire. However, it does not provide guidelines beyond the road closure process and notification requirements. It appears at the time of Goldfields Fire 13 there were no other relevant road closure/opening and traffic management guidelines made available to DEC from other authorities. As road closure, opening and traffic management can be complex and potentially hazardous operation, comprehensive inter-agency guidelines for road and traffic management during fires would be of significant assistance to personnel who may become involved in road closure/opening decisions and operations.

**GHD Recommendation 36**

DEC's Fire Operations Guideline 75 should be replaced by comprehensive inter-agency procedures which address:

1. The roles and responsibilities of each agency in executing a road closure, and managing vehicle control points;
2. How the risk of road impact by fire and smoke should be assessed;
3. Traffic management planning guidelines for the IMT (planning process and format; factors for consideration in selecting roadblock locations);
4. The decision process and operational procedures for the planned closure of a road;
5. The decision process and operational procedures for the emergency (unplanned) closure of a road;
6. The decision process and operational procedures for relocating a vehicle control points;
7. The decision process and operational procedures for regulating traffic through a vehicle control points;
8. Managing the welfare and safety of the public held at vehicle control points;
9. The decision process and authority for declaring a road safe to re-open; and

10. The operational procedures for re-opening a road.

**DEC's response to GHD Recommendation 36**

Agree: See also the response to Recommendation 35. Points 1-10 have been included in the *Guidelines for the Operation of Road Closures during Bushfires*


**Figure 33. Cover of the 13 page guideline for the operation of road closures that operated during the 2008/09 fire season**

**Identified Learning Point GHD 9.4 Response**

**9.4.9 Road Closure/opening and Traffic Management**

At the time of the Goldfields Fire 13 there were no DEC or inter-agency guidelines or procedures to guide decision making processes for road closure/openings.

**GHD Recommendation 37**

It is recommended that DEC, develop a road re-opening risk assessment process (intended for implementation by an IMT) that uses current and forecast weather, uses the appropriate physical attributes based fire behaviour prediction model, applies worst case predicted weather and fuel factors, and applies a reasonable additional precautionary time factor to allow for contingencies that may arise in effecting the road re-closure. The road re-opening risk assessment process should address the factors identified in section 7.3.2 of this review.

**DEC's response to GHD Recommendation 37**

Agree: The DEC FOG will specifically deal with the road re-opening risk assessment process. See also response to Recommendation 35.

**GHD Recommendation 38**

It is further recommended that the application of such a risk assessment process utilise BoM spot weather forecast information, and that the risk assessment prepared by the Planning Unit be considered by the IMT (including agencies responsible for implementing and maintaining the road closure).

**DEC's response to GHD Recommendation 38**

Agree: This process was applied during the 2008-09 fire season.

**Identified Learning Point GHD 9.4 Response**

**9.4.9 Road Closure/opening and Traffic Management**

Goldfields Fire 13 has highlighted a range of road closure/opening and traffic management training and competency issues, not just for DEC but for FESA, WAPOL, Main Roads WA (and their Term Network Contractors) and Local Government. The introduction of new inter-agency road closure/opening and traffic management guidelines will generate the need for a suite of new training and exercising requirements for all agencies involved in road closures/opening and traffic management, and potentially also for new equipment.

**GHD Recommendation 39**

The recommended review and development of new inter-agency road closure/opening and traffic management guidelines should include training specialists at appropriate stages to facilitate identification of the various road closure/opening and traffic management training requirements that will arise.

**DEC's response to GHD Recommendation 39**

Agree: DEC, in conjunction with WAPOL, has developed a training module for the implementation of these guidelines. This training was implemented prior to the 2008-09 fire season.

**GHD Recommendation 40**

Development and delivery of relevant training modules will need to be implemented promptly, and thereafter supported by inter-agency exercising on a regular basis.

**DEC's response to GHD Recommendation 40**

See response to Recommendation 39. DEC has participated in an inter-agency review of the guidelines that were applied during the 2008-09 fire season. The findings of the review will be incorporated in future training programs.

**Identified Learning Point GHD 9.5 Communications**

In DEC's remote regions, vehicles are fitted out with HF radios as there is no fixed infrastructure to support a VHF radio network in these areas. DEC vehicles and fire fighting resources deployed from coastal, south-west forests and Wheatbelt regional areas are fitted with VHF radios which are currently not compatible with HF radios. DEC and FESA are currently implementing a major radio upgrade program. The fitting of new generation UHF and high-band VHF cross-banded radios in DEC's vehicles operating in remote regions can overcome the present radio incompatibility issues.

**GHD Recommendation 41**

It is recommended that DEC's vehicles used for fire management in remote regions be fitted with new generation UHF and high-band VHF cross-banded radios.

**DEC's response to GHD Recommendation 41**

Agree: DEC is implementing a refit of radios to all fire vehicles as part of the WA Emergency Radio Network (WAERN) program.

DEC is continuing to install high band VHF repeater systems in key remote locations in the Kimberley and Goldfields regions.

**Identified Learning Point GHD 9.5 Communications**

At remote area fires fixed radio repeater infrastructure networks are not available to relay VHF fireground radio traffic over long distances to the ICC. To optimise the effectiveness of the investment already made in DEC's mobile communication platforms it will be necessary to upgrade existing units such that radio traffic at the fireground (analog) can be converted to digital format and transmitted to the ICC via existing wireless telecommunications networks or satellite communication technology. With currently available 'radio over IP' technology, the potential exists for DEC to overcome the problems of relaying remote fireground radio communications to an Incident Control Centre many hundreds of kilometres away.

**GHD Recommendation 42**

It is recommended that DEC investigates what upgrading is required for their current fleet of communications trailers and buses, to incorporate 'radio over IP' capability.

**DEC's response to GHD Recommendation 42**

Agree: DEC is implementing the acquisition and fitting of 'radio over IP' technology as part of the Clever Networks program funded by the Commonwealth and State Governments. This will overcome existing problems in relaying remote fire ground radio communications to Incident Control Centres.

**GHD Recommendation 43**

It is recommended that a 'radio over IP' technical solution be developed and available for trialling by the 2008/09 fire season.

**DEC's response to GHD Recommendation 43**

Agree: Trials of 'radio over IP' will be undertaken in 2009.

**Identified Learning Point GHD 9.6 Fatigue**

The Incident Controller, supported by the IMT is responsible for implementing fatigue management guidelines at fire incidents. For effective implementation monitoring of the periods being worked by personnel at the incident is required. Additional steps that could encourage greater scrutiny and application of fatigue management guidelines is a process of monitoring and reporting compliance during IMT meetings.

**GHD Recommendation 44**

It is recommended DEC develop a structured system for daily monitoring and reporting of fatigue management guideline compliance for daily consideration by IMTs. Any resulting procedures should be incorporated into FOG 12.

**DEC's response to GHD Recommendation 44**

Agree conditionally: DEC has revised FOG 12. These guidelines incorporate a suite of actions that addresses fatigue management during wildfire incidents and prescribed burns. Monitoring and compliance of fatigue management guidelines has been addressed as part of the review of FOG 12.

**Identified Learning Point GHD 9.7 Aviation Management**

Search and Rescue (SAR) watch procedures for DEC's contract helicopter are routinely carried out over DEC's VHF radio network. As a VHF radio network is not a practical option in the Goldfields region, the Goldfields region office did not have VHF radios communication with the helicopter to carry out mandatory SAR watch procedures. A system of using SMS text messages was used overcome the lack of radio communication. While this was the best that could be done at the time, a better system needs to be developed to meet mandatory SAR watch procedures for future operations.

**GHD Recommendation 45**

It is recommended that DEC Fire Management Services and DEC Goldfields Region review the available options for conducting SAR watch procedures when aircraft are operating in Goldfields region and develop procedures that fully comply with SAR watch requirements. The system/procedures developed are likely to have application for other remote areas that do not have VHF radio network coverage and should be adopted with any necessary local customising in those areas.

**DEC's response to GHD Recommendation 45**

Agree: DEC stringently applies SAR watch procedures during aircraft operations. These procedures comply with CASA requirements. Additionally DEC provides an enhanced SAR watch locally. The local SAR watch arrangements will need to take account of the communication technology available on site. DEC is investigating a variety of technologies, including satellite tracking, that will ensure reliable communication between aircraft and SAR watch keepers.

**Identified Learning Point GHD 9.7 Aviation Management**

Emergency technology is providing alternative means for Air Observers to map fires and to electronically download their maps to ground locations without the need to land.

**GHD Recommendation 46**

It is recommended that DEC investigate the air observation electronic mapping and download systems being developed and trailed in Victoria to determine their potential application in WA.

**DEC's response to GHD Recommendation 46**

Agree: DEC is actively exploring options for airborne remote sensing technology suitable to the department's fire management and land management needs.

**Identified Learning Point GHD 9.8 Potential Application of Thermal Imaging Technology**

One of the significant challenges in controlling heath-scrub fires is identifying hot spot and active fire locations and prioritising areas for containment action. Thermal imagery camera (TIC) technology has significant potential for application in heath-scrub fires.

**GHD Recommendation 47**

It is recommended that DEC, in partnership with FESA, examine the potential applications and benefits of combined infra-red/ multi-spectral line scanners (such as those used in NSW and Victoria) for fire management in WA, and develop an operational trial program for an appropriate line scanning system.

**DEC's response to GHD Recommendation 47**

Agree: See also the response to Recommendation 46. DEC is investigating the opportunity to contract services utilising this technology in Australia.

**GHD Recommendation 48**

It is recommended that DEC trial use of the FESA helicopter mounted FLIR unit in a range of forest, woodland and heath vegetation fires, to identify the operational applications in which FESA's current FLIR capacity may be of benefit during DEC operations.

**DEC's response to GHD Recommendation 48**

Agree: DEC will work with FESA to explore the opportunities presented by FLIR technology in monitoring wildfires.

**GHD Recommendation 49**

It is further recommended that DEC investigate the potential for current generation hand-held TICs to improve the prioritising and targeting of mop-up operations and develop an operational trial program to evaluate one or more units.

**DEC's response to GHD Recommendation 49**

Agree: DEC will continue to investigate the potential application of this technology to improve the focus of scarce resources to potential points of escape on the fire perimeter.

**Identified Learning Point GHD 9.9 Fire Training Programmes**

The primary purpose of this operational review is to identify lessons that can be learnt from Goldfields Fire 13, and make improvements to operational practices. A range of actions to improve operational practices have been identified in this review which will require implementation. Many of these will further require the review and amendment of training materials relating to the improved operational practice. A systematic approach to this task will need to be taken to ensure the full range of issues requiring amendments to training packages are attended to.

**GHD Recommendation 50**

It is recommended that DEC's fire training specialists review the suite of accepted recommendations in this report, to identify the range of training packages that will require updating to reflect any changes to operational practice arising from this review.

**DEC's response to GHD Recommendation 50**

Agree: DEC undertook an analysis of the findings of all the Boorabbin reviews and used this to amend or develop training programs. A priority was given to the focus areas and lessons learned as identified in the Operational Review.

DEC has devoted the entirety of its 3 day annual fire seminar for 2008 to providing key fire staff with information about the lessons learned from Goldfields Fire 13.

**GHD Recommendation 51**

As training packages may take some considerable time to review and update, it is further recommended that DEC conduct a series of workshops aimed at disseminating lessons learnt during Goldfields Fire 13 prior to the onset of the 2008/09 fire season. In order for DEC's fire fighting workforce to learn the lessons arising from Goldfields Fire 13 before the next fire season, suggested priority areas for workshops to focus on are:

- Road closure, opening and traffic management at fires;
- The fire appreciation process and situation analysis in planning;
- Fire behaviour prediction and the decision trap of over-reliance on generalised anecdotal based understandings of fire behaviour; also, the implications of drought affected fuels;
- Fire incident communications planning; and

- Operations – particularly tactics for control of heath type fires.

**DEC's response to GHD Recommendation 51**

Agree: See the response to Recommendation 50.

**Identified Learning Point GHD 9.10 Recovery**

The fatalities which occurred during the evening of 30 December 2007 resulted in a range of staff suffering differing levels of critical incident stress. Critical incident counselling resources were dispatched to the fire to undertake the process of post-incident stress management and counselling. The prompt arrival of critical incident counselling specialists to the fire, the efficient organisation for involved staff to receive counselling, and the manner in which the counselling was conducted was praised by staff and found to be of value. Beyond this general reflection that the procedures implemented were efficient and well received there was no more detailed analysis or post-incident review of the arrangements. This is possibly due to post-incident counselling not being listed as an agenda item for consideration during After Action Reviews and Post Incident Analysis.

**GHD Recommendation 52**

It is recommended that FOG 31 be reviewed to include critical incident response/counselling as a specific item for consideration under the 'recovery' section.

**DEC's response to GHD Recommendation 52**

Agree: DEC's staff counselling policy (Policy 42) has been amended to incorporate improved critical incident stress management procedures.

Managing trauma/stress during an incident will be included as an explicit function for the Safety Advisor in the incident management structure.

DEC has issued an instruction to ICs and line managers to ensure that Critical Incident Debriefs are conducted before personnel leave the incident or as soon as practicable when staff return to their workplaces.

A 'Working in an Emergency' booklet along the lines of the booklet produced by the Victorian Government – 'Working in an Emergency, Your Job, You and Your Family' will be developed and distributed throughout DEC.

Trauma counselling and stress management will be incorporated into all unit leader training courses

**GHD Recommendation 53**

It is further recommended that consideration should be given to reviewing the arrangements successfully implemented at Goldfields Fire 13 and incorporating these into a Fire Operations Guideline on critical incident response.

**DEC's response to GHD Recommendation 53**

Agree: A departmental guideline will be prepared to prescribe welfare response procedures, incorporating post incident counselling, for all types of critical incidents.

**Identified Learning Point GHD 9.10 Recovery**

After Action Reviews and Post Incident Analysis procedures were followed to review and learn from DEC's management of Goldfields Fire 13. Both AAR and PIA processes were applied and documented in each case, and have provided DEC management with a detailed list of incident management activities and processes that went well and areas and suggestions for improvement. What is not clear in existing guidelines (Fire Operations Guideline 31 – After Action Review and Post Incident Analysis) is the process to be followed in analysing and responding to the matters raised in DEC's AAR and PIA process. Additionally, DEC has commissioned an independent operational review of Goldfields Fire 13 (resulting in this review).

**GHD Recommendation 54**

For completeness, it is recommended that DEC review FOG 31 with a view to providing clarification and guidance on the following:

- a monitoring and review process to ensure that the matters raised during AARs and PIAs are appropriately responded to; and
- guidance on how to avoid duplication of effort in the PIA process that follows the AAR process, and how independent operational reviews fit in to the incident review and continuous improvement process.

**DEC's response to GHD Recommendation 54**

Agree: FOG 31 will be amended to incorporate the identification and management of lessons learned.

FOG 31 will include a requirement for all action items written in PIAs and AARs to include clear responsibility and deadlines for implementation. A process to audit the progress of implementation will be incorporated in FOG 31.

DEC has initiated (prior to the Boorabbin fire) a comprehensive training program for fireline leaders that incorporates the AAR process.

**Identified Learning Point GHD 9.10 Recovery**

After Action Reviews and Post Incident Analysis procedures implemented for Goldfields Fire 13 were not able to consider post-fire rehabilitation planning and implementation as these had not been completed at the time.

**GHD Recommendation 55**

It is recommended that an After Action Review be undertaken to consider the things done well and areas for improvement in the rehabilitation of Goldfields Fire 13.

**DEC's response to GHD Recommendation 55**

Agree: The AAR for Goldfields Fire 13, addressing post-fire rehabilitation of disturbed sites, has been completed.

## 16.2 Actions completed and actions proposed by DEC in response to the Recommended actions contained in the Post Incident Analysis

### 3.3.1 Fire Management History in the Goldfields Region (GFR)

**Recommended Actions**

1. Large fires in the GFR involving outside resources will integrate local staff into the IMT to best effect with the IC supported by a local senior officer as Deputy IC.
2. DEC will review research needs for fire behaviour modelling in the GFR and also consider what adaptations of existing knowledge and models can be applied.
3. The positive and negative operational experiences from Boorabbin will be built into training and awareness forums for IMTs so PFT staff will in future be prepared for the special fire management conditions that pertain in the GFR.
4. Fire management instructions will be amended to accommodate the improvements identified and accepted throughout the PIA process. Where they are specific to the special conditions of remote regions such as the GFR, they will be noted as such.

**DEC's Response to the Recommended actions**

1. This action is now routinely applied in all Regions.
2. See DEC's response to GHD recommendation 1.
3. See DEC's response to GHD recommendation 54.
4. See DEC's response to GHD recommendation 54.

### 3.4 Fire Preparedness

#### 3.4.1 Wildfire Threat Analysis and Fire Prevention Plan (WTA-FPP)

**Recommended actions**

1. The WTA-FPP for the crown lands between Coolgardie and Southern Cross will be reviewed and the suggested additions made for the 08/09 fire season and subsequent fire seasons.

2. The WTA-FPP will be used to capture multi agency improvements to fire prevention and preparedness in the Boorabbin National Park and other crown lands along the GEH.

3. DEC has commenced a project to ascertain the feasibility and benefits of extending the WTA-FPP to other regions.

4. DEC will work with road management authorities (MRWA and Shires) to initiate combined fire mitigation measures within road reserves, DEC-managed lands and other crown lands adjoining road reserves statewide

**DEC's Response to the Recommended actions**

1. See DEC's response to GHD recommendation 4.
2. See DEC's response to GHD recommendations 4, 5 and 6.
3. See DEC's response to GHD recommendation 5.
4. See DEC's response to GHD recommendations 2, 3 and 9.

#### 3.4.2 Incident Preparedness and Response Plan (IPRP)

**Recommended Actions**

1. The IPRP annual review for the GFR and other remote regions will include attention to pre-organizing machinery and other key services prior to the season, particularly for peak holiday periods.

**DEC's Response to the Recommended actions**

1. See DEC's response to GHD recommendation 7

#### 3.4.3 Fire personnel availability in Remote Regions

**Recommended Actions**

1. DEC will review standing orders for fire rosters and resourcing for remote regions such as the GFR considering the increasing land base managed and the limitations of distance and time for first response capability.

2. DEC's review of detention standing orders in remote regions will examine the capacity of regions to produce an adequate first response to fires, particularly Level 2 and Level 3 fires, and the relationship of that response capacity with the rostering of IMT staff in the south west regions. This matter will need to be considered in the context of risk management for multiple

fires across several regions in extreme weather conditions and also the logistical issues of time lags and distances involved in reinforcing remote regions.

3. DEC will examine the possibility of rostering by zone rather than region and link it to statewide preparedness levels.

**DEC's Response to the Recommended actions**

1, 2 and 3. DEC is continuing to review the options for rostering arrangements to ensure provision of adequate resources for remote regions.

**3.4.4 Contractor Resource Availability**

**Recommended actions**

1. Pre season fire planning will as far as possible include arrangements with local contractors to make fire fighting machinery and operators available particularly during high risk and holiday periods.

2. Basic fire fighter training will be provided to contractor's staff so their machinery operators can operate safely and effectively during fires. The IPRP is the appropriate place to document arrangements.

**DEC's Response to the Recommended actions**

1. See response to GHD recommendation 8.

2. The current practice for training of contractors' staff will be extended in line with requirements outlined in IPRPs.

**3.5 Initial Fire Response**

**3.5.1 Fire Detection and Notification**

**Recommended actions**

1. DEC will initiate consideration of improved fire reporting systems on highways with the relevant road management authorities (MRWA and Shires). DEC will assist with the fire reporting information needed for any advisory signs to be located on land managed by other agencies.

2. DEC will review its current systems and procedures for fire detection and reporting in the GFR and other remote regions to see if cost effective improvements can be made.

**DEC's Response to the Recommended actions**

1. See response to GHD Recommendations 9 and 10.
2. DEC will continue to utilize aircraft, satellite and public reporting information as the primary source for fire detection in remote regions.

**3.5.2 Fire Cause Investigation**

**Recommended actions**

1. DEC will continue to give emphasis to the requirements contained in FOG 52 in the training of DOs, ICs and IMT staff.

2. FOG 52 will be reviewed to see if any improvements are needed or any triggers require cross referencing with other initial fire assessment and resource dispatch guidelines.

3. DEC will continue to participate fully in the standing Bushfire Arson Investigation Team to ensure effective inter-agency collaboration to reduce the incidence of arson in Western Australia.

**DEC's Response to the Recommended actions**

1, 2, and 3. DEC is participating in a review, with the Police Arson Squad and FESA, to identify improvements in wildfire investigation and reporting.

### 3.6 Fire Assessment and Appreciation

#### 3.6.1 Declaring Wildfire Incident Levels

**Recommended actions**

1. FOG 83 will be reviewed and modified to further emphasise the strategic assessment of fire potential and other risks posed by the incident and the formal declaration of fire status at the earliest phase of the fire, with reassessments at appropriate junctures during the fire. 'Potential' and 'risk' will include all values that might be impacted.

2. Other standard guidelines and procedures that have some bearing on the declaration and recording of incident status will also be reviewed and coordinated with FOG 83.

**DEC's Response to the Recommended actions**

1. and 2. See DEC's response to GHD Recommendations 11 and 14.

#### 3.6.2 Strategic Appreciation of the Fire

**Recommended actions**

1. Strategic assessments of the potential of all wildfire incidents will be made as close to the time of detection of the fire as possible and discussed by the District and Regional Duty Officers. Dependent on the significance of the fire, the strategic assessment will be discussed with the SDO as soon as possible.

2. The quality, style and timeliness of strategic assessments of wildfire incidents will be commensurate with the circumstances of the fire and resources available. The focus will be on information content and insight rather than presentation quality. It is expected that strategic assessments will move from more subjective judgments in the initial phases of a fire to more quantitative and measured projections and risk assessments as information and resources improve in latter phases.

3. A declaration of the status of each fire will be made in accordance with FOG 83. FOG 83 will be reviewed and amended.

4. DEC's AIIMS/IMS Planning Section documents and procedures will be reviewed to ensure they are conducive to early assessment, appreciation and central reporting of the fire.

5. The function and scope of a DEC Emergency Incident Response Coordination Centre will be examined. Such a centre may present opportunities for improving the coordination of consultative decision making in reporting, assessing and declaring the status of fires and appropriate responses by DEC and other agencies.

6. Strategic assessments of Level 2 and Level 3 fires will be made at least once per shift and documented on IMS (ICS) forms covering Situational Analysis. Direct communication between the IC and the RDO/SDO to discuss the assessments will be made at least once per shift.

7. Strategic assessments of fires will cover the duration of the long term forecast, usually four days and pay particular attention to wind direction and fire intensity parameters.

8. Strategic assessments of fires will consider risks to people and major assets as well as the safety of fire fighters and produce key objectives and strategies for protecting these values.

Strategic assessments may identify primary objectives that are not about fire suppression. These assessments will be recorded on the appropriate IMS (ICS) form.

9. Formal training programs for IMTs, particularly ICs and POs, will emphasise the importance of the strategic assessment of incidents, the kinds of assessment required and the critical timeframes for these assessments. Preseason training will emphasise the same points.

NOTE: The Coordination Group recognizes that these principles are already part of the IMS used by DEC, but improvements can be made to written standard guidelines and procedures such as FOG 83 and ICS forms and a reorientation made that encourages IMTs to use the IMS procedures selectively and flexibly to meet the strategic assessment needs of each incident.

**DEC's Response to the Recommended actions**

1, 2, 3 and 4. See DEC's response to GHD Recommendations 14, 20 and 21.

5. DEC has approved the development of a State Incident Management Coordination Centre at its Kensington Operational Headquarters, subject to the availability of funds. A staged development of this facility is likely.

6. The duty statements for RDOs and SDOs have been amended to include the requirement for consultation with ICs on incident management strategies.

7, 8 and 9. See DEC' response to GHD Recommendations 14, 20 and 21.

**3.6.3 Fire Behaviour Prediction**

**Recommended actions**

1. FOG 83 will be revised using experience from the Boorabbin fire to include more specific guidance on the use and adaptation of the South Coast mallee heath fire tables to the mallee heath and shrub fuels of the GFR and the Wheatbelt Region.

2. The WTA-FPP for Crown lands between Coolgardie and Southern Cross will be amended to include a more specific reference to FOG 83 and advice on the prediction of fire behaviour in Boorabbin fuels. The same should be done for any other WTA-FPPs produced for remote region areas with mallee heath and shrub fuels.

3. Formal training courses and preseason briefings will instruct IMT staff on fire prediction in mallee heath and shrub fuels over the range of conditions and regions in which they occur. Formal training courses will present case studies of actual fires in mallee heath and shrub fuels that exemplify state of the art fire prediction procedures and techniques.

4. IMT staff will be required to make fire behaviour predictions in a number of timeframes each shift that allow the IC, RDO and SDO to make timely strategic assessments of the potential of the fire.

5. DEC will develop guidelines for minimum staffing of the Situation Unit (SU) at Level 2 and Level 3 fires such that the two key tasks of the SU, namely preparation of an IAP and critical predictions of fire behaviour, are adequately resourced.

6. Protocols for the transmission, receipt, consideration and interpretation of weather forecasts at the ICC and the Operations Point will be implemented.

7. The exchange of a disciplined and detailed consideration of the forecast for every shift and each substantial change in predicted weather conditions will be established as a formal requirement of IMS.

8. The presentation and consideration of actual fire behaviour and predicted fire behaviour will be a standard agenda item for IMT meetings.

9. DEC fire research scientists, along with FMS senior staff, will review current knowledge of fire prediction in all regions with reference to past and recent fires and identify priorities for further

research and adaptation of existing knowledge to fire prediction, particularly for remote regions with developing fire management and response regimes.

10. DEC fire research scientists and FMS senior staff will examine the outcomes of the Bushfire CRC research program (Project FUSE) from South Australia to evaluate their application to fire behaviour in similar Western Australian shrublands.

**DEC's Response to the Recommended actions**

1, 2 and 4 DEC will develop a set of guidelines for the use of shrubland fire tables and other prediction systems to determine the fire potential and their impact. This information will be applied by IMTs, RDOs and SDOs in the regular strategic assessments of wildfire incidents.

3. See response to GHD Recommendation 1.

5. DEC has amended the IMT structures (including PFTs) to ensure that the Situation Unit is adequately resourced.

6. See DEC's response to GHD Recommendation 26. DEC will amend FOG 18 to include these protocols.

7. DEC has amended the checklists for RDOs and SDOs to ensure that strategic assessments are carried out incorporate the recommendations from weather forecasts. DEC will amend FOG 80 to incorporate these requirements in the guideline.

8. See DEC's response to GHD Recommendation 21.

9 and 10. See DEC's response to GHD Recommendation 1.

### 3.6.4 Adequacy of Resources Allocated at Initial Dispatch

**Recommended actions**

1. IMT staff will be given training and awareness in the special conditions and constraints that apply to resourcing of fires in remote regions. This will be met by improved SOPs, preseason briefings and operational experience. Operational experience will be formally captured in After Action Reviews and Post Incident Analysis.

2. Fire crews attending remote region fires will be given training and awareness of the special conditions and constraints that apply to resourcing of fires in remote regions. This will be achieved through formal training courses, by maintaining knowledge of current SOPs, all fire fighters being involved in preseason briefings, and crew leaders participating in After Action Reviews and Post Incident Analysis.

3. District Duty Officers, Regional Duty Officers, Incident Controllers will be encouraged to take a considered approach to resourcing remote region fires that meets the special conditions and constraints that pertain to resourcing such fires. The SDO will also be mindful of the special conditions and constraints applying to resourcing remote region fires and where possible will ensure a sufficient buffer is built into the response, commensurate with prudent risk management elsewhere in the prevailing fire hazard and existing or potential resource deployment.

4. A DEC State Emergency Incident Management Coordination Centre will be evaluated and if feasible established as soon as possible.

**DEC's Response to the Recommended actions**

1 and 2. DEC will develop and implement a series of workshops on fire behaviour and suppression tactics for IMT, field staff and fire crews, based on the lessons learned from the Boorabbin wildfire incident.

3. See DEC's response to GHD Recommendation 15.

4. See item 5 under section 3.6.2 above

### 3.6.5 Preformed Team Dispatch Criteria

**Recommended actions**

1. FOG 91 will be reviewed to ensure that it provides appropriate procedures for the dispatch of PFTs.

2. FOG 91 will allow the SDO discretion in determining what elements of a PFT should be deployed to wildfire incidents.

3. ICs and SDOs will be encouraged to respond to higher order risks with a conservative PFT despatch (more resources rather than less), commensurate with the overall fire or emergency service demands and risks prevailing or expected throughout the State.

4. SDOs will be encouraged to consult other senior fire staff about the dispatch of PFTs when a Level 3 incident is likely to develop.

5. Pre season briefings to DOs and PFTs will include an explanation of FOG 91 to ensure there is a common understanding of its contents and intent.

6. ICs will be briefed on the application of FOG 91 and the need for them to specify their IMT resource requirements as early as possible and in the light of worst case scenario planning and situational awareness.

**DEC's Response to the Recommended actions**

1, 2 and 3. See DEC's response to GHD Recommendation 15.

4. DEC has incorporated this requirement in the revised SDO checklist and in pre-season briefings

5 and 6. DEC has provided briefings to DOs, ICs and PFTs prior to the start of 2008-09 fire season.

### 3.6.6 Fire Resources Support to Remote Regions

**Recommended actions**

1. DEC will undertake a strategic review of the current patterns of demand for fire research, fire management and fire suppression resources in remote regions and determine what priorities should receive attention.

2. Within the context of strategic priorities for resourcing remote regions, DEC will examine what improvements can be made to current fire management systems and arrangements and where appropriate adapt SOPs accordingly.

3. DEC will examine the prospects for benefits from improved mutual working arrangements with other agencies and LGAs to facilitate joint fire management and suppression initiatives.

4. The strategic reviews of priorities and systems will guide DEC in seeking assistance for remote region fire management and fire fighting from State and Federal Governments through the appropriate protocols.

**DEC's Response to the Recommended actions**

1 and 2 DEC will undertake a strategic review as a priority task for the Fire Management Services Reference Group.

3 and 4 See DEC's response to GHD Recommendation 6. DEC will continue to develop mutual aid working arrangements with Local Government Authorities, bushfire

brigades and other agencies (MRWA, Water Corporation, WAPOL, Western Power, Telstra, and FESA etc).

### 3.7.1 Fire Suppression Strategies and Tactics

**Recommended actions**

1. A review of fire fighting strategies and tactics for mallee heath fuels in the GFR will be undertaken and safe and effective methods documented.

2. Formal training programs for IMT roles will include coverage of fire fighting strategies and tactics in mallee heath fuels. Preseason briefings for PFTs will include updates on fire fighting strategies and tactics when appropriate.

3. The WTA-FPPs for the GFR, and similar regions, will describe approved strategies for fire fighting and for the implementation of fire protection works programs.

4. DEC will investigate the availability or procurement of a large chain for scrub rolling to enable rapid deployment during wildfires as well as increased availability for bushfire mitigation operations.

5. Accurate mapping of low fuel areas (natural, fire scars, woodlands) will be investigated and implemented if feasible as a basis for fire management plans and wildfire strategy planning. A detailed study of remote sensing techniques will be undertaken.

6. After Action Reviews and Post Incident Analysis for mallee heath fuel wildfires will review the effectiveness of fire fighting strategies and convert them into lessons learned.

**DEC's Response to the Recommended actions**

1, 3, 4 and 6. See DEC's response to GHD Recommendation 30.

2. See response to 3.6.4 (items 1 and 2) above.

5. DEC will utilize the funding received under the National Disaster Mitigation Programme to use remote sensing to map fire scars and natural low fuel zones within the Goldfields and South Coast Regions.

### 3.7.2 Operations Point

**Recommended actions**

1. DEC will undertake a feasibility study of portable facilities for OPs and field based ICCs, specifically accommodation (caravans, dongas, shipping containers and tents), a command unit and supporting infrastructure.

2. DEC will consider the organizational, industrial, financial, logistical and administrative issues associated with on site accommodation and long stay facilities at OPs.

3. Additional mobile communication units will be established and deployed to facilitate better communications at OPs in the future.

4. The establishment of large and long stay OPs will be serviced by sufficient Management Support and Staging Area staff.

5. Guidelines for the selection of the OP will be prepared.

6. Guidelines for the planned relocation or emergency evacuation of the OP will be prepared.

7. Preseason planning will include the identification of suitable OPs that will be documented in the IPRP and any WTA-FPPs for high priority risk areas.

**DEC's Response to the Recommended actions**

1 and 2. See DEC's response to GHD Recommendations 33, 34a and 34b.

3,4,5,6 and 7 See DEC's response to GHD Recommendations 12 and 33.

### 3.7.3 Incident Control Centre

**Recommended actions**

1. The Kalgoorlie Regional office will be permanently set up for emergency power supply connection. Access to an emergency power supply unit will be organized prior to the 2008-09 fire season.

2. A full suite of radio communications equipment will be fitted to the office so that all radio bands relevant to fire fighting can be accessed

3. GFR staff will maintain a stock of office and administrative supplies for support of an incoming IMT as part of pre season preparations. The IPRP will continue to list suppliers of essential stocks, materials and services, particularly contacts for after hours and holiday periods.

4. Similar contingency arrangements will be reviewed for other DEC offices that could be candidate ICC locations for large incidents.

**DEC's Response to the Recommended actions**

1. DEC has installed the capacity for emergency power supplies at the Kalgoorlie Regional office.

2. DEC has installed WAERN VHF/UHF radios in all Goldfields Region vehicles. DEC is in the process of establishing linked VHF High band repeaters between Kalgoorlie and Merredin.

3 and 4. DEC has implemented these recommendations.

### 3.7.4 Fire Operational Guidelines

**Recommended actions**

1. Improvements to FOGs will be implemented as highlighted throughout the PIA and also as described in the document *Findings and Actions from Inquiries Conducted by the Department of Environment and Conservation into the Boorabbin Fire - 28 December 2007 – 8 January 2008* and as acknowledged in DEC's response to the GHD Operational Review. The review of FOGs will consider their application to remote areas such as the GFR.

**DEC's Response to the Recommended actions**

1. DEC has reviewed and developed nine key FOGs that incorporate the lessons learned from the Boorabbin wildfire incident.

## 3.8 Special Constraints in the Goldfields Region

### 3.8.1 Travel Distance Times to Remote Regions

**Recommended actions**

1. Resource dispatch procedures (such as FOG 59) will be examined to see if the distance factor is adequately covered for remote region incidents.

2. DEC will examine the practicalities, costs and staff issues associated with portable accommodation facilities that can be located closer to the OP and fire ground to reduce travel times and decrease dependence on scarce or unavailable local accommodation particularly in remote regions.

3. IMTs will be encouraged to review their requirements for remote region incidents and to conduct post incident analysis of special issues that arise from their experience with distance and time in remote region incidents they attend.

4. The special conditions relating to distance to remote region incidents will be emphasized in DEC fire training courses for IMT leaders and DOs.

5. IPRPs will note the distances and travel times to remote region fire areas to assist resource logistics calculations.

6. Improved arrangements for reliable availability of charter aircraft will be sought for the peak fire season period.

**DEC's Response to the Recommended actions**

1, 4 and 5 The distance factor is considered in the development of dispatch orders.

2. See DEC's response to GHD Recommendation 33.

3. See DEC's response to GHD Recommendation 54.

6. DEC has increased its capacity to ensure reliable availability of charter aircraft.

### 3.8.2 Use of Aircraft

**Recommended actions**

1. DEC will continue to use aircraft as effective tools at remote region fires for transport, intelligence gathering, safety procedures, monitoring of fire behaviour, transport to and around fires and communications between the ICC and the OP.

2. Aircraft operations for fires are effectively managed through the considerable air work experience of Fire Management Services Branch and supported by the AIIMS functional structure of an Air Operations Group under the command of the OO. These practices are already effective and will continue to undergo development and improvement in the future within the overall DEC aviation management arrangements.

3. DEC will look into the availability and condition of strategic airstrips in remote areas, particularly those near likely OPs as part of pre season preparations and updating of IPRPs.

4. Complementary modes of transport will be used to overcome load limits on ferry aircraft, such as follow-up ground support vehicles.

5. Improved radio links to aircraft working at remote region fires will be put in place.

6. It is not envisaged that water bombers will be deployed routinely to GFR fires as they have for the South Coast Region and the Mid West Region. The use of water bombers, especially for asset protection, will be assessed on a case by case basis.

**DEC's Response to the Recommended actions**

1, 2, 4, 5 and 6. Agreed.

3. DEC will continue to review the availability of strategic airstrips in remote areas.

### 3.8.3 Use and availability of Water in Remote Region Fires

**Recommended actions**

1. Training of IMT members and fire crews for attending remote region fires will include dry fire fighting techniques that work with limited water supplies.

2. Safety awareness training of IMT members and fire crews attending remote region fires will include advice on safe operating procedures that are not dependent on water supplies. The customary safety procedure of never running tanks dry will continue to be emphasized.

3. The establishment of water take-off points (hydrants/standpipes) at key sites along the Goldfields Water Supply pipeline will be investigated.

4. Preseason planning and preparation in remote regions with limited water supplies will identify and organize access to whatever water supply infrastructure and plant is available. This process will include large water tankers and access to more hydrants off the GWS pipeline, if cost effective. The measures will be documented in the IPRP and WTA-FPP where appropriate.

5. Maintenance of a strategic network of access tracks in trafficable condition is essential for gaining access to fires and for developing strategies that use existing fuel types to advantage.

6. Reliable information on the condition of fuels is required to plan fire suppression strategies that make full use of low fuel areas and facilitate dry fire fighting techniques.

**DEC's Response to the Recommended actions**

1 and 2. Training in the use of dry firefighting and safe operating procedures will continue to be provided by DEC.

3 and 4. Completed.

5 and 6. Agreed. See also 3.7.1 (Item 5) above.


**Figure 34 One of several new hydrants installed on the Goldfields Water Supply pipeline between Southern Cross and Kalgoorlie to provide improved access to water supplies during wildfire incidents.**

### 3.8.4 Vulnerability of Tyres

**Recommended actions**

1. A supply of tyres (a cache) will be available within DEC for automatic dispatch to similar fires in the future. Both heavy and light vehicles tyres will be included.

2. DEC training of Crew Leaders, SCs, OOs and LOs will include the lessons learned for remote region fire fighting, including the risk and implications of tyre staking.

**DEC's Response to the Recommended actions**

1. See DEC's response to GHD Recommendation 32.
2. See DEC's response to GHD Recommendations 50 and 51.

### 3.8.5 Communications in Remote Regions

**Recommended actions**

1. DEC will continue to upgrade of its field-based mobile and fixed communications and IT facilities that will resolve the technical issues experienced at the Boorabbin fire.

2. The mobile VHF repeater system will be improved to cater for the expected conditions of remote region fire grounds.

3. IMT staff, particularly Planning Section, will receive additional training in communications and IT procedures and facility management.

4. Staff will be routinely trained in the use of satellite phones.

5. Staff filling roles in the Communications Planning Unit who prepare and monitor the Communications Plan will receive specialist technical training and guidance on the preparation of Communication Plans.

6. There will be an emphasis on the production of a communications plan at incidents where communication challenges or complexities might be experienced.

7. Specialist communication and IT staff will be sent to fires at an early stage when necessary.

8. Mobile communications units will be deployed to fires at an early stage when communications challenges or complexities might be experienced. DEC will review if there are sufficient mobile repeaters available for remote region fires.

9. DEC will ensure that interagency communications are provided for through participation in the WAERN program.

10. DEC will continue to ensure there is effective communications for aircraft SAR watch in remote regions that comply with CASA regulations and the facilities and procedures provided by Air Services Australia

11. The transmission of digital data and complex documents by satellite and the web will be enabled through the Department's review and upgrade of its communications and IT fixed and mobile systems for fires in remote regions.

12. DEC will investigate the use of UHF (CB) radios (through the WEARN system) and if useful include in the mobile communications capability to enable radio traffic monitoring and transmission with travellers using this system. Radio communication protocols and procedures will be developed accordingly.

**DEC's Response to the Recommended actions**

1 and 2. See DEC's response to GHD Recommendation 13.

3, 4, 5 and 6. See DEC's response to GHD Recommendation 17 and 51.

7 and 8. See DEC's response to GHD Recommendation 17.

9. See DEC's response to GHD Recommendation 41.

10. See DEC's response to GHD Recommendation 45.

### 3.9 Fire Weather

#### 3.9.1 Weather Forecasts

**Recommended actions**

1. Training of IMTs will continue to emphasise the critical importance of the weather forecast in all situations.

2. Training of IMTs will include skills development in reading, interpreting and applying forecasts.

3. The presentation of critical warnings or special information in forecasts will be reviewed to see if they can be made more prominent to the reader. Any recommendations will be presented to BOM for their consideration.

4. Protocols will be established for obtaining, handling, sharing, transmitting and receiving forecasts within IMTs and Duty Officer networks.

5. The SDO will discuss the forecast with IMTs at least once each shift, in addition to the routine dissemination and discussion of forecasts through the standard daily telephone conferences with duty officers. All regions DOs, the SDO, and a representative of any current IMTs will participate in all scheduled daily teleconferences.

6. IMT officers will be required to discuss the forecast with either the RDO, SDO or SOO at least once each shift. IMT officers will be encouraged to discuss the forecast with the BOM duty officer via the established protocol.

7. ICs will ensure that appropriate general and spot forecasts are obtained and disseminated throughout the IMT and they are read and understood.

8. POs will ensure that the presentation, discussion and interpretation of the forecast and forecast updates is a standard agenda item on IMT and Planning Unit meetings.

9. POs and SOs will assess the range of fire behaviour possible within the forecast parameters (and other fire variables), including a 'worst case scenario' for strategic planning purposes and risk management.

10. SDOs, ICs and POs will ensure that they have a sufficiently skilled and experienced fire behaviour analyst in their IMT at L3 fires who is dedicated to the production of timely fire behaviour predictions based on interpreting forecasts and is not unduly distracted by other planning tasks.

11. The interpolation and application of mallee heath tables to the GFR and Wheatbelt Region will be documented with particular reference to the forecast weather conditions that are preconditions to the use of the table. Training in the use of the tables with reference to relevant interpretation of the weather forecast will be undertaken.

NOTE: The Coordination Group acknowledges that these recommendations are already part of traditional practice and also happened to varying degrees within the Boorabbin IMT. However, the Boorabbin experience indicates the need for increased emphasis and discipline in the application of these principles and practices including the adoption of any improvements made to written SOPs.

**DEC's Response to the Recommended actions**

1,2,3,4,5,6,7,8,9 and 10. See DEC's response to GHD Recommendation 26.

11. See DEC's response to 3.6.3 (Item 1) above.

**3.10 The Incident Management System**

**3.10.1 Incident Action Plans**

**Recommended actions**

1. DEC will review the ICS templates, particularly Situation Analysis and make any improvements necessary to ensure that it elicits a strategic appreciation of the potential of the fire over an extended timeframe so the full scope of the incident and the response needed can be ascertained as early as possible.

2. DEC staff training on ICS IAP will emphasise the intent and purpose of each section of the IAP and stress a focus on the insights and outcomes rather than the process or product. Adaptive use of the system to achieve strategic, pragmatic and timely outcomes is the main message. This approach needs to be balanced against the elements of the system that experience has shown are essential for effective and responsible record keeping and formal justification of decisions made.

3. Technical training of Planning Unit staff will need to include the application, adaptation and limitations of using mallee heath fuel tables for fire behaviour computations.

4. Training of all IMT leaders and Planning Unit staff will make close and disciplined attention to the reading and interpretation of the weather forecasts (general and spot forecasts) absolutely mandatory. A system of automatic sharing and discussion of the weather forecast in IMT meetings will be instituted. Confirmation of receipt of forecasts will be a communication protocol.

5. The SDO and RDO will pay particular attention to the resourcing of the Planning Unit if there is a risk of insufficient strategic intelligence output from the IMT. The anticipation of resource requirements for any fire will continue to be a blend of the fire classification, prevailing hazard, other fire commitments and overall risk assessment and judgement by the SDO and IC, shared as appropriate with other senior staff.

6. The SDO and the RDO will maintain adequate situational awareness of remote region incidents by the receipt of appropriate and timely IAP Situation Analysis reports from the IC.

7. ICs will be reminded to expect a strategic assessment and longer term projection of the fire as an early task for the Planning Unit. ICs will be required to share this with the SDO.

8. A general guideline will be given to ICs, SDOs, RDOs and POs; that Situation Officers should be adequately resourced to ensure continuous incident analysis and prediction. If a fire requires the services of a Situation Officer then the production of a Situation Analysis should be their prime task. The situation analysis is a primary component of the IAP.

**DEC's Response to the Recommended actions**

1. See DEC's response to GHD Recommendations 20 and 21.
2. See DEC's response to GHD Recommendation 20.
3. See DEC's response to 3.6.3 (Item 1) above.
4. See DEC's response to GHD Recommendation 26.

5, 7 and 8. See DEC's response to 3.6.3 (Item 5) above.

6. See DEC's response to GHD Recommendations 14, 20 and 21

### 3.10.2 Fire Maps

**Recommended actions**

1. IMTs will use all forms of map products in a timely way to inform the RDO, SDO, and other agencies.

2. The production of fire prediction maps will be given high priority by IMTs for all wildfire incidents.

3. Formal fire training and preseason briefings will emphasise the importance of taking a flexible approach to timely map production and explain the capacities and limitations of the existing and incoming new systems.

4. DEC will deploy the new communications pantechnicon vehicle with additional mapping facilities during the 2008/09 fire season for operational trials. The existing communications buses will be maintained and improved for routine incident management operations.

5. DEC will investigate the technical options for capturing and transferring graphical information from aircraft.

6. SDOs will give priority to dispatching GIS staff to fires with Level 3 potential as soon as possible in the first shift. Partial IMT deployments will include a GIS Situation Mapping Officer as the default dispatch.

7. Deployment should include a Situation Mapping Officer to the OP to gather and transfer information to the ICC and to assist intelligence flow at the OP.

8. DEC will seek resources to acquire equipment that is capable of mapping the fire boundary at night from the air (Line Scanner, FLIR, unmanned aircraft or similar).

**DEC's Response to the Recommended actions**

1, 2, 3, 6 and 7. See DEC's response to GHD Recommendation 16, 17 and 23.

4. See DEC's response to GHD Recommendation 17.

5. and 8. See DEC's response to GHD Recommendations 46 and 47.

## 3.11 Managing Road Traffic

### 3.11.1 Traffic Management

**Recommended actions**

1. A Vehicle Control Point (VCP) Guideline that is common to all agencies involved in road traffic management at bush fires will be prepared. The Guideline must cover all aspects of establishing, managing and dismantling VCPs with clear designation of responsibilities and prescription of procedures. *Guidelines for the Operation of Road Closures during Bushfires* has been completed for use during the 2008/09 fire season. The agencies participating in the drafting of the VCP Guideline include WAPOL, MRWA, FESA, DEC, and representatives of local government.

2. The VCP Guideline will cover community support and welfare procedures for travellers collecting at VCPs.

3. The VCP will deal with the role of the risk assessment procedure by the HMA that determines the establishment, management and dismantling of roadblocks.

4. DEC will review and improve FPI 75, now appearing as FOG 75, to cover the lessons learnt from Boorabbin and to mesh seamlessly with the new VCP Guideline. In particular FOG 75 will instruct DEC IMTs on the calling, establishment and risk assessment processes that determine the opening and dismantlement of road blocks. DEC staff will have clear guidance

on their HMA responsibilities and those of other agencies and how they work together. An emphasis will be placed on notifying the appropriate contacts within other agencies involved in VCPs.

5. DEC staff will be trained in the use of FOG 75 and the VCP Guideline prior to the 2008/2009 fire season and subsequent fire seasons. Any necessary equipment will be procured.

6. DEC's ICS procedures and documentation will be amended to accommodate the provisions of FOG 75 and the VCP Guideline. DEC staff and IMTs will be trained in the use of the changes made to the ICS.

7. DEC will examine the application of FOG 75 and VCP Guideline to DEC's prescribed burning operations that might affect public roads and make appropriate adaptations to procedures for prescribed burning.

8. DEC will recommend the establishment or improvement of roadside rest areas on the GEH and other major highways to MRWA through the auspices of SEMC that might serve better VCP arrangements in the event of wildfires near highways in remote areas.

**DEC's Response to the Recommended actions**

1,2,3,4,6 and 7 See DEC's response to GHD Recommendations 35, 36, 37, 39 and 40.

5. See DEC's response to GHD Recommendation 39 and 40.

8. See DEC's response to GHD Recommendation 2.

### 3.12 Interagency Operations

#### 3.12.1 Agencies at the incident

**Recommended actions**

1. A whole of Government Vehicle Control Point Guideline must be prepared and actively adopted by all relevant agencies.

2. DEC will recommend through appropriate forums, that other agencies involved in bushfire incidents that they have the necessary SOPs and training to enable efficient participation in AIIMS IMS actions where DEC is the HMA.

3. DEC will review and improve FOG 83.

4. DEC IMT staff and DOs will be trained to implement the revised FOG 83.

5. DEC IMT staff and DOs will be retrained in the SEMC Policy 7 and emergency management arrangements, particularly WESTPLAN - BUSHFIRE.

6. DEC DO staff will establish OAMGs and DEC IMT will establish IMGs in accordance with FOG 83 and WESTPLAN - BUSHFIRE.

7. SDOs will provide advice to DEC ICs on when and how to call an OAMG for all Level 3 incidents.

8. Pre season planning will include the documentation of all information required to quickly and efficiently establish an OAMG or IMG. The IPRP will include the necessary contact information.

9. Regional Managers with the assistance of Fire Coordinators will be encouraged to make personal contact with the key agency managers that comprise their local OAMG prior to each fire season.

10. DEC regions will participate in any joint training or exercises conducted by other agencies to foster OAMG preparedness and efficiency. Where necessary, DEC will instigate such initiatives through DEMC and LEMC processes.

11. DEC will actively participate in all relevant OAMG activities and deliver any promised follow-up actions for OAMGs.

**DEC's Response to the Recommended actions**

1. See DEC's response to 3.11.1 (Item 1) above.

2. Agreed

3 and 4. See DEC's response to GHD Recommendation 14.

5, 6, 7 and 8. See DEC's response to GHD Recommendations 14 and 19.

9, 10 and 11. Agreed.

### 3.13 Public Information

#### 3.13.1 Information provided to the public

**Recommended actions**

DEC will amend AIIMS documents and conduct appropriate training and awareness sessions to achieve the following:

1. The SDO will place a high priority on the early provision of an Information Services Unit (ISU) to Level 2 or Level 3 fires that are likely to have significant impact on the public, public interest, other diverse stakeholders or high value assets.

2. Subject to the SDO's discretion an ISU will accompany the dispatch of a partial PFT to a Level 2 fire, and a PFT dispatched to a Level 3 fire will include an ISU.

3. ICs and POs will avoid allocating primary ISU duties to SOs if possible.

4. Media releases will be approved and signed by the IC and issued through the PCO. The SDO will monitor the IMT's media releases to ensure that they are technically correct and are adequately covering the identified risks.

5. ISUs in IMTs will provide liaison between the SDCA Media Officer (MO) and the IC to facilitate efficient contact and exchange of information.

6. ICs, SDOs, and MOs need to be especially attentive to public information that deals with risk assessment and public safety to ensure that the communiqués are clear and impart the correct information and message. The IC must ensure that risk assessments done by the IMT are presented and explained to the SDO and MO prior to the preparation of information bulletins so they can be correctly rendered as public statements.

7. DEC will highlight, as specified in DEC's Guide to Media Relations Information Services for Incidents, that the MO will ensure that copies of Fire Updates are emailed/faxed through to FESA and Police Operations and all other combat and support agencies involved, as necessary.

8. The IMT and the Principal Communications Officer (PCO) will ensure that all DEC information on an incident is coordinated.

**DEC's Response to the Recommended actions**

1. Not applicable.

2, 3 and 4. See DEC's response to GHD Recommendation 27.

5, 6, 7 and 8. DEC will apply these protocols.

### 3.14 Qualifications of Staff

**Recommended actions**

1. There will be a presumption that fires with the potential to become a Level 3 incident will require a Level 3 IC.

2. PFTs will be led by Level 3 ICs.

3. Level 3 fires will be led by Level 3 ICs.

4. SDOs will pay heed to the lead times for upgrading resource commitments in remote regions considering the potential of the fire to escalate.

5. DEC will review its formal classification of the training, experience and qualifications of Level 1, Level 2 and Level 3 ICs and do the same for the other key leaders of IMTs (OO, PO, LO). The parameters describing the levels will be documented.

6. DEC will continue to develop and deliver appropriate formal nationally accredited training courses for the key IMT leadership roles.

7. The 'red card' system of practical fire competency will be reviewed and improved if necessary.

8. DEC will put particular effort into the development of fire competency and the progression of staff though the formal levels of competency using formal training, informal training, mentoring and experience on the job. DEC will have a view to successional planning and the long lead times to develop higher level fire management staff.

9. DEC will strongly support the staff involved in the Boorabbin fire to continue to develop their fire management skills and ongoing contribution to fire management and incident management operations.

**DEC's Response to the Recommended actions**

1 and 3. Agreed.

2. PFTs at Level 2 incidents may be led by a Level 2 IC.

4 See DEC's response to GHD Recommendation 15.

5 and 6. DEC will continue to review the qualifications required to fill key IMT roles and will develop and deliver appropriate training courses for these roles.

7. DEC will review its Red Card system on an annual basis.

8 and 9. Agreed.

### 3.15 Safety

#### 3.15.1 Safety Considerations at the Fire

**Recommended actions**

1. The role of the Safety Advisor in the IMT and ICS should be inclusive of all of the safety responsibilities that pertain to the HMA (DEC). It should be a strategic level overview as well as a tactical SOP level. It will include responsibilities detailed in FOG 75.

2. FOG 75 will be improved to include the lessons learned at the Boorabbin fire and to integrate with the interagency VCP Guidelines.

3. ICS Section 3.4 Divisional and Sector Transport Plan should be broadened to incorporate the provisions of FOG 75 so it fully integrates with the interagency VCP Guidelines.

4. Major roads within fire grounds should be considered for designation as a 'Traffic Management Division' with specific Divisional planning included in the IAP. The Road Traffic Management Division will need to fully integrate with FOG 75 and the VCP Guidelines that allocates responsibilities and sets out functions.

5. The safety SOPs so effectively applied to DEC staff at Boorabbin will continue to be supported with all of DEC's training, briefing and AAR/PIA processes to reinforce their continued use.

6. Fire fighting strategies and tactics for mallee heath fuels and remote area fires will highlight the special safety features that apply to fires in these areas.

7. Communications systems will be improved and be mobile to cover all communications needs in remote area incidents.

8. A cache of truck tyres will be procured for prompt dispatch to remote area fires where there is a risk of excessive tyre staking.

9. SAR watch for aircraft in remote areas will meet normal DEC standards.

**DEC's Response to the Recommended actions**

1. Agreed. The role statement for the Safety Advisor will be amended to incorporate this recommendation. See also DEC's response to 3.11.1 above.

2. See DEC's response to 3.11.1 above.

3, 4 and 5. Agreed.

6. See DEC's response to 3.7.1 (Item 1) above.

7. See DEC's response to 3.8.5.

8. See DEC's response to GHD recommendation 32.

9. See DEC's response to GHD recommendation 45.

**3.15.2 The Management of Fatigue**

**Recommended actions**

1. Duty Officers will recognize the special constraints of time and distance in remote region incidents that can affect fatigue experienced by fire fighters and the special difficulties of managing that fatigue.

2. The special constraints in remote region incidents affecting logistics will be taught in formal LO training courses.

3. IPRPs will preplan accommodation for fire crews, IMTs and PFTs.

4. DEC will investigate strategies for forward basing more staff in closer proximity to the OP.

5. DEC's fatigue management system at fires will continue to be rigorously applied.

6. Improved technology systems for tracking the duty time of staff will be developed for more efficient fatigue management.

7. Fly-in, fly-out systems (aircraft), or like-for-like resource replacement or rotation by road vehicle will be investigated where established accommodation is inadequate and opportunities for forward basing of staff are limited.

**DEC's Response to the recommended actions**

1 – 7. See DEC's response to GHD Recommendation 41.

**3.16 Training**

**3.16.1 Staff Training Before and After the Fire**

**Recommended actions**

1. Priorities for DEC's fire training program will be reviewed with reference to the recommendations emerging from the Boorabbin wildfire incident.

2. Training of IMT staff and Duty Officers in the use of the VCP Guideline will occur prior to the 2008/09 fire season.

3. Pre season training in the application of the revised FOG 75 will occur prior to the 2008/09 fire season and subsequent fire seasons.

4. Pre season training of IMT staff and Duty Officers will occur to explain the changes to DEC's ICS forms and procedures, particularly the strategic assessment and projection of wildfires.

5. Training of IMT staff, particularly Planning Unit staff in PFTs, in the adaptation and use of mallee heath fire prediction tables in several relevant regions will be implemented.

6. Implement training as listed in recommendations for other Sections of the PIA.

**DEC's Response to the Recommended actions**

1, 2, 3 and 6. DEC has provided pre-season training in the management of VCPs at bushfires. This training was conducted at the commencement of the 2008-09 fire season. See also DEC's response to GHD Recommendations 50 and 51.

5. See DEC's response to GHD Recommendation 1.

**3.17 Critical Incident Management and Staff Welfare**

**3.17.1 Critical Incident Review Process**

**Recommended actions**

1. Develop a checklist for the management of emergencies and critical incidents on DEC-managed lands and waters, based on a model provided by the Country Fire Service in South Australia. The checklist will include the use of an AIIMS style incident response team to manage all aspects of the aftermath to critical incidents; guidance for liaison with people other than DEC staff affected by an incident; incident review processes; and staff welfare requirements.

2. Develop improved policy (update Policy 42) and procedures for dealing with Critical Incident Stress and conduct training to ensure that ICs, IMT leaders and line managers understand the requirements. Consider drafting a FOG that will provide guidance for team leaders.

3. Issue an instruction to ensure that CIS debriefing is carried out for all staff exposed to critical incidents, preferably before they leave the incident, and if not as soon as possible after they return to their workplaces.

4. Prepare a "Working in an Emergency" booklet, based on the Victorian model, for DEC staff. Check with other Western Australian EM agencies to offer a collaborative approach.

**DEC's Response to the Recommended actions**

1 and 3 DEC has completed these actions.
2 and 4 DEC has initiated these actions and development of the policy and the booklet is well advanced.

## EPILOGUE

The Department of Environment and Conservation expresses its deepest sympathy to the families and friends of Lewis Bedford, Robert Taylor and Trevor Murley who tragically died in the Boorabbin fire.

During the Service of Remembrance that was held on 30 December 2008, one year after the tragic incident, the following words were spoken:

**"Their deaths will affect us in sharpening up our caring actions, in resolving to find better ways of dealing with the ongoing threat of fire in this country, and will sharpen up our resolve to make sure that others not directly connected with fire events are able to clearly know and support us in our actions.**

**Today as we gather at this site of the road deaths last year, we can turn to each other in care and support. This is an opportunity to know that we are all interconnected, and that what hurts one of us hurts us all."**

These words were chosen by Rev Dr Anna Killegrew who, together with Rev Peter Harrison of Koorarawalyee Retreat, hosted the Service of Remembrance.

**Trevor Murley**

**Robert Taylor**

**Lewis Bedford**

# APPENDICES

DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
*Conserving the nature of WA*

# POLICY STATEMENT NO. 19

# FIRE MANAGEMENT POLICY

## 1. OBJECTIVE

The Department will manage prescribed fire and wildfires on lands managed by the Department to protect and promote the conservation of biodiversity and natural values whilst also providing for protection of human life and community assets. The Department will also promote fire management that protects biodiversity on lands not managed by the Department.

Fire management will be planned and implemented in partnership with other landowners and land managers, fire authorities and the community. The Department will implement an informed and balanced approach to risk management. A variety of fire regimes incorporating different frequency, intensity, season and scale will be applied at the landscape scale on lands for which the Department has a fire management responsibility.

## 2. BACKGROUND

The rationale and the principles upon which this policy is based are provided in the Appendix.

## 3. LEGAL BASE

- Sections 33(1)(a) and 33(3) of the *Conservation and Land Management Act 1984* (CALM Act) provide for the Department to manage lands to which the Act applies, according to management plans or, in the absence of a management plan, in accordance with the necessary or compatible operations provisions of the Act depending on the land category. Fire management activities are subject to these provisions.

- The *Bush Fires Act 1954* applies to land throughout the State including Department-managed lands. The provisions of the Bush Fires Act do not, however, affect the provisions of the CALM Act and the Department is generally not bound by the Bush Fires Act.

- Section 39 of the Bush Fires Act provides wide-ranging powers for a bush fire control officer to take necessary steps to extinguish a fire. If an authorised CALM Act officer is present at a fire on or near any Crown land, the officer may take supreme control of the fire as if the officer were a bush fire control officer appointed by a local government authority. The Bush Fires Act also provides other powers to designated Departmental officers. Section 56 of the Act imposes a specific duty on an authorised CALM Act officer to take enforcement actions under the Bush Fires Act (eg. to demand the name and address of an offender, to require a person to produce an authorisation to light a fire, and to apprehend an alleged offender without a warrant).

- The *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* provide special protection to threatened species (both Acts). The Commonwealth Act also protects threatened ecological communities. These impose an obligation to conduct fire management activities accordingly.

- Under common law, the Department falls under a duty as an occupier to take all reasonable care to eliminate or minimise foreseeable risks of harm. The Department could be held liable for injury or loss caused by fire that a Departmental employee had negligently lit or negligently failed to control.

- In July 2003 the Department was allocated the role of managing fire preparedness on non-metropolitan, non-townsite unallocated Crown land and unmanaged reserves. The responsibility for fire suppression on these lands remains with local government.

- Under the Western Australian Emergency Management Arrangements that are outlined in the State Emergency Management Committee Policy Statement No 7, the Department is recognised as the Hazard Management Agency (HMA) for wildfires on or near CALM-managed lands. Under these arrangements, the HMA "is responsible for ensuring that emergency management activities pertaining to the prevention of, preparedness for, response to and recovery from a wildfire are undertaken". The HMA's responsibilities include the preparation of a strategic plan or arrangements (WESTPLAN-WILDFIRES) that is designed to cope with wildfires on or near CALM-managed lands, and that includes details of joint agency operational arrangements.

## 4. RELATIONSHIP TO OTHER DEPARTMENTAL POLICIES

The Department's Fire Management Policy is consistent with and recognises the requirements contained in other Departmental policies:

- Policy 3 Management of Phytophthora and Disease caused by it
- Policy 9 Conservation of Threatened Flora in the Wild
- Policy 10 Rehabilitation of Disturbed Land
- Policy 31 Management of Reserves for the Conservation of Nature
- Policy 40 Road Management
- Policy 41 Beekeeping in Public Land
- Policy 49 Radio Communications
- Policy 60 Occupational Health and Safety
- Media Relations Policy
- Public Participation Policy
- Wilderness Policy

## 5. POLICY

### 5.1 Safety and Risk

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| Safety | Firefighter and public safety is the first priority in every fire management activity. |
| Risk management | The protection of human life and biodiversity, cultural and community assets will be undertaken commensurate with the risk posed by fire to human life and those assets and the consequence of fire impacting on human life and those assets. |

## 5.2 Use of Fire

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| Objectives for fire management | Fire will be used to achieve a range of land management objectives, including the conservation of biodiversity; maintenance of ecosystem health and productive capacity; conservation of soil, water and catchment values; conservation of natural and cultural heritage; regeneration and protection of native forests and plantations; and protection of human life, community assets, indigenous heritage sites, recreation sites and scenic values. These objectives, and the methods used to achieve them, will be specified in individual burn prescriptions. |
| Prescribed burning | Prescribed burning plans will integrate biodiversity conservation and asset protection objectives in order to optimise outcomes. In the planning of prescribed burning programs the assessment of fire requirements for biodiversity outcomes will be given first consideration and any shortcomings from this approach for other objectives will be taken into account subsequently so that prescribed burn plans achieve all priority objectives. |
| Manage for diversity | A variety of fire regimes incorporating different frequency, intensity, season and scale will be applied at the landscape scale (tens of thousands of hectares) and other scales. Planned fire regimes will incorporate the incidence of wildfires. |
| Fire planning | Planning for prescribed burns will incorporate the need for biodiversity conservation and strategic protection from wildfires, at both the landscape scale and land management unit scale (several hundred to several thousand hectares). Three year indicative prescribed burning plans and annual burning plans will be prepared. The planning and application of fire regimes will require consideration of interacting factors such as invasive species (weeds and feral animals), regeneration of native species, grazing impacts, fire history and the size of the park/reserve/forest. This is of particular concern in fragmented landscapes where Department-managed lands are surrounded by extensive urban and agricultural land uses. |
| Community consultation | During the planning process for prescribed burning the Department will consult with traditional owners, the community, government agencies and specific stakeholders. In particular a formal process of public consultation and engagement will be implemented during the preparation of the three year indicative prescribed burning plans for the south-west forest regions and annual plans for other regions. Fire management will be considered during public consultation on the content of area management plans prepared for the Conservation Commission. Consultation processes will also be used as an opportunity to develop community understanding and support for fire management programs. |
| Community awareness and education | The Department will make available to the community information concerning the outcomes of the community consultation process. Information on fire management and the Department's planning and operational processes will also be published and posted on the internet. |

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| Qualified personnel | Prescribed burns will be planned, directed and conducted by qualified and experienced staff. Written prescriptions will be prepared by trained staff, with appropriate input from other Departmental staff and sources external to the Department. |
| Approvals | Every prescription will be reviewed and approved by the responsible manager prior to implementation. Each year the three year indicative prescribed burning program and the proposed annual burn program for the south-west forest regions will be brought to Corporate Executive by the Director of Regional Services for endorsement. |
| Monitoring and audit | The extent to which prescribed burn objectives have been achieved will be monitored and recorded in order to continue the process of adaptive management. Fire management plans and prescriptions will contain performance indicators and monitoring criteria against which achievements can be measured. The outcomes of monitoring and performance appraisal will be reported at appropriate intervals to the Executive Director. The achievement of fire management objectives contained in CALM's prescribed burning programs and in area management plans will be subject to periodic audit by the Conservation Commission. |
| Smoke management | Prescribed burns will be managed to reduce the risk of smoke causing detrimental impacts on population centres and other sensitive areas through application of smoke management guidelines. Potential impacts of smoke and ash on water catchments, road traffic, neighbours and visitors, and firefighters will be considered when planning and implementing prescribed burns. |

### 5.3 Fire Suppression

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| Suppression capacity | The Department will maintain its fire management, suppression and response capability in accordance with sound risk management principles recognising the availability of resources from local government volunteers, fire authorities and other sources. This requires an adequate state of preparedness and standards of fire suppression relative to the values at risk, and to the difficulty of controlling fires in a safe and cost-effective manner. |
| Readiness | The Department will, in consideration of risk assessment outcomes and the availability of resources from other agencies, maintain an effective and efficient fire-suppression capability of personnel, equipment and aircraft. Resources need to be mobile and personnel must be fit, skilled and well trained. |
| Detection | The Department will, in high risk or high value areas, maintain fire detection and fire reporting systems that will give timely and accurate warning of fires threatening community or environmental values. Lower level detection and reporting systems will apply in other areas. |

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| Response | The Department will respond to fires occurring on or near Department-managed lands to a degree that is appropriate to the values at risk, the prevailing and forecast weather, the availability of resources, the cost of the suppression operation, and the likelihood of long-term impact or net gains to the environment. In circumstances where impacts of the wildfire are likely to be low or resources are limited, the response may mean observation, rather than active suppression. |
| Control | The Department will take control of, or provide assistance at fires on or near Department-managed lands in accordance with State and local arrangements between the Department and fire authorities and other agencies; |
| Access | The Department will maintain an effective system of roads, fire access tracks and helipads to provide access and safety for firefighters. |
| Environmental harm | The Department will fully consider the protection of environmental and other values in determining strategies for fire suppression. Where appropriate, fires may be contained within management units defined by existing roads rather than by constructing new firelines around the perimeter of the fire. Where firelines are constructed during suppression operations, they will be subsequently rehabilitated to minimise the threat of soil erosion, weeds or spread of dieback disease. |
| Training | The Department will develop and deliver high quality training and performance assessment programs for Departmental staff for appropriate roles in fire and incident management. |
| Interagency arrangements | The Department will establish interagency agreements and working arrangements with fire authorities and volunteers to provide cooperative and coordinated fire fighting that can deal successfully with the full range of emergencies on or near Department-managed lands. |

## 5.4 Wildfire Prevention

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| Prevention | The Department will plan and conduct wildfire prevention activities to minimise the incidence of preventable wildfires (ie. unplanned fires of human origin). |
| Identify fire cause | The Department will, where practical, attempt to identify the origin and cause of wildfires on lands under its control and will investigate fires that result in damage to private or community property. Where regulations have been breached, the Department will take appropriate action to identify and, as appropriate, arrange prosecution of offenders. |

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| Arson | The Department does not have jurisdictional responsibility to effect initiatives for arson prevention or preparing communities for wildfire events. However, the Department will work closely with the Fire and Emergency Services Authority, the Police Arson Squad and local government authorities in developing and implementing coordinated fire prevention and preparedness programs. |

### 5.5 Liaison

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|---|---|
| Interagency arrangements | CALM will participate with other State agencies and local government authorities in developing approaches to fire risk mitigation, including in peri-urban areas. |
| Partnerships | The Department will carry out its fire management role in partnership with other relevant agencies, primarily the Fire and Emergency Services Authority, the Forest Products Commission, local government authorities and Volunteer Bush Fire Brigades. |

### 5.6 Research

| | |
|---|---|
| Research and knowledge | The Department will sponsor and undertake research into fire management and ensure that the resultant knowledge is disseminated to fire managers and the community. |

## 6. POLICY IMPLEMENTATION REQUIREMENTS

- To enable a consistent, reliable and transparent assessment of the risk and consequence of wildfire to biodiversity, cultural and community assets, the Department will utilise the Australasian Standard (AS/NZS 4360 Risk Management) as the basis for its approach to wildfire risk management.

- The Department recognises the importance of science, local knowledge and expertise and indigenous knowledge to underpin fire management. The Department will continue to promote and support research into fire ecology, fire behaviour, fire information systems and fire control systems and to apply adaptive management principles in its fire management operations.

- The Department will work with fire management agencies and research organisations to investigate and implement fire management strategies that mitigate against the impacts of climate change with respect to fire ecology and wildfire management.

- In order to facilitate support and assistance for cooperative and coordinated fire management across jurisdictional boundaries, the Department will implement education and awareness programs for neighbours and the community on best practice fire management.

- In order to promote the safe, efficient, effective and integrated management of fire and fire related activities on lands managed by the Department, a comprehensive set of standards, procedures and prescriptions will be published and maintained.

- Strategies other than prescribed burning, such as mechanical treatments of vegetation (eg. rolling or slashing) and grazing with livestock will be considered and applied where appropriate in meeting management objectives for the land in question.

- The need for effective fire management will be recognised in the policies and plans prepared by the Department. This includes area management plans prepared for the Conservation Commission for regions, State forest, parks and reserves as well as fire protection plans for high value assets, property, plantations etc as required. Every district will annually prepare a Fire Preparedness and Response Plan and a Prescribed Burning Plan.

- All instructions, prescriptions or guidelines developed for fire management activities undertaken by the Department must be consistent with the fire management principles and operational rationale in the Appendix.

- The Department will provide appropriate awareness and training programs for all staff likely to participate in any aspect of fire management to ensure adequate understanding, knowledge and skill levels to implement the fire policy in an environmentally sensitive, safe and cost-effective manner.

- The Department will use its best endeavours to both consult and involve traditional owners in fire management activities where the objective is to replicate traditional burning practices.

- The Department will contribute to State-wide fire management by representation on community based and interagency committees and working groups concerned with fire management at local, regional and State levels.

- The Department will maintain formal liaison with fire management authorities in other countries, States and Territories to ensure the currency of mutual aid arrangements and the transfer of knowledge on best practice fire management.

- Departmental staff must meet their obligations under this Policy through assigned levels of delegation, approved budgets, sourcing and planning as provided for in the Department's table of delegations, Departmental and other instructions.

- The implementation of this Policy will be subject to Departmental audit and periodic audit by the Conservation Commission in assessing the implementation of management plans.

## 7. CUSTODIAN

The Director of Regional Services is the custodian of this Policy.

## 8. EXECUTIVE DIRECTOR APPROVAL

Approved on 17 October 2005

by K J McNamara

Executive Director

## Appendix to Fire Management Policy

This appendix outlines the rationale for fire management plans and activities implemented by the Department of Conservation and Land Management. A set of principles to guide fire management is also outlined.

**Rationale**

- Fires have occurred regularly on most lands managed by the Department. Fires from natural causes (eg. lightning) will inevitably occur. Fires from human activities, either deliberate or accidental, will also occur, but unplanned fires may be minimised by effective public education and awareness, and by enforcement of legislation and compliance management.

- Aboriginal people have inhabited Western Australia for more than 40,000 years and over this period they have used fire as a management tool for hunting, access and spiritual reasons. The landscapes that European settlers and their descendents have come to recognise as being distinctively Australian have been fashioned by fire over many generations.

- Fire is a natural environmental factor that can have both destructive and beneficial effects. It can regenerate, recycle nutrients, create and maintain habitats, but can also kill, injure and destroy. The impact of fire varies with the frequency, intensity, scale, time of year and the fire sensitivity of the community in which it occurs.

- Wildfires do not distinguish between land tenures. Fire protection and fire management regimes must involve all State Government agencies with land management or fire management responsibilities, local government authorities and private land managers working cooperatively to achieve agreed fire management objectives.

- Fire has very different impacts on the biota contained in the twenty-six bioregions represented in Western Australia. Fire regimes must be appropriate to the needs of each bioregion.

- Exclusion of fire from naturally fire prone vegetation over large areas results in the gradual build-up of live and dead vegetation which becomes fuel and increases the risk of large, intense and costly fires. In most vegetated ecosystems, the exclusion of fire for long periods over large areas is difficult to achieve, and may also be undesirable from a biodiversity conservation and community protection point of view.

- A regime of too frequent fires, planned or unplanned, can have adverse impacts on biodiversity for some species and in some ecosystems including riparian zones, granite outcrops, wetland ecosystems and small patches of remnant vegetation.

- Planned fire will be excluded from representative scientific reference areas, including fire sensitive ecosystems, and these will provide an important benchmark against which the effects of other fire regimes can be evaluated. Some biota and ecosystems may also benefit from long periods of fire exclusion. The location and size of fire exclusion areas should take account of firefighter safety and other management influences.

- Planned fires can be used in natural areas to minimise loss of life, property and services, and to achieve biodiversity conservation objectives. This is likely to be a more cost-effective and predictable method of fuel management over large areas than using alternative methods including manual, mechanical, chemical and biological methods.

- Suppression difficulty and damage potential to life and property of a bushfire are proportional to the size of the fire, the conditions under which it is burning, and the rate and amount of heat energy released (fire intensity). The intensity and speed at which fire burns is related to the quantity and structure of accumulated litter, bark and plant material, which is in turn related to the period since last fire. In most vegetated ecosystems, accumulated fuel loads can be reduced by low intensity prescribed fires. This reduces the likelihood of intense fires even under extreme conditions and improves the capacity for firefighters to safely control a fire. Under extreme fire danger conditions, the spread of fire may only be retarded in light fuels.

- Threshold levels of available fuel quantities or fire intervals have been identified in many major vegetation types which represent the upper limits beyond which fire behaviour in summer conditions will be severe and too dangerous to be suppressed by either ground or aerial fire suppression methods. In situations where a number of fires are burning simultaneously and fire fighting resources are fully committed, the existence of strategically-located areas of reduced fuel provides fire managers with greater flexibility in the deployment of available resources. Fires burning into light fuels may be given lower priority for attention because they are less likely to exhibit severe fire behaviour.

- Maintaining air quality is a major challenge in the execution of approved prescribed burning programs. The need for prescribed fire to conserve biodiversity and to protect community values presents a risk to achieving the standards of air quality regulations in high population areas. This risk can be minimised through the use of sophisticated smoke prediction models.

- Public understanding of the role and effects of fire, and application of planned fire and fire suppression operations is vital. Effective communication and consultation with the community leads to greater understanding and support for fire management programs, and ensures that knowledge within the community is made more readily available to managers.

**Principles for Fire Management**

- The vegetation and climate across Western Australia make it highly prone to bushfire. Over millions of years fire has contributed to the evolution of the State's ecosystems. Fire is an important disturbance factor that will continue to influence the biotic composition and structure of all natural ecosystems.

- Plant and animal species and communities vary widely in their adaptations to, and reliance on fire. Species and communities require particular fire regimes for their long-term survival. Such requirements may vary within the ecological and geographical range of species.

- There is no single fire regime that is suited for all flora, fauna and ecosystems. Organisms have developed with a great variety of fire regimes, and thrive in different circumstances. A fire regime that enables one organism to gain competitive advantage will disfavour a competitor.

- Diversity and variability in fire regimes at the landscape level help maintain biodiversity. The application of ecologically based fire regimes that provide for an interwoven mosaic of vegetation and habitats representing a range of fire intervals, fire intensities, seasons and scales will help optimise the conservation of biodiversity. Patchiness of burning is an important factor in providing environmental heterogeneity at a local level. In some instances fire exclusion will be planned. On the other hand, widespread, high intensity fires will periodically remove most of this local patchiness from the landscape. Patchiness can be achieved through applying fire during periods of fuel moisture differential, through the lighting pattern used, and by burning adjacent to light fuels.

- Fire management at a very local level may be critical for the survival of some threatened species and ecological communities.

- Following fire, other factors such as climatic events (eg. drought) and insect attacks often drive ecosystems towards a new transient state with respect to species composition and structure. This may preclude the identification of changes specifically attributable to fire.

- Climate has a major influence on fire regimes, and is one of the fundamental factors determining the distribution of vegetation communities at a regional scale. Some regions of the State have experienced significant shifts in climate over the past three decades and there is an expectation amongst the scientific community that the rate of climate change may accelerate in the future. Fire management should therefore be based on an understanding of climatic trends and adapt to meet changing circumstances.

- All available knowledge including life histories, vital attributes of the native flora and fauna and knowledge of indigenous traditional fire regimes will be used to develop ecologically-based fire regimes.

- Fire management policies and practices should adapt to new knowledge gained through strategic long-term and short-term research and monitoring programs. This adaptive approach to fire management should be flexible to any changes to community values and expectations.

- Fire management planning on lands managed by the Department must address the threats and impacts of wildfire, accommodate the use of planned fire and provide for the achievement of specified land management objectives.

- The response to the threat of wildfire on Departmental lands must consider legal requirements, be thoroughly planned, safe, effective, cost-efficient and environmentally sensitive. All fire management activities, including fire suppression and prescribed burning, must be conducted in accordance with clearly defined procedures that provide for safe work practices and have outcomes monitored and recorded.

- Planning an appropriate response to the occurrences of wildfires must include an assessment of the threat to human life, community assets and services, and natural values, and consider these in conjunction with the management objectives of the area.

- Principles of environmental care must guide all preparedness, suppression, recovery and prescribed burning activities.

**APPENDIX 2**

# Terms of Reference for the Chronology of Fire Development From the Request for Quotations document

## SCOPE OF SERVICES
### Chronological review of the fire's development

The Department of Environment and Conservation (DEC) wishes to appoint a suitably qualified and experienced service provider that will undertake a fact-finding style review that establishes:

- the landscape attributes of the fire location,
- the known fire history of the area,
- the fuel and weather circumstances leading up to and during the fire event,
- the ignition circumstances,
- a chronological analysis of the weather and fire development from ignition to completion of suppression operations,
- the impact of fire suppression actions taken on the development of the fire,
- identification and analysis of any other management factors that limited fire spread (eg. areas previously treated by prescribed burning or burnt by wildfire),
- Completion of a draft and final report.

It is expected that a Draft Report shall be completed for DEC comment and review before the end of February 2008. The delivery of a Final Report based on any required draft report amendments or additions must be completed before the end of March 2008.

**APPENDIX 3**

Appendix A

# Goldfields Fire 13 – Operational Review: Terms of Reference

**CONTRACT BRIEF - GOLDFIELDS FIRE 13 OPERATIONS REVIEW**

**VERSION 140208**

BACKGROUND

**A wildfire known to the Department of Environment and Conservation (DEC) as Goldfields Fire 13 burnt 43,000 ha of natural woodlands and heath vegetation in the period 28th December 2007 to 8th January 2008 in the vicinity of the Boorabbin National Park on the Great Eastern Highway between the towns of Coolgardie and Southern Cross.**

**The fire was fought by a multiagency team lead by the Department of Environment and Conservation as the agency responsible for fire management and suppression in national parks.**

**On 30th December 2007 two trucks were incinerated when the fire intercepted them on the Great Eastern Highway. Three occupants of the trucks were killed. A coronial inquiry will be conducted into the circumstances of the fire.**

**DEC is undertaking a series of reviews of the fire and related matters (see diagram attached) to determine the facts and to identify lessons that might improve future fire suppression. The reviews will be made available to the Coroner.**

**Independent professionally qualified consultants will undertake two of the reviews, namely the *Fire Development and Chronology* and the *Operational Review*. This call for tender relates to the second component, the *Operational Review*. The two reviews are related as an understanding of the behavior of the fire explains the context in which the fire suppression activities were conducted.**

SCOPE

**The objective of the review is to give an accurate and discriminating account of the operational management of the fire sufficient to identify and explain the causes and contributing influences that resulted in significant fire outcomes. The review will cover two time frames during the course of the active fire; from the start of the fire until 0600 hrs on 31st December 2007 and from 0600 hrs on 31st December to the fire being declared controlled and mopped up on 9th January. The intensity of the review for each period will be that required to meet the objective of the study. The consultant will also consider aspects of fire planning and preparation in**

the Goldfields Region prior to the Boorabbin fire. A brief commentary on the status of fire planning and fire preparedness in the Department at large will also be required.

The Review will be done in the context of the *Australian Inter-service Incident Management System (AIIMS)* that is the operational methodology used by DEC and associated agencies for wildfire management. The preparation of plans, objectives and strategies for the management of the fire as described by the AIIMs procedures, particularly with respect to the safety of fire fighters and the public, will be relevant. The contractor will employ a *'Prevention, Preparedness, Response, Recovery' (PPRR)* approach so the report presents a strategic and regional context for DEC's management of wildfire whilst elucidating the specific details of this fire incident. Subject to the scope of the review, the contractor will broadly adopt the principles and procedures outlined in DEC's Fire Operational Guideline 31 (FOG 31 – see attached) that sets out the Department's approach to After Action Review (AAR) and Post Incident Analysis (PIA). The contractor will review the application of DEC's *Standard Operational Procedures (SOP)* and *Fire Operational Guidelines (FOG)* relevant to the incident (attached), and recommend any improvements or changes that in their professional opinion might be warranted as a result of this fire experience. Only those SOPs and FOGs deemed relevant to this incident need be reviewed. It is expected that an examination of the efficacy and application of DEC's SOPs and FOGs in the context of AIIMS will constitute the main body of work for the Operational Review.

The consultant will produce a statement of 'conclusions' from the review that links to a set of 'recommendations'. This section of the report to be titled 'Lessons Learnt'. The conclusions, recommendations and lessons learnt may in part be qualified and conditional as determined by the scope of the review and available information. Specific limitations that can be reliably anticipated will be specified in the contract where possible, otherwise they will be explained in the report.

The consultant will use the *Fire Development and Chronology Review* to inform the *Operational Review*, and vice versa as necessary.

The consultant will make a brief comparison of DEC's wildfire management with comparable best practice in Australia relevant to, and limited to, the principal findings in the Review. The purpose of the comparison is to highlight the practices of other wildfire management jurisdictions that might be instructive for DEC or for other State emergency management authorities, or the Coroner. The comparison is not intended to be an exhaustive analysis, but rather to identify key issues and point to further lines of enquiry that might contribute to DEC's 'Lessons Learnt' document.

At an earliest possible stage of the review the consultant will discuss their initial key findings with DEC to provide an opportunity to refine the critical lines of enquiry and define the ongoing scope of the review. DEC's purpose will be to ensure the consultant is focused on the essential aspects of the enquiry so that all of the facts and information necessary for the proper and complete elucidation of the event emerge. A final draft of the Review Report will also be provided to DEC in order to allow checking for factual accuracy.

As this review is likely to be material to the Coroner's enquiries, DEC will expect the consultant to exercise complete professional integrity and independence from DEC's reviews and findings, notwithstanding that all information about the fire in DEC's possession will be made available to the consultant. It is expected that much of the information that is a matter-of-fact required by the consultant will be available from the AAR and PIA processes undertaken by DEC. Whenever possible, the consultant will attend DEC's debriefings and reviews as an observer. The consultant will indicate the origin and status of key information or views in the Review Report. It is expected the consultant will employ various methods for gathering information that will include direct interview of DEC staff, reference to operational records from the fire, post fire statements and documents, direct field observations, DEC SOPs and FOGs, national AIIMS documentation, DEC policy statements and other related documents, fire management published documents from other sources, and professional knowledge, judgment and experience. DEC will assist the consultant with the provision of documents, maps and records as needed, and full access to DEC staff as required. The consultants will have access to DEC offices and workspace as needed by arrangement.

The prime focus of the review is on DEC's operational management of the incident and DEC's formal responsibilities in these situations. The review will also examine the multi agency interaction at this fire and consider its efficacy at the operational level. The interagency aspects of the Review will be conducted through interviews with relevant IMT leaders prior to the 31st December, the DEC Goldfields Regional Manager and the ICs from Gold and Black preformed teams. The consultant may wish to interview a limited number of non DEC personnel (subject to availability) who may be able to contribute to this aspect of the review.

Whilst it is expected that the Coroner will find the review very helpful, the scope of the review will not cover the whole likely ambit of the Coroner's enquiries and interests, particularly with respect to the interview of people not employed by DEC. Likewise, the statements, documents and information gathered by the Coroner through the police and others might not necessarily be available to the contractor. Specific information needed by the consultant might be requested from the Coroner on advice from the State Solicitors Office (e.g. Coroner's Bureau of Meteorology Report). The consultant should be prepared for the possibility they will be called by the Coroner to give evidence and explain aspects of their Review Report.

REVIEW SUBJECTS

This list of subjects is provided as a guide to the consultant and is essentially chronological. The list aims to capture an adequate strategic context for this fire event whilst concentrating on the operational management of the fire in relation to the efficacy and application of DEC's wildfire management SOPs and FOGs in the AIIMS environment. The intensity and scope of enquiry into each aspect and phase of the fire will be progressively assessed to ensure the most informative and useful outcome is achieved in the public interest.

Prevention

1. DEC's fire management function, organization and operations
2. DEC's fire management organization and traditional practice in the Goldfields Region
3. DEC's Widlfire Threat Analysis (WTA) and Fire Prevention Plan for Crown Lands Between Coolgardie and Southern Cross
4. Interactions with other Emergency Management Authorities at State and Goldfields Regional level
5. Identification of hazards and assessment of threats to the environment, human life, public and private assets

Preparedness

1. Implementation of the Goldfields WTA Plan
2. General fire management strategies and operations in the Goldfields Region, including sufficiency of resources, level of staff experience and availability of assistance if required
3. Seasonal fire management 2007/2008 in Goldfields Region
4. DEC fire management context for 2007/2008 season
5. DEC fire situation pertaining in December 2007 and January 2008
6. DEC fire preparation 28th December 2007 and outlook

Response

Initial phase

1 Initial fire report and immediate actions

2 Initial dispatch and fire appreciation

3 Initial strategies and tactics

4 Setting up IMT

5 Fire behavior, development, and intelligence

6 Assessment of fire potential: regional and Departmental

7 Resourcing

8 Sectorisation of fire, operations point, allocation of resources

9 Safety assessment: hazards, risks, priorities

10 Strategies and actions for management of risks to fire suppression personnel and members of the public

Escalation phase north of Great Eastern Highway

1 Fire behavior, projected development and weather forecasts

2 Fire line production and fire containment

3 Fire planning, intelligence, mapping, IAP

4 Strategy and objectives for containment north of the Great Eastern Highway

5 Operations on shifts 1 to 3 (28th & 29th December): progress and issues

6 Safety management strategies and operational application

7 Specifics of traffic management on the Great Eastern Highway: intended and actual

8 Shift changes and overnight situation

9 Night time firefighting in the Goldfields

10 Fatigue management and firefighting conditions

Escalation phase south of the Great Eastern Highway 30th December 2007

1 Strategy and IAP for 30th December

2 Weather forecast and fire development risks

3 Deployments of resources on 30th December

4 Fire breakout to south and crossing of the Highway: cause and progress

5 Response to fire breakout

6 Strategy and implementation of strategy to pursue the fire

7 Fire behavior in woodland fuels, low fuels (fire scars, salt lakes) and against firebreaks

8 Traffic management on the Highway in periods AM and PM to nightfall: intended and actual

9 Management and support of travelers at road blocks

10 Public reaction to road closures and influence on IMT and IAP based on IMT interviews and news media reports

11 Intelligence: ground and air

12 Fire line production and efficacy of strategy

13 Safety of fire crews

14 Deployment and function of other agencies, role of OAMG

15 Functionality of the IMT and its components

16 Public information produced by the IMT

17 Observed fire behavior: afternoon and in evening and wind influence

18 Predicted fire behavior: afternoon and evening and influence of weather forecast

19 Traffic management on the Highway after nightfall and departure of helicopter: intended and actual

20 Overnight fire management strategy

21 Knowledge of fire position, extent and fuels

22 Revisions and amendments of the IAP on 30th December

23 Decision to send more resources and upgrade fire status

24 Traffic management at the time of the fatalities

25 Fire behavior at the time of the fatalities

26 Response of agencies to the fatalities in relation to fire management and Highway management overnight.

Post 30th December Fire Phase – Shifts 5 – x

1 Apply selected components of the DEC Post Incident Analysis process (Fire Operations Guideline 31) as required

2 Focus on aspects that relate to any key pre 30th December matters

3 Identify any significant issues or outcomes that might improve DEC's fire management practices

4 Review ongoing management of the fire and functionality of the IMTs

5 Give an account of the ongoing management of traffic on the Highway to the conclusion of the fire

6 Review fire strategies implemented after 30th December including alternative or fall-back strategies

Recovery

1 Note the recovery process for the restoration of Highway traffic.

2 DEC has implemented a process of After Action Review (AAR) and Post Incident Analysis (PIA) as indicated in the attached diagram. Comment on the efficacy of the process and any improvements as appropriate.

REVIEW REPORT

1 The Review Report will be structured to clearly show the chronology of events and the relationship of key outcomes in time.

2 The Review Report will be structured in two parts to distinguish the events prior to the deaths of three members of the public on the Great Eastern Highway and those events coming after to ensure there is a suitable concentration on key issues.

3 The Review Report will necessarily focus on DEC staff and DEC activities but will as far as possible within the resources and information available to the consultant also cover other people and agencies that had a significant role in the fire. It is appreciated that the extent of access to non DEC staff and to documents or information held by other parties cannot be predetermined.

**APPENDIX 4**

Department of Environment and Conservation

# Code of Practice for Fire Management

May 2008



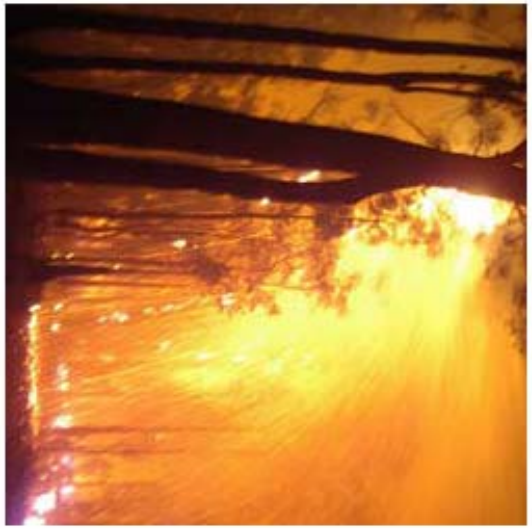

ACT NOW

Department of Environment and Conservation

Our environment, our future

# Table of Contents





## Endorsements

This Code of Practice for Fire Management has been approved for implementation by:

Manager Fire Management Services

Director Regional Services

Director General DEC

# 1. INTRODUCTION



## 1.1 Background

### Fire prone environment – A history of fire

1. Fire is a natural environmental factor that can have both destructive and beneficial effects. It can regenerate, recycle nutrients, create and maintain habitats, but can also kill, injure and destroy. The impact of fire varies with the frequency, intensity, scale, time of year, and the fire sensitivity of the community in which it occurs.
2. The vegetation and climate across Western Australia make it highly prone to bushfire. Over millions of years fire has been a force in the evolution of the State's ecosystems. Fire is an important environmental disturbance that will continue to influence the biotic composition and structure of all natural ecosystems.
3. Aboriginal people have inhabited Western Australia for more than 40,000 years and over this period they have used fire as a management tool for hunting, access and spiritual reasons. Aboriginal use of fire resulted in significant changes in some ecosystems and new equilibrium states developed. When Europeans arrived, they inhabited a fire-managed landscape.
4. Following European settlement, it became evident that uncontrolled fire could damage or destroy their assets and resources they wished to exploit. As a result of the European influence, fire regimes changed from those characterised by frequent, patchy fires applied by Aboriginal people and ignited by lightning to regimes applied by European settlers and authorities designed to protect privately owned and community assets. Fire suppression and exclusion were commonly pursued near settled and urbanised areas.

### Biodiversity and fire

5. Much of the State's native biota has evolved in ecosystems prone to drought and fire. Consequently, most organisms have developed adaptations for living with fire and many have become dependent on fire in some way for their persistence. Conversely there are some ecosystems that are independent of fire (non-flammable) and some organisms that occur in less fire prone habitats that require long fire-free intervals to ensure their persistence.
6. Because fire is elemental in the maintenance of many of our native ecosystems, its use as a management tool must recognise that both the application of fire (in all its variety of frequencies and intensities), and its exclusion, will have consequences. On the basis of current knowledge, some of these consequences are predictable, but others are not.
7. Long periods of fire exclusion can alter habitats and simplify habitat diversity. Some species are unable to cope with very frequent fire and will exhibit relictual distribution patterns, being confined to naturally less flammable sites such as rocky outcrops and wet areas.
8. Exclusion of fire from naturally fire prone vegetation over large areas results in the gradual build-up of live and dead vegetation. This becomes available as fuel and increases the risk of large, intense, and damaging fires. In most vegetated ecosystems, the exclusion of fire for long periods over large areas is difficult to achieve. Fires that burn in long unburnt vegetation are almost impossible to control and the intensity and scale of these wildfires can threaten biodiversity and human life and property.
9. Leaving large areas of fire-prone vegetation unburnt for long periods can result in long-term deleterious impacts on biota, environment and community values as a result of large and intense wildfires.
10. The proactive use of fire (prescribed burning) can be used in natural ecosystems to achieve biodiversity conservation objectives and to minimise the risk of loss of life, property and services from wildfire. This is usually a more cost-effective, environmentally acceptable and predictable method of managing the quantity of flammable material over large areas than applying manual, mechanical, chemical or biological controls.

### Living with fire

11. Wildfire is an integral component of the rural landscapes of Western Australia. Seasonal wetting and drying of live and dead vegetation, which becomes the fuel for a fire, occurs across the State throughout the year. In the southern part of the State, most wildfires occur over the hot, dry summer months, whereas in the northern tropical regions, most wildfires occur over the dry season. Fires occur regularly and are caused by lightning and humans. Human caused wildfires result from escapes from burning off, illegal lighting, deliberate arson or accidental lighting.

12. Land managers must carefully balance the risk to human life and property from wildfire with the impacts of fire management actions on other values held by the community, such as water quality, biodiversity, history and culture. This balance should be based on the best available scientific and local knowledge and on the application of risk management principles. However, in some instances, it is clear that trade-offs will be required between protection of life and property, and ecological or other values.

13. There is an increasing trend for people to live in environments that are adjacent to natural bushland areas managed by the Department. In doing so the threat from wildfire to life and valuable assets is ever present.

14. Climate change is predicted to result in an increasing trend to aridity in many parts of the State. This trend will affect the flammability and fire regimes of these areas, threaten the persistence of various biota and increase the risk from fire to life and property.

15. Suppression difficulty and damage potential to life and property of a bushfire are proportional to the size of the fire, the conditions under which it is burning, and the rate and amount of heat energy released (fire intensity). The intensity and speed at which a fire burns are affected by the quantity and structure of accumulated litter, bark and plant material, which are in turn related to the vegetation type and period since last fire. In most vegetated ecosystems, accumulated fuel loads can be reduced by low intensity prescribed fires. Low fuel loads reduce the likelihood of large and intense fires even under extreme conditions and consequently improve the capacity of firefighters to safely control a fire. Under extreme fire danger conditions, the spread of fire may only be retarded in very low fuel loads. However, in some vegetation types there can be a measurable reduction in the fire intensity for at least 15 years after a previous fire, which translates into reduced difficulty of fire suppression.

16. As well as managing the accumulation of flammable vegetation, effective fire management also requires effective fire detection and suppression systems and ongoing advances in knowledge about fire ecology and behaviour.

## 1.2 Purpose of the Code

17. The Code of Practice for Fire Management (the Code) provides a framework for fire management procedure and practice on land managed by the Department of Environment and Conservation (the Department) in Western Australia.

18. The Code is to enable the efficient, effective and safe management of fire on Department-managed land to achieve land management objectives, and protect human life, property and environmental values from the deleterious effects of wildfire or inappropriate fire regimes.

19. The Code provides a basis for establishing and maintaining a consistent standard of fire management on Department-managed land.

20. The Code provides a means by which the Department may communicate with the public and other government agencies on how it manages fire on Department-managed lands.

21. The Code recognises the use of land adjoining Department-managed lands and the need for the integrated management of risks and impacts between these categories of land.

## 1.3 Contents and organisation of the Code

22. The Code lays down principles, standards and guidelines that apply as far as is practicable to fire management on Department-managed land to ensure that, in an effective, efficient and safe manner:

    23. environmental values, including the State's biota, are protected from the deleterious effects of wildfire and inappropriate fire regimes;

    24. human life, property, and assets are protected from the deleterious consequences of wildfire;

    25. water catchment, air shed and landscape values are protected; and

    26. archaeological, historical, and other cultural sites are protected.

27. The first section of the Code describes the purpose of the Code, and the manner in which the Code is to be applied. The second addresses the prescribed application of fire to Department-managed lands. The third addresses the management of wildfire on Department-managed lands, including prevention of, preparation for, response to, and recovery from wildfire. The fourth section addresses public participation, research, and monitoring. Also included in the Code are definitions, appendices and an index.

## 1.4 Definitions and References

28. The definition of terms as they are applied for the purposes of this Code is essential to the correct interpretation of its contents. These are listed in the Definitions section. Numbers in superscript associated with references in the Code to other departmental documents are pointers to a table at the back of the Code setting out the full title of these documents.

## 1.5 Application of the Code

29. The Code applies to all Department-managed land in the State of Western Australia. This code will apply to unallocated Crown land (UCL) and unmanaged reserves (UMR) to the extent that responsibilities for fire preparedness on UCL and UMR have been allocated to the Department.

30. Agents engaged by the Department to undertake fire management activities on Department-managed land will be required to conform to this Code.

31. Any plan, instruction, prescription or guideline developed for activities on Department-managed land will be prepared to be consistent with this Code. Compliance with this Code is a requirement for all fire-related activities on Department-managed land.

32. Departmental staff will meet their obligations under this Code through assigned levels of delegation, funding and planning as provided for in Departmental and other relevant instructions. The Department will produce appropriate guidelines and operational manuals to support the Code.

## 1.6 Role of Fire Management Services

33. Fire Management Services (FMS) is part of the Regional Services Division and facilitates the delivery of the Department's fire management business through the Department's Regional structure. FMS provides policy guidance, technological support, information management systems, coordination of planning and operations, and training and development to Departmental staff.

34. FMS personnel work closely with Regional Managers and their fire management staff in Regions and Districts to develop and deliver the fire management outcomes of the Department. FMS also works closely with personnel representing the business outcomes of other Divisions, notably Nature Conservation, Parks and Visitor Services, Sustainable Forest Management and Science Division to ensure a holistic approach to the role of fire in achieving their contribution to the Department's conservation and land management objectives.

## 1.7 Monitoring of compliance

35. Compliance with the Code will be monitored by the Director Regional Services of the Department and reported on in accordance with Departmental instructions.

## 1.8 Review of the Code

36. The Code will be reviewed within 10 years of its approval.

## 1.9 Relationship to legislation, departmental policy and approved management plans

37. The Code supports the discharge of the Department's legislative responsibilities which include:

38. The *Conservation and Land Management Act 1984*, which provides for the Department to manage lands to which the Act applies, according to those operations prescribed in management plans [*Sections 33(1)(a)(i)* and *33(3)(a)*], or, in the absence of a management plan, in accordance with necessary operations or compatible operations depending on the land category [*Sections 33(3)(b)* and *33(b)*]. Fire management activities are subject to these provisions.

39. The *Wildlife Conservation Act 1950*, which provides for the protection of fauna and flora in Western Australia.

40. The *Bush Fires Act 1954*, which applies to land throughout the State including Department-managed lands. *Sections 39* and *45* provide authorised CALM Act officers with powers to suppress fires in and near forest and Crown lands. Other sections provide for authorised CALM Act officer to enforce the provisions of the Bush Fires Act. The provisions of the Bush Fires Act do not, however, affect the provisions of the CALM Act, and the Bush Fires Act does not generally bind the Department.

41. Common Law requires that the Department has a duty as an occupier to take all reasonable care to eliminate or minimise foreseeable risks of harm. The Department may be held liable for injury or loss caused by fire, which a Departmental employee had negligently lit or negligently failed to control. On land where the Department has statutory responsibilities, there may be a duty to take all reasonable steps to contain a fire that has occurred without negligence by the Department.

42. The Code also recognises the Department's responsibilities for air quality management and to avoid, as far as practical, impacts of smoke generated by prescribed burning on the community.

43. Further to State legislation, the Code also accommodates the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, which provides for the protection of threatened species, ecological communities and other matters of national environmental significance. The Department has interpreted this legislation in its Fire Management Policy (Policy Statement No. 19 – Fire Management)[v].

44. The Code is consistent with the Fire Management Policy[v] and recognises the requirements of other Departmental policies and arrangements relating to Department-managed land.

## 1.10 General requirements of fire management

45. Planning and implementation of fire suppression and prescribed burning activities on Department-managed lands will:
46. be undertaken by competent and qualified staff
47. recognise safety as a primary priority
48. be guided by principles of environmental care
49. be founded on scientifically based knowledge and experience
50. be influenced by knowledge of indigenous traditional fire regimes and practices
51. provide for the achievement of the management objectives for the area
52. comply with legal requirements
53. include assessments of the threats to and impacts on human life and public health, community assets and services, and natural values
54. be in accordance with clearly defined procedures that provide for safe work practices
55. be documented in accordance with Departmental standards
56. have outcomes monitored and recorded
57. be effective and cost-efficient
58. be guided by ecological principles for fire management
59. provide for State and local level integration, coordination and cooperation
60. provide for public participation

# 2. APPLICATION OF FIRE ON DEPARTMENT-MANAGED LAND

61. This section applies to the deliberate introduction of fire under prescribed conditions by DEC staff and contractors into and onto Department-managed land. Fires so lit are termed prescribed burns.

62. Fire has a part to play in the achievement of a range of land management objectives, including the conservation of biodiversity, maintenance of ecosystem health and vitality, maintenance of productive capacity, conservation of soil, water and catchment values, conservation of natural and cultural heritage, protection of human life, built assets and natural commercial products such as timber, honey and wildflowers, and protection of parks, recreation sites and scenic values. The purpose and objectives of any prescribed burning will be clearly defined in measurable and reportable terms.

63. The use of prescribed burning to achieve land management objectives will comply with legal requirements, be thoroughly planned and, when conducted, be in accordance with clearly defined objectives and operational procedures providing for safe work practices and manageable fire behaviour; be ecologically appropriate to the local environment; and have the outcomes monitored and recorded.

64. Prescribed burning plans will incorporate nature conservation, land use and fire protection objectives in order to optimise outcomes. The planning of prescribed burning will require the recognition and balancing of often competing objectives and will take into account the role of fire in the maintenance of biodiversity, the protection of economic values and the mitigation of the risk and consequences of wildfire.

65. In fragmented landscapes where remnant vegetation on reserves is surrounded by extensive urban and agricultural land uses, the planning and application of fire regimes will require consideration of interacting factors such as weed invasion, lack of regeneration of native species, grazing impacts, fire history, and size of reserve.

66. The Department will, where appropriate, consult and involve neighbours, traditional owners and other stakeholders in fire management activities.

67. The Department will work with communities to facilitate understanding of the role of fire as a management tool in the Western Australian environment.

## 2.1 Prescribed burn prescriptions, plans and programs

### 2.1.1 Integration of planning

68. The Department will integrate the planning for all prescribed burning on Department-managed lands to the maximum extent practicable.

69. The Department will, where necessary, develop fire management plans for specific areas, and will ensure integration of prescribed burning activities with other land management activities being undertaken to achieve identified land management objectives.

70. The Department will seek to integrate fire planning and prescribed burning programs with adjacent land managers and local authorities to maximise mutual benefits.

### 2.1.2 Prescribed Fire Plans

71. Each area designated for a prescribed burn will have a Prescribed Fire Plan[2] prepared for it. The contents of the Prescribed Fire Plan[2] will conform to the standards set by the Department as specified in the Prescribed Fire Manual[3].

72. Each Prescribed Fire Plan[2] will include: burn objectives, details of the area to be burned, resources required for the operation, standards to be met, checks and notifications to be undertaken, authorisations to be obtained, and post burn appraisals to be conducted.

73. All Prescribed Fire Plans[2] will be approved by the Regional Manager and those involving aerial ignition will be endorsed by a representative of FMS.

74. The objectives for all prescribed burns will be consistent with current approved management plans or interim guidelines, or in the absence of these documents, be consistent with the purpose for which the land is vested.

### 2.1.3 Indicative burning plans

75. Prescribed burns on all Department-managed lands will be represented in Regional indicative burning plans that indicate the year and season that each prescribed burn is intended to be conducted. In Regions where it is feasible and appropriate, the plan will indicate all prescribed burns planned for the next three years. This plan will be reviewed and reissued annually as specified in the Master Burn Plan Manual[4].

### 2.1.4 Annual prescribed burn program

76. The Department will produce an annual prescribed burn program as specified in the Master Burn Plan Manual[4] that identifies and schedules all prescribed burns intended to be conducted on Department-managed lands.

77. The annual prescribed burn program will be approved by the Department's Corporate Executive.

78. The annual prescribed burn program may be varied to meet changes in circumstances, such as those imposed by wildfires, weather or management activities.

### 2.1.5 Prescribed burn operations

79. Prior to the commencement of prescribed burning, seasonal weather and fuel conditions are to be monitored using the relevant indices and fire behaviour guides to identify when suitable burning conditions are imminent.

80. Potential impacts of smoke and ash on water catchments, road traffic, neighbours and visitors, and firefighters will be considered when planning and implementing prescribed burns. (See also 2.1.6.)

81. Sufficient firefighting personnel and equipment, commensurate with the fire danger, are to be retained available for fire suppression when committing resources to prescribed burning operations.

82. All Prescribed Fire Plan[2] requirements will be met and authorisations obtained prior to lighting any fire.

83. Members of the public in the vicinity of a prescribed burn will be protected by a range of measures which may include the erection of warning signs on access routes, the conduct of searches within the area proposed for burning prior to ignition, and the issue of public warnings through appropriate media.

84. The officer in charge of a burn will be in possession of a copy of the approved Prescribed Fire Plan[2] and meet all conditions specified there in during the conduct of the operation.

85. Only persons duly authorised or instructed by the Department to do so may ignite a prescribed burn.

86. Safety of all personnel involved in a prescribed burn will be the responsibility of the officer in charge of the burn. All occupational health and safety standards and Departmental requirements will be met prior to and during ignition, patrol and mopping up operations.

87. All personnel involved in prescribed burning will be competent in the roles and tasks which are assigned to them. Where a system of endorsement exists, the personnel will be appropriately endorsed by the Department, or be receiving supervised on-job training to achieve this.

88. Prior to ignition of a prescribed burn, the officer in charge of the burn must provide comprehensive briefing to all personnel involved in the prescribed burn, on the burn plan, their tasks, and safety precautions, in accordance with the Prescribed Fire Manual[3].

89. Prior to the commencement of any prescribed burn the officer in charge of the burn is to ensure that all private property such as machinery, beehives, stock, or harvested forest product has been identified and protected.

90. Security measures for a prescribed burn, including identification and treatment of hazards and risks, and conduct of patrols, will comply with standards set out in the Prescribed Fire Manual[3].

91. The Department will take appropriate action to deal with fire that escapes beyond the planned control lines and keep the situation under review until the fire is declared safe.

92. The Department will promptly investigate any escape from Departmental prescribed burning operations that causes significant damage to private property or results in significant control problems. The investigation will determine the cause of the escape, ascertain the extent of damage or other problem, and prepare a formal report for the purpose of improving the conduct of prescribed burning.

93. Patrols and mop up operations will be carried out to the standards set out in the Prescribed Fire Manual[3] until the prescribed burn is completed and declared safe.

94. Rehabilitation of temporary fire access tracks, fire control lines and other works will be in accordance with the Fire Management Guideline for the Stabilisation and Rehabilitation of Fireline[6].

### 2.1.6 Smoke management

95. Prescribed burns will be managed to reduce the potential risk of smoke causing detrimental impacts on major population centres, airports, major roads, neighbours and other sensitive areas through the application of smoke management guidelines.

96. The Department will undertake a risk analysis for each burn to determine the comparative risk of smoke impacts from prescribed burns on communities and air quality with the risks to public safety and natural assets from potential wildfire.

97. The Department will apply information on weather, fire behaviour, smoke trajectory predictions, burn location, size and strategic importance in determining the most suitable burn prescription and ignition application to achieve an effective burn outcome with low smoke impacts.

### 2.1.7 Records of prescribed burns

98. Records are to be kept of each burn prescription and associated documents for future reference. The burn outcomes will be monitored and recorded as set out in the Prescribed Fire Manual[3].

99. The Department will record its expenditure on all aspects of prescribed burn planning and implementation.

### 2.1.8 Monitoring

100. The Department will carry out ongoing monitoring of the outcomes of particular burns when the Department has determined, on the advice of its specialist officers, that a need exists to establish whether the fire management objectives have been achieved.

101. Monitoring of prescribed burns should be undertaken in accordance with relevant procedures and guidelines, where available.

102. The Department will ensure that information recorded is used to inform future fire operations.

# 3. WILDFIRE MANAGEMENT



## 3.1 Risk management approach to fire management

103. The Department's fire management planning will identify the potential environmental social and economic risks associated with fire management on Department-managed lands. As far as practicable, risks will be analysed (likelihood and consequences), evaluated and mitigated.

104. The Department will adopt and maintain a risk management process consistent with the Australian/New Zealand standard for risk management (AS/NZ 4360:1999) for Department-managed land that includes: the values at risk of damage from wildfire; the probability of wildfire occurring; the likely wildfire behaviour; the capacity for detection of and response to wildfire; the capacity for suppression of wildfire; and the potential consequences for local communities and the environment.

105. The Department will apply a comprehensive range of fire prevention, preparedness and mitigation measures to manage the risk of damaging wildfires and inappropriate fire regimes.

106. The Department will maintain fire history records for all Department-managed lands for use in developing risk management programs and strategies.

107. The Department will maintain and enhance models for predicting the accumulation of flammable materials and fire hazards on and near Department-managed lands.

108. The Department will utilise the emergency management approach to wildfire management, specifically addressing prevention, preparation, response and recovery in its documentation and operations.

## 3.2 Wildfire prevention

109. The Department will conduct fire prevention activities that eliminate or reduce the probability of occurrence of a specific hazard, and that reduce the degree of damage likely to be incurred by fire.

110. The Department will undertake fire prevention activities relating to the minimisation of preventable wildfires including education (both school and wider community), enforcement of legislation and risk management.

111. The Department will consider hazard management on and around sites of known high hazard and/or risk on public land (e.g. rubbish tips, picnic areas, sawmills on or adjacent to Department-managed land) and where appropriate, implement measures (e.g. slashing, prescribed burning) to mitigate that hazard or risk.

112. The Department will undertake, participate in, and support programs aimed at improving the effectiveness of fire prevention activities through cooperation and collaboration with the Fire and Emergency Services Authority (FESA) and other stakeholders.

113. The Department will work cooperatively with FESA, Bush Fire Brigades, Local Government Authorities and other stakeholders on programs to prevent the occurrence of unplanned fires.

### 3.2.1 Education

114. The Department will conduct and participate in programs which maintain public awareness of wildfire risk and vulnerability, promote the importance of self-protection, and encourage the responsible use of fire by the community.

115. The Department will participate with other fire authorities in public education and awareness programs designed to prevent deliberate and accidental fire ignitions and increase understanding on the role and use of prescribed fire.



#### 3.2.2 Enforcement

116. Where there is sufficient evidence to suggest that a person (or persons) was responsible for deliberately lighting or negligently causing a fire on Department-managed lands or a fire that subsequently enters onto Department-managed lands, action may be taken in accordance with Departmental guidelines to recover the costs of suppression and/or damage caused by the fire. Prosecution will be considered.

117. The Department will, as appropriate, encourage and assist appropriate authorities to investigate, identify and prosecute persons suspected of being responsible for fires that burned onto Department-managed land.

118. Where arson is suspected to have occurred on Department-managed land, the Department will take appropriate action to identify and, as appropriate, prosecute the offenders.

119. The Department will coordinate its fire investigation activities with the Western Australian Police Service Arson Squad, FESA and Local Government Authorities.

120. The Department will undertake patrols, where necessary, in areas where barbecues and campfires are commonly used, to ensure compliance with fire legislation and to provide advice and assistance regarding the wise and proper use of fire.

## 3.3 Wildfire preparedness

121. Preparedness activities focus on essential emergency response capabilities through the development of plans, procedures, organisation and management of resources, training and public education. Wildfire preparedness refers to all activities undertaken in advance of wildfire occurrence to decrease wildfire area and severity and to ensure more effective fire suppression.

122. Preparedness activities to be undertaken by the Department include training and development of fire personnel; provision and maintenance of fire equipment; information and communication systems; maintenance of fire access, firebreaks and water supplies; detection; pre-suppression planning; and data management.

123. A daily level of preparedness for wildfire suppression is to be utilised which is appropriate to the existing and forecast fire danger and the possibility of serious fire conditions. Preparedness levels will be conducive to minimising the risks of potential losses of human life and damage to Department-managed land assets and values resulting from wildfire.

124. The approach to preparedness must be strategic and include the analysis of fire risk and the identification and appropriate reduction in hazards by the Department and local communities.

125. The level of preparedness will be in accord with the requirements of the Fire Risk to Resources Model[7] maintained by the Department.

#### 3.3.1 Personnel availability

126. The Department will, as far as is practicable, ensure that the total number and distribution of competent personnel meets the requirements specified in its Fire Risk to Resources Model[7] for fire suppression.

127. The Department will, as far as is practicable, ensure that sufficient competent Departmental and other personnel are available at Departmental despatch centres for immediate deployment commensurate with the existing and forecast fire danger and current fire management commitments.

128. The Department will strategically locate personnel and resources to ensure rapid and effective response to wildfires, and to respond to changes in fire danger.

#### 3.3.2 Equipment

129. The Department will, as far as is practicable, hold or have ready access to a level of equipment and services that will enable it to respond in accordance with the Department's Fire Risk to Resources Model[7] for fire suppression.

130. The Department will, as far as is practicable, provide a system that ensures the maintenance and availability of equipment held for fire management purposes.

#### 3.3.3 Detection

131. The Department will, as far as is practicable, provide a fire detection system that meets the performance requirements set out in the Fire Risk to Resources Model[7] for fire suppression.

132. The Department will ensure that the system and level of fire detection activated is appropriate to the fire danger and the prevailing conditions.

#### 3.3.4 Incident Preparedness and Response Plans

133. The Department will annually produce Incident Preparedness and Response Plans[8] for each Region and/or District that describe how the requirements for fire suppression will be met in that Region/District, and specify resources extant in the Region/District and procedures to be implemented in the event of wildfire. The format for regional Incident Preparedness and Response Plans[8] is to be consistent across the Department.

134. The Department will assist FESA in the development of the Western Australian Wildfire Emergency Management Hazard Plan (Westplan Bushfire) or its successor.

135. The Department will develop and apply processes that promote opportunities for local knowledge and input from communities to assist with fire preparedness activities.



#### 3.3.5 Interagency coordination

136. The Department will participate in interagency coordination programs in accordance with relevant legislation and arrangements put in place under State emergency management guidelines and interagency agreements.

137. The Department will, where it considers it appropriate, enter cooperative arrangements for wildfire response with local government authorities and FESA fire services.

#### 3.3.6 Training and competency acquisition

138. The Department will apply national standards as the basis of competency definition, or where these do not exist, accepted industry standards.

139. The Department will define the competency requirements for all Incident Management roles to standards that are required to meet the Risk to Resources Model[7] for fire suppression.

140. The Department will review the competencies of its firefighting personnel each year.

141. The Department will provide or facilitate training programs for skills acquisition and maintenance, and personal development, and will conduct competency assessments to ensure that its personnel have the required competencies.

142. The Department will maintain systems to record training, competency acquisitions and accreditations for all fire management activities.

#### 3.3.7 Information and communication systems

143. The Department will develop and maintain information systems to support its fire management activities.

144. The Department will provide and maintain effective State-wide radio, telephone and data communication systems sufficient to support fire management activities.

145. All radio communication systems will conform to the Department's Policy Statement 21 – Communications[8].

146. The Department will ensure that its communications systems have effective links with those of other fire services.

147. The Department will provide specialist training to all personnel required to use the Department's communication systems for fire management activities.

#### 3.3.8 Weather forecasts and fire danger

148. The Department will monitor seasonal and daily fire danger across the State.

149. The Department will maintain indices indicative of seasonal and daily fire danger.

150. The Department will maintain access to a network of weather observation stations.

151. The Department will liaise with the Bureau of Meteorology regarding current and future trends in fire danger.

#### 3.3.9 Roads, tracks and access routes

152. The Department will identify road, track and access networks necessary for fire management purposes and other essential activities on Department-managed lands.

153. The Department will develop plans indicating the standard required of each identified road, track and access route.

154. The Department will develop plans for the construction and maintenance of identified roads, tracks, bridges and access routes and implement those plans as far as is practicable.

#### 3.3.10 Water points

155. The Department will develop criteria and standards for the establishment and maintenance of permanent or mobile water points for supply of water for ground and/or aerial firefighting on Department-managed lands.

156. The location of permanent water points will be signposted on the ground and recorded on Departmental fire management plans.

### 3.4 Wildfire response

157. Firefighter and public safety will be given priority over all other fire suppression considerations.

158. Control of wildfires threatening life, property and other high community values and high environmental values on or near Department-managed land will be given priority over routine Departmental activities, subject to consideration of overall Departmental needs.

159. The Department will respond to fires occurring on or near Department-managed lands to a degree that is appropriate to the values at risk; the prevailing and forecast weather; availability of resources; the cost of the suppression operation; and likelihood of long-term impact or net gains to the environment. The guiding principles of fire management as described in this Code will be applied.

160. The Department will take control of, or provide assistance at fires on or near Department-managed lands in accordance with State and local arrangements between the Department and other fire authorities and land management agencies.

161. Fire suppression will include the provision of accurate and timely information to local communities.

#### 3.4.1 Initial response

162. On receiving a report that a wildfire has been detected, the Department will despatch resources after consideration of current fire commitments, available indications of fire behaviour, damage potential of the fire and the availability of resources.

163. The Department will assign each wildfire a unique identifier, which shall be used in all subsequent suppression activities and record keeping.

164. Each wildfire will have an Incident Controller assigned to it. More than one wildfire may be assigned to an Incident Controller.

165. An initial report on each wildfire will be provided by dispatched resources on arrival at the fire, in accordance with Departmental procedures.

### 3.4.2 Fire organisation

166. The control and command structure for wildfire suppression will follow the Australian Inter-service Incident Management System (AIIMS)[11]. AIIMS provides a common management framework to assist with the effective and efficient control of incidents. The framework applies to a range of incidents from small to large, and provides the basis for an expanded response as the incident grows in size and complexity.

167. The management of wildfires involving numbers of agencies and organisations will conform to the structures described in the *Emergency Management Act 2005* or its successors.

168. Each wildfire with resources deployed will be allocated an incident level from 1 (lowest) to 3 (highest), which is determined by incident size and complexity. This incident level will be reviewed as the size, complexity and impact of the incident changes over time.

169. An Incident Action Plan will be developed for the control of each wildfire identified as either Level 2 or Level 3. The contents of the incident action plan will be determined by the incident level and specific nature of the incident. The Department will develop and apply guidelines for the preparation of Incident Action Plans[10].

### 3.4.3 Operational guidelines

170. The Department will develop guidelines for fire suppression activities. These will include but not be limited to: management of personnel; construction of fire control line; use of earthmoving equipment; rehabilitation of fire lines, back burning and burning out; use of aircraft; use of water and additives; and incident security.

171. The Department will develop and implement procedures for the reporting of wildfire information internal and external to the incident during the suppression phase of that incident.

172. Where appropriate, local knowledge will be actively sought to inform and apply incident control decisions.

### 3.4.4 Fire investigation

173. The Department will, wherever practicable, endeavour to establish the origin and cause of every wildfire on Department-managed land.

174. A fire investigator will, wherever practicable, investigate and report on suspected human-caused fires attended by the Department on Department-managed land.

175. The Department will fully investigate and report on all wildfire events that involve death and or injury, significant environmental or property damage or significant suppression cost.

176. The Department will support/participate in investigations carried out by other agencies with statutory responsibility to carry out such investigations associated with fire on Department-managed lands.

### 3.4.5 Records

177. The Department will maintain records of each wildfire attended by the Department or reported on Department-managed land.

178. The Department will describe and define the information and documents to be retained as records.

179. The Department will maintain these records in a format that complies with the Department's records management policy.

## 3.5 Wildfire recovery

180. The Department will undertake or assist other agencies to undertake recovery activities, including supporting wildfire affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing. Other wildfire recovery actions to be undertaken include operations to salvage, repair, rehabilitate or replace fire damaged assets and sites disturbed by fire control operations.

181. The Department will implement or initiate recovery measures for health and safety of firefighting personnel, and affected communities.

### 3.5.1 Post incident debriefs and reports

182. Each fire suppression event undertaken by the Department will be the subject of a post incident debrief. The format and scope of the post incident debrief will depend on the incident level and the nature of events during the incident. The style of debriefing may range from an informal discussion between firefighting personnel on a small incident, to a formal debriefing on a complex incident.

183. The Department will record and report the outcomes of any post incident debrief that identifies significant issues or events. In these situations, the Department will collate and analyse the post incident debrief records, and report on actions taken in response.

184. The Department will conduct a formal post incident analysis and prepare a written report with recommendations for incidents where substantial resources were engaged, wildfire damage to assets or values was significant, safety was compromised, or recovery issues have been raised.

185. The Department will ensure that lessons learned from the incident are incorporated into planning for future wildfire events.

### 3.5.2 Health and safety for personnel

186. The Department will ensure that the safety of all firefighting and support personnel will be given the highest priority in the planning and application of all fire management operations.

187. The Department will review and apply standards for the medical and physical fitness requirements of all fire management personnel in accordance with best practice information and experience as set out in the Fire Fitness Guidelines for Managing the Department of Environment and Conservation Fire Fitness Program[12].

188. To the extent practicable during firefighting operations, firefighters will be given sufficient time to rest to relieve fatigue and stress arising from their involvement in fire suppression operations.

189. The Department will make available critical incident stress debriefing to personnel subjected to traumatic events or circumstances.

### 3.5.3 Rehabilitation

190. The Department will undertake rehabilitation of disturbance resulting from firefighting operations as soon as practical after the wildfire is contained.

191. Where substantial rehabilitation works are or will be required, a rehabilitation plan will be prepared and implemented.

# 4. PUBLIC PARTICIPATION

## 4.1 Public participation

192. The annual prescribed burn program and the plans for proposed prescribed burns of identified public interest will be made available for public consultation.

193. The Department will provide information through public access media and opportunity for participating in decision making at various forums from time to time.

# 5. RESEARCH AND MONITORING

194. The Department will directly or indirectly engage in research into the effects of fire on flora, fauna and ecosystems.

195. The Department will directly or indirectly engage in research into the effectiveness of prescribed burning and other operations in providing fire protection.

196. The Department will consider and may undertake where practicable during fire suppression opportunistic research into fire behaviour, firefighting methods and firefighter performance.

197. The Department will directly or indirectly support fire management research by facilitating monitoring of selected areas, including prescribed burns, areas long unburned and areas burned by wildfires.

198. Where appropriate and resources are available, the Department will undertake monitoring of areas treated with prescribed fire to assist in determining the effectiveness of those treatments in achieving the objectives set for the prescribed burning operations.

199. The Department will directly or indirectly engage in social research into public attitudes to fire and its management.

# 6. PUBLICITY AND MEDIA

200. The Department will facilitate the provision of relevant information to media outlets that informs the public of the Department's fire management operations.

201. The Department will maintain a publicly available website that contains information on fire management operations.

202. The Department will use electronic media outlets including the internet to provide public alerts concerning wildfire incidents and smoke accumulation events.

# 7. APPENDICES



## 7.1 Principles of environmental care

Fire management activities will be planned and conducted in an environmentally sensitive manner according to the following principles:

- fire regimes and fire management activities to be appropriate for maintaining the vigour and diversity in populations of species and communities of the State's indigenous flora and fauna;
- water quality and quantity to be protected by measures which minimise the impact of fire management activities on streams, springs, soaks, swampy ground and bodies of standing water, and their physical, chemical, and biological quality;
- soil to be protected by measures which prevent inappropriate disturbance of its physical and chemical properties or which promote stabilisation of bare or disturbed earth following disturbance;
- landscape values, geomorphological features, cultural and historical sites to be considered when planning operations;
- indigenous flora and fauna to be protected following wildfire suppression by measures which promote the re-establishment of the ecological processes existing prior to the wildfire;
- the possible introduction and spread of pest plants and animals, plant diseases, and insect pests to be avoided;
- air quality to be addressed by measures which diminish the impacts of smoke generated by prescribed burning.

## 7.2 Referenced Departmental documents

| Ref No. | Title of Departmental document |
|---|---|
| 1 | Policy Statement No. 19 Fire Management |
| 2 | Fire Operations Guideline 79 Prescribed Fire Plan |
| 3 | Prescribed Fire Manual (Draft) 2007 |
| 4 | Master Burn Plan Manual (Draft) 2007 |
| 5 | Fire Management Guideline G3 – Smoke Management and Air Quality January 2006 (Draft) |
| 6 | Fire Management Guideline G2 – Fireline Stabilisation and Rehabilitation February 2007 (Draft) |
| 7 | Fire Risk and Resources Model 2007 (Draft) |
| 8 | Fire Operation Guideline 7 – Guidelines for the Preparation of Incident Preparedness and Response Plans |
| 9 | Policy Statement No. 21 Communications |
| 10 | Fire Operations Guideline 3 – Preparation of Incident Action Plans at Departmental Fires |
| 11 | The Australian Inter-service Incident Management System – A Management System for any Emergency, 3rd Edition – Australian Fire Authorities Council 2005 |
| 12 | Fire Management Guideline G4 – Fire Fitness, April 2007 |

## 7.3 DEFINITIONS

| | |
|---|---|
| Annual prescribed burn program | A plan developed and reviewed each year outlining the areas and scheduling of prescribed burns for the coming year. |
| Approved Management Plan | A plan developed as per the requirements of Part V of the *Conservation and Land Management Act 1984* (CALM Act) by the Department of Environment and Conservation for the Conservation Commission and approved by the Minister for the Environment. |
| AS/NZ 4360:1999 | The Australian and New Zealand Standard for Risk Management. |
| Authorised Officers | Any person appointed in accordance with Part IV of the CALM Act. |
| Back burning | A fire ignited along the inner edge of a fire control line to consume the fuel in the path of a wildfire. |
| Burning out | Setting fire so as to consume unburnt fuel between the fire control line and the wildfire. |
| Burn prescription | A document prescribing the conditions under which a planned fire can be conducted and the strategies and tactics to be employed in achieving the burn objectives. |
| Burning program | A schedule of prescribed burning operations to be undertaken within a specified period of time (season, year, three years). |
| Conservation Commission | A body established under the CALM Act in which many of the lands managed by the Department are vested. The Commission is responsible for the development of management plans and providing independent advice to the Minister. |
| Control Lines | See fire control lines. |
| Department, Departmental | Relating to the Department of Environment and Conservation. |
| Department-managed land | Land of a type described in the CALM Act for which the Department is responsible. This includes non-townsite and non-urban unallocated Crown land and unmanaged reserves for which the Department has a fire planning and preparedness responsibility. |
| Ecological principles for fire management | As published as an attachment to Fire Policy 19 – Fire Management. |
| Fire control line | A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire. |
| Fire danger | The resultant of all factors which determine whether fires start, spread, and do damage and whether and to what extent they can be controlled. |
| Firefighter | Any employee or agent of the Department who occupies or is designated to occupy a position in the Australian Inter-service Incident Management System – Incident Control System (or its successors) for the purpose of fire suppression. |
| Firefighting operations | Any work or activity associated directly with the control of wildfire. |
| Fire investigator | A person accredited by the Department for the purpose of investigating the cause and origin of wildfire. |
| Fire load | The combination of the probable number of wildfires in a given period, the number of existing wildfires, and their anticipated difficulty of control. |
| Fire prevention | All activities concerned with minimising the incidence of wildfire, particularly those of human origin. |
| Fire protection | All activities designed to protect an area (including human life, property, assets and values) from damage by wildfire. |
| Fire regime | The history of fire use in a particular vegetation type or area including the frequency, intensity, season and scale of burning. It may also include proposals for the use of fire in a given area. |
| Fire Risk to Resources Model | A decision process associated with determining the number and competence of personnel and the type, quantum, capacity and location of resources needed to manage fire by the Department to a acceptable standard. |
| Hazard | A fuel complex defined by volume, type, condition, arrangement and location that determines both the ease of ignition and of fire suppression difficulty. |
| Incident | An emergency incident that requires a specialised response by competent personnel and appropriate equipment over a relatively short period of time (hours to days). |
| Incident Action Plan | A plan developed by an Incident Management Team and approved by the Incident Controller for the combat of an emergency incident. |

## 7.3 DEFINITIONS

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|---|---|
| Incident Controller | The person having overall management of the fire in accordance with the Australian Inter-service Incident Management System-Incident Control System (or its successors). |
| Incident level | A descriptor reflecting the level of complexity of an emergency incident ranging from Level 1 for low complexity to Level 3 for high complexity. |
| Incident Preparedness and Response Plans | A plan prepared by each region and district for the purpose of preparing for and responding to wildfire on Department-managed land. |
| Interim guidelines | A document that provides guidance to land managers in the absence of an approved management plan. |
| Management plan | A plan required under Part V of the CALM Act for the management of a defined area of land. |
| Master Burn Plan | A plan developed and reviewed each year setting out the location and scheduling of prescribed fire for the next three years. |
| Post incident analysis | The analysis of all activities associated with prevention, preparedness, response and recovery of an emergency incident aimed at developing recommendations to ensure improved performance in future. |
| Post incident debrief | The collection and collation of information from personnel involved in an emergency incident. |
| Prescribed burning | The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives. It is undertaken in specified environmental conditions. |
| Prescribed Fire Manual | Document providing guidance to personnel involved in prescribed fire planning and application. |
| Prescribed Fire Plan | A plan prepared to enable the implementation of prescribed fire over a specified area under specified conditions to achieve specified management outcomes. |
| Regional indicative burn plan | A plan that sets out the areas and schedule of burns intended to be undertaken within the planning period. |
| Rehabilitation plan | A plan setting out actions required to stabilise and rehabilitate disturbance associated with fire suppression operations. |
| Risk | The combination of the probability of a situation occurring and the consequence of that occurrence. |
| Safe | A stage post fire (prescribed or wildfire) when no further action or attention is required to prevent the fire escaping from its intended location. |
| Smoke management guidelines | Guidelines developed for use by Departmental personnel to minimise the impact of smoke resulting from prescribed fire operations on populated areas. |
| Traditional owners | Aboriginal people with a customary or traditional association with the land, regardless of their common law native title. |
| Unallocated Crown land | Land belonging to the Crown with no vested purpose. |
| Unmanaged reserves | Land belonging to the Crown that has not been vested with an agency for management. |
| Water point | A permanent (dam, water hole or tank) or mobile (tanker or moveable water tank) source of water for the replenishment of fire suppression equipment. |
| Western Australian Emergency Management Hazard Plan | One of many documents prepared by the emergency services of Western Australia as required by the *Emergency Management Act 2005* to prevent, prepare, respond and recover from a specific type of emergency, eg. flood. fire, cyclone etc. |
| Westplan Bushfire | A plan required under the *Emergency Management Act 2005* that sets out the arrangements for the management of wildfire incidents. |
| Wildfire | An unplanned grass, scrub or forest fire. |

## 7.4 FIRE MANAGEMENT POLICY



### POLICY STATEMENT NO. 19

### FIRE MANAGEMENT POLICY

#### 1. OBJECTIVE

The Department will manage prescribed fire and wildfires on lands managed by the Department to protect and promote the conservation of biodiversity and natural values whilst also providing for protection of human life and community assets. The Department will also promote fire management that protects biodiversity on lands not managed by the Department.

Fire management will be planned and implemented in partnership with other landowners and land managers, fire authorities and the community. The Department will implement an informed and balanced approach to risk management. A variety of fire regimes incorporating different frequency, intensity, season and scale will be applied at the landscape scale on lands for which the Department has a fire management responsibility.

#### 2. BACKGROUND

The rationale and the principles upon which this policy is based are provided in the Appendix.

#### 3. LEGAL BASE

- Sections 33(1)(a) and 33(3) of the *Conservation and Land Management Act 1984* (CALM Act) provide for the Department to manage lands to which the Act applies, according to management plans or, in the absence of a management plan, in accordance with the necessary or compatible operations provisions of the Act depending on the land category. Fire management activities are subject to these provisions.
- The *Bush Fires Act 1954* applies to land throughout the State including Department-managed lands. The provisions of the Bush Fires Act do not, however, affect the provisions of the CALM Act and the Department is generally not bound by the Bush Fires Act.
- Section 39 of the Bush Fires Act provides wide-ranging powers for a bush fire control officer to take necessary steps to extinguish a fire. If an authorised CALM Act officer is present at a fire on or near any Crown land, the officer may take supreme control of the fire as if the officer were a bush fire control officer appointed by a local government authority. The Bush Fires Act also provides other powers to designated Departmental officers. Section 56 of the Act imposes a specific duty on an authorised CALM Act officer to take enforcement actions under the Bush Fires Act (eg. to demand the name and address of an offender, to require a person to produce an authorisation to light a fire, and to apprehend an alleged offender without a warrant).
- The *Wildlife Conservation Act 1950* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* provide special protection to threatened species (both Acts). The Commonwealth Act also protects threatened ecological communities. These impose an obligation to conduct fire management activities accordingly.
- Under Common Law, the Department falls under a duty as an occupier to take all reasonable care to eliminate or minimise foreseeable risks of harm. The Department could be held liable for injury or loss caused by fire that a Departmental employee had negligently lit or negligently failed to control.
- In July 2003 the Department was allocated the role of managing fire preparedness on non-metropolitan, non-townsite unallocated Crown land and unmanaged reserves. The responsibility for fire suppression on these lands remains with local government.
- Under the Western Australian Emergency Management Arrangements that are outlined in the State Emergency Management Committee Policy Statement No 7, the Department is recognised as the Hazard Management Agency (HMA) for wildfires on or near CALM-managed lands. Under these arrangements, the HMA "is responsible for ensuring that emergency management activities pertaining to the prevention of, preparedness for, response to and recovery from a wildfire are undertaken". The HMA's responsibilities include the preparation of a strategic plan or arrangements (WESTPLAN-WILDFIRES) that is designed to cope with wildfires on or near CALM-managed lands, and that includes details of joint agency operational arrangements.

#### 4. RELATIONSHIP TO OTHER DEPARTMENTAL POLICIES

The Department's Fire Management Policy is consistent with and recognises the requirements contained in other Departmental policies:

- Policy 3 Management of Phytophthora and Disease caused by it
- Policy 9 Conservation of Threatened Flora in the Wild
- Policy 10 Rehabilitation of Disturbed Land
- Policy 31 Management of Reserves for the Conservation of Nature
- Policy 40 Road Management
- Policy 41 Beekeeping in Public Land
- Policy 49 Radio Communications
- Policy 60 Occupational Health and Safety
- Media Relations Policy
- Public Participation Policy
- Wilderness Policy

## 5. POLICY

### 5.1 Safety and risk

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| Safety | Firefighter and public safety is the first priority in every fire management activity. |
| Risk management | The protection of human life and biodiversity, cultural and community assets will be undertaken commensurate with the risk posed by fire to human life and those assets and the consequence of fire impacting on human life and those assets. |

### 5.2 Use of fire

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| Objectives for fire management | Fire will be used to achieve a range of land management objectives, including the conservation of biodiversity; maintenance of ecosystem health and productive capacity; conservation of soil, water and catchment values; conservation of natural and cultural heritage; regeneration and protection of native forests and plantations; and protection of human life, community assets, indigenous heritage sites, recreation sites and scenic values. These objectives, and the methods used to achieve them, will be specified in individual burn prescriptions. |
| Prescribed burning | Prescribed burning plans will integrate biodiversity conservation and asset protection objectives in order to optimise outcomes. In the planning of prescribed burning programs the assessment of fire requirements for biodiversity outcomes will be given first consideration and any shortcomings from this approach for other objectives will be taken into account subsequently so that prescribed burn plans achieve all priority objectives. |
| Manage for diversity | A variety of fire regimes incorporating different frequency, intensity, season and scale will be applied at the landscape scale (tens of thousands of hectares) and other scales. Planned fire regimes will incorporate the incidence of wildfires. |
| Fire planning | Planning for prescribed burns will incorporate the need for biodiversity conservation and strategic protection from wildfires, at both the landscape scale and land management unit scale (several hundred to several thousand hectares). Three year indicative prescribed burning plans and annual burning plans will be prepared. The planning and application of fire regimes will require consideration of interacting factors such as invasive species (weeds and feral animals), regeneration of native species, grazing impacts, fire history and the size of the park/reserve/forest. This is of particular concern in fragmented landscapes where Department-managed lands are surrounded by extensive urban and agricultural land uses. |
| Community consultation | During the planning process for prescribed burning the Department will consult with traditional owners, the community, government agencies and specific stakeholders. In particular a formal process of public consultation and engagement will be implemented during the preparation of the three year indicative prescribed burning plans for the south-west forest regions and annual plans for other regions. Fire management will be considered during public consultation on the content of area management plans prepared for the Conservation Commission. Consultation processes will also be used as an opportunity to develop community understanding and support for fire management programs. |
| Community awareness and education | The Department will make available to the community information concerning the outcomes of the community consultation process. Information on fire management and the Department's planning and operational processes will also be published and posted on the internet. |
| Qualified personnel | Prescribed burns will be planned, directed and conducted by qualified and experienced staff. Written prescriptions will be prepared by trained staff, with appropriate input from other Departmental staff and sources external to the Department. |
| Approvals | Every prescription will be reviewed and approved by the responsible manager prior to implementation. Each year the three year indicative prescribed burning program and the proposed annual burn program for the south-west forest regions will be brought to Corporate Executive by the Director of Regional Services for endorsement. |
| Monitoring and audit | The extent to which prescribed burn objectives have been achieved will be monitored and recorded in order to continue the process of adaptive management. Fire management plans and prescriptions will contain performance indicators and monitoring criteria against which achievements can be measured. The outcomes of monitoring and performance appraisal will be reported at appropriate intervals to the Executive Director. The achievement of fire management objectives contained in CALM's prescribed burning programs and in area management plans will be subject to periodic audit by the Conservation Commission. |
| Smoke management | Prescribed burns will be managed to reduce the risk of smoke causing detrimental impacts on population centres and other sensitive areas through application of smoke management guidelines. Potential impacts of smoke and ash on water catchments, road traffic, neighbours and visitors, and firefighters will be considered when planning and implementing prescribed burns. |

## 5.3 Fire suppression

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| Suppression capacity | The Department will maintain its fire management, suppression and response capability in accordance with sound risk management principles recognising the availability of resources from local government volunteers, fire authorities and other sources. This requires an adequate state of preparedness and standards of fire suppression relative to the values at risk, and to the difficulty of controlling fires in a safe and cost-effective manner. |
| Readiness | The Department will, in consideration of risk assessment outcomes and the availability of resources from other agencies, maintain an effective and efficient fire-suppression capability of personnel, equipment and aircraft. Resources need to be mobile and personnel must be fit, skilled and well trained. |
| Detection | The Department will, in high risk or high value areas, maintain fire detection and fire reporting systems that will give timely and accurate warning of fires threatening community or environmental values. Lower level detection and reporting systems will apply in other areas. |
| Response | The Department will respond to fires occurring on or near Department-managed lands to a degree that is appropriate to the values at risk, the prevailing and forecast weather, the availability of resources, the cost of the suppression operation, and the likelihood of long-term impact or net gains to the environment. In circumstances where impacts of the wildfire are likely to be low or resources are limited, the response may mean observation, rather than active suppression. |
| Control | The Department will take control of, or provide assistance at fires on or near Department-managed lands in accordance with State and local arrangements between the Department and fire authorities and other agencies. |
| Access | The Department will maintain an effective system of roads, fire access tracks and helipads to provide access and safety for firefighters. |
| Environmental harm | The Department will fully consider the protection of environmental and other values in determining strategies for fire suppression. Where appropriate, fires may be contained within management units defined by existing roads rather than by constructing new firelines around the perimeter of the fire. Where firelines are constructed during suppression operations, they will be subsequently rehabilitated to minimise the threat of soil erosion, weeds or spread of dieback disease. |
| Training | The Department will develop and deliver high quality training and performance assessment programs for Departmental staff for appropriate roles in fire and incident management. |
| Interagency arrangements | The Department will establish interagency agreements and working arrangements with fire authorities and volunteers to provide cooperative and coordinated firefighting that can deal successfully with the full range of emergencies on or near Department-managed lands. |

## 5.4 Wildfire prevention

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| Prevention | The Department will plan and conduct wildfire prevention activities to minimise the incidence of preventable wildfires (ie. unplanned fires of human origin). |
| Identify fire cause | The Department will, where practical, attempt to identify the origin and cause of wildfires on lands under its control and will investigate fires that result in damage to private or community property. Where regulations have been breached, the Department will take appropriate action to identify and, as appropriate, arrange prosecution of offenders. |
| Arson | The Department does not have jurisdictional responsibility to effect initiatives for arson prevention or preparing communities for wildfire events. However, the Department will work closely with the Fire and Emergency Services Authority, the Police Arson Squad and local government authorities in developing and implementing coordinated fire prevention and preparedness programs. |

## 5.5 Liaison

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| Interagency arrangements | CALM will participate with other State agencies and local government authorities in developing approaches to fire risk mitigation, including in peri-urban areas. |
| Partnerships | The Department will carry out its fire management role in partnership with other relevant agencies, primarily the Fire and Emergency Services Authority, the Forest Products Commission, local government authorities and Volunteer Bush Fire Brigades. |

## 5.6 Research

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| Research and knowledge | The Department will sponsor and undertake research into fire management and ensure that the resultant knowledge is disseminated to fire managers and the community. |

## 6. POLICY IMPLEMENTATION REQUIREMENTS

- To enable a consistent, reliable and transparent assessment of the risk and consequence of wildfire to biodiversity, cultural and community assets, the Department will utilise the Australasian Standard (AS/NZS 4360 Risk Management) as the basis for its approach to wildfire risk management.
- The Department recognises the importance of science, local knowledge and expertise and indigenous knowledge to underpin fire management. The Department will continue to promote and support research into fire ecology, fire behaviour, fire information systems and fire control systems and to apply adaptive management principles in its fire management operations.
- The Department will work with fire management agencies and research organisations to investigate and implement fire management strategies that mitigate against the impacts of climate change with respect to fire ecology and wildfire management.
- In order to facilitate support and assistance for cooperative and coordinated fire management across jurisdictional boundaries, the Department will implement education and awareness programs for neighbours and the community on best practice fire management.
- In order to promote the safe, efficient, effective and integrated management of fire and fire related activities on lands managed by the Department, a comprehensive set of standards, procedures and prescriptions will be published and maintained.
- Strategies other than prescribed burning, such as mechanical treatments of vegetation (e.g. rolling or slashing) and grazing with livestock will be considered and applied where appropriate in meeting management objectives for the land in question.
- The need for effective fire management will be recognised in the policies and plans prepared by the Department. This includes area management plans prepared for the Conservation Commission for regions, State forest, parks and reserves as well as fire protection plans for high value assets, property, plantations etc as required. Every district will annually prepare a Fire Preparedness and Response Plan and a Prescribed Burning Plan.
- All instructions, prescriptions or guidelines developed for fire management activities undertaken by the Department must be consistent with the fire management principles and operational rationale in the Appendix.
- The Department will provide appropriate awareness and training programs for all staff likely to participate in any aspect of fire management to ensure adequate understanding, knowledge and skill levels to implement the fire policy in an environmentally sensitive, safe and cost-effective manner.
- The Department will use its best endeavours to both consult and involve traditional owners in fire management activities where the objective is to replicate traditional burning practices.
- The Department will contribute to State-wide fire management by representation on community based and interagency committees and working groups concerned with fire management at local, regional and State levels.
- The Department will maintain formal liaison with fire management authorities in other countries, States and Territories to ensure the currency of mutual aid arrangements and the transfer of knowledge on best practice fire management.
- Departmental staff must meet their obligations under this Policy through assigned levels of delegation, approved budgets, sourcing and planning as provided for in the Department's table of delegations, Departmental and other instructions.
- The implementation of this Policy will be subject to Departmental audit and periodic audit by the Conservation Commission in assessing the implementation of management plans.

## 7. CUSTODIAN

The Director of Regional Services is the custodian of this Policy.

## 8. DIRECTOR GENERAL APPROVAL

Director General

# Appendix to Fire Management Policy



This appendix outlines the rationale for fire management plans and activities implemented by the Department of Conservation and Land Management. A set of principles to guide fire management is also outlined.

## Rationale

- Fires have occurred regularly on most lands managed by the Department. Fires from natural causes (eg. lightning) will inevitably occur. Fires from human activities, either deliberate or accidental, will also occur, but unplanned fires may be minimised by effective public education and awareness, and by enforcement of legislation and compliance management.
- Aboriginal people have inhabited Western Australia for more than 40,000 years and over this period they have used fire as a management tool for hunting, access and spiritual reasons. The landscapes that European settlers and their descendents have come to recognise as being distinctively Australian have been fashioned by fire over many generations.
- Fire is a natural environmental factor that can have both destructive and beneficial effects. It can regenerate, recycle nutrients, create and maintain habitats, but can also kill, injure and destroy. The impact of fire varies with the frequency, intensity, scale, time of year and the fire sensitivity of the community in which it occurs.
- Wildfires do not distinguish between land tenures. Fire protection and fire management regimes must involve all State Government agencies with land management or fire management responsibilities, local government authorities and private land managers working cooperatively to achieve agreed fire management objectives.
- Fire has very different impacts on the biota contained in the 26 bioregions represented in Western Australia. Fire regimes must be appropriate to the needs of each bioregion.
- Exclusion of fire from naturally fire prone vegetation over large areas results in the gradual build-up of live and dead vegetation which becomes fuel and increases the risk of large, intense and costly fires. In most vegetated ecosystems, the exclusion of fire for long periods over large areas is difficult to achieve, and may also be undesirable from a biodiversity conservation and community protection point of view.
- A regime of too frequent fires, planned or unplanned, can have adverse impacts on biodiversity for some species and in some ecosystems including riparian zones, granite outcrops, wetland ecosystems and small patches of remnant vegetation.
- Planned fire will be excluded from representative scientific reference areas, including fire sensitive ecosystems, and these will provide an important benchmark against which the effects of other fire regimes can be evaluated. Some biota and ecosystems may also benefit from long periods of fire exclusion. The location and size of fire exclusion areas should take account of firefighter safety and other management influences.
- Planned fires can be used in natural areas to minimise loss of life, property and services, and to achieve biodiversity conservation objectives. This is likely to be a more cost-effective and predictable method of fuel management over large areas than using alternative methods including manual, mechanical, chemical and biological methods.
- Suppression difficulty and damage potential to life and property of a bushfire are proportional to the size of the fire, the conditions under which it is burning, and the rate and amount of heat energy released (fire intensity). The intensity and speed at which fire burns is related to the quantity and structure of accumulated litter, bark and plant material, which is in turn related to the period since last fire. In most vegetated ecosystems, accumulated fuel loads can be reduced by low intensity prescribed fires. This reduces the likelihood of intense fires even under extreme conditions and improves the capacity for firefighters to safely control a fire. Under extreme fire danger conditions, the spread of fire may only be retarded in light fuels.
- Threshold levels of available fuel quantities or fire intervals have been identified in many major vegetation types which represent the upper limits beyond which fire behaviour in summer conditions will be severe and too dangerous to be suppressed by either ground or aerial fire suppression methods. In situations where a number of fires are burning simultaneously and firefighting resources are fully committed, the existence of strategically-located areas of reduced fuel provides fire managers with greater flexibility in the deployment of available resources. Fires burning into light fuels may be given lower priority for attention because they are less likely to exhibit severe fire behaviour.
- Maintaining air quality is a major challenge in the execution of approved prescribed burning programs. The need for prescribed fire to conserve biodiversity and to protect community values presents a risk to achieving the standards of air quality regulations in high population areas. This risk can be minimised through the use of sophisticated smoke prediction models.
- Public understanding of the role and effects of fire, and application of planned fire and fire suppression operations is vital. Effective communication and consultation with the community leads to greater understanding and support for fire management programs, and ensures that knowledge within the community is made more readily available to managers.

## Principles for Fire Management

- The vegetation and climate across Western Australia make it highly prone to bushfire. Over millions of years fire has contributed to the evolution of the State's ecosystems. Fire is an important disturbance factor that will continue to influence the biotic composition and structure of all natural ecosystems.
- Plant and animal species and communities vary widely in their adaptations to, and reliance on fire. Species and communities require particular fire regimes for their long-term survival. Such requirements may vary within the ecological and geographical range of species.
- There is no single fire regime that is suited for all flora, fauna and ecosystems. Organisms have developed with a great variety of fire regimes, and thrive in different circumstances. A fire regime that enables one organism to gain competitive advantage will disfavour a competitor.
- Diversity and variability in fire regimes at the landscape level help maintain biodiversity. The application of ecologically based fire regimes that provide for an interwoven mosaic of vegetation and habitats representing a range of fire intervals, fire intensities, seasons and scales will help optimise the conservation of biodiversity. Patchiness of burning is an important factor in providing environmental heterogeneity at a local level. In some instances fire exclusion will be planned. On the other hand, widespread, high intensity fires will periodically remove most of this local patchiness from the landscape. Patchiness can be achieved through applying fire during periods of fuel moisture differential, through the lighting pattern used, and by burning adjacent to light fuels.
- Fire management at a very local level may be critical for the survival of some threatened species and ecological communities.
- Following fire, other factors such as climatic events (e.g. drought) and insect attacks often drive ecosystems towards a new transient state with respect to species composition and structure. This may preclude the identification of changes specifically attributable to fire.
- Climate has a major influence on fire regimes, and is one of the fundamental factors determining the distribution of vegetation communities at a regional scale. Some regions of the State have experienced significant shifts in climate over the past three decades and there is an expectation amongst the scientific community that the rate of climate change may accelerate in the future. Fire management should therefore be based on an understanding of climatic trends and adapt to meet changing circumstances.
- All available knowledge including life histories, vital attributes of the native flora and fauna and knowledge of indigenous traditional fire regimes will be used to develop ecologically-based fire regimes.
- Fire management policies and practices should adapt to new knowledge gained through strategic long-term and short-term research and monitoring programs. This adaptive approach to fire management should be flexible to any changes to community values and expectations.
- Fire management planning on lands managed by the Department must address the threats and impacts of wildfire, accommodate the use of planned fire and provide for the achievement of specified land management objectives.
- The response to the threat of wildfire on Departmental lands must consider legal requirements, be thoroughly planned, safe, effective, cost-efficient and environmentally sensitive. All fire management activities, including fire suppression and prescribed burning, must be conducted in accordance with clearly defined procedures that provide for safe work practices and have outcomes monitored and recorded.
- Planning an appropriate response to the occurrences of wildfires must include an assessment of the threat to human life, community assets and services, and natural values, and consider these in conjunction with the management objectives of the area.
- Principles of environmental care must guide all preparedness, suppression, recovery and prescribed burning activities.

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**APPENDIX 5**

## Fire Management Guidelines

Fire management guidelines and supporting documents (as at January 2009)

### General

| Status | Number | Title | Custodian | Version | Review |
|---|---|---|---|---|---|
| | G1 | Fire Fighter Food | Planning FMS | Jun-08 | Jun-10 |
| | G2 | Fireline Rehabilitation | Planning FMS | Jun-08 | Jun-10 |
| | G3 | Smoke | Planning FMS | Jun-08 | Jun-10 |
| | G4 | Fire Fitness | FMS | Jan-09 | Oct-10 |

### Ecological

| Status | Number | Title | Custodian | Version | Review |
|---|---|---|---|---|---|
| | E1 | Organic Soils | Dir. Science Div. | Jun-08 | Jun-10 |
| | E2 | Tingle Forest | Dir. Science Div. | Jun-08 | Jun-10 |
| | E3 | Habitat Protect (Birds) Reeds/Rushes | Dir. Science Div. | Jun-08 | Jun-10 |
| | E4 | Tuart Woodlands | Dir. Science Div. | Jun-08 | Jun-10 |
| | E5 | Granite Outcrops | Dir. Science Div. | Jun-08 | Jun-10 |
| | E6 | Mulga | Dir. Science Div. | Jun-08 | Jun-10 |
| | E7 | Coastal Heath Woodlands | Dir. Science Div. | Jun-08 | Jun-10 |

### Species

| Status | Number | Title | Custodian | Version | Review |
|---|---|---|---|---|---|
| | S1 | Geocrinia | Dir. Science Div. | Jun-08 | Jun-10 |
| | S2 | Honey Possum | Dir. Science Div. | Jun-08 | Jun-10 |
| | S3 | Mallee Fowl | Dir. Science Div. | Jun-08 | Jun-10 |
| | S4 | Noisy Scrub Bird | Dir. Science Div. | Jun-08 | Jun-10 |
| | S5 | Quokka | Dir. Science Div. | Jun-08 | Jun-10 |
| | S6 | Sunset Frog | Dir. Science Div. | Jun-08 | Jun-10 |
| | S7 | Tammar | Dir. Science Div. | Jun-08 | Jun-10 |
| | S8 | Western Ringtail Possum | Dir. Science Div. | Jun-08 | Jun-10 |
| | S9 | Cypress | Dir. Science Div. | Jun-08 | Jun-10 |
| Draft | S10 | Black Cockatoos | Dir. Science Div. | Feb-08 | Jun-10 |
| | S11 | Geophytes | Dir. Science Div. | Jun-08 | Jun-10 |
| | S12 | Buffel Grass | Dir. Nature Cons. | Oct-08 | Oct-09 |

**FMG Binder Accessories**

The documents below are to be used in the creation of any Hard Copy Collections of the Fire Management Guidelines. If you wish to download all four (4) files, download the FMG Binder Accessories (ZIP).

| Status | Title | Version |
|---|---|---|
| | FMG Binder Accessories (ZIP) | Oct-08 |
| | FMG Binder Cover Page | Oct-08 |
| | FMG Binder Contents Page | Oct-08 |
| | FMG Binder Preamble | Oct-08 |
| | FMG Binder Spine | Oct-08 |

**APPENDIX 6**

## Fire Management Principles

Fire management principles and supporting documents (as at December 2008)

| Status | Title | Custodian | Download | Version |
|---|---|---|---|---|
| | Principles for Fire Management | Senior Fire Planner | Document | Dec-08 |
| | Principles for Fire Management in Spinifex Grasslands | Senior Fire Planner | Document | Dec-08 |
| | Savanna Fire Principles | Senior Fire Planner | Document | Dec-08 |

Department of Environment and Conservation

# *Principles for Fire Management*

Photo: DEC

***Principle 1.***

The vegetation and climate across Western Australia make it highly prone to bushfire. Over millions of years fire has contributed to the evolution of the State's ecosystems. Fire is an important disturbance factor that will continue to influence the biotic composition and structure of all natural ecosystems.

***Principle 2.***

Plant and animal species and communities vary widely in their adaptations to, and reliance on fire. Species and communities require particular fire regimes for their long-term survival. Such requirements may vary within the ecological and geographical range of species.

***Principle 3.***

There is no single fire regime that is suited for all flora, fauna and ecosystems. Organisms have developed with a great variety of fire regimes, and thrive in different circumstances. A fire regime that enables one organism to gain competitive advantage will disfavour a competitor.

***Principle 4.***

Diversity and variability in fire regimes at the landscape level help maintain biodiversity. The application of ecologically based fire regimes that provide for an interwoven mosaic of vegetation and habitats representing a range of fire intervals, fire intensities, seasons and scales will help optimise the conservation of biodiversity. Patchiness of burning is an important factor in providing environmental heterogeneity at a local level. In some instances fire exclusion will be planned. On the other hand, widespread, high intensity fires will periodically remove most of this local patchiness from the landscape. Patchiness can be achieved through applying fire during periods of fuel moisture differential, through the lighting pattern used, and by burning adjacent to light fuels.

***Principle 5.***

Fire management at a very local level may be critical for the survival of some threatened species and ecological communities.

***Principle 6.***

Following fire, other factors such as climatic events (eg. drought) and insect attacks often drive ecosystems towards a new transient state with respect to species composition and structure. This may preclude the identification of changes specifically attributable to fire.

***Principle 7.***

Climate has a major influence on fire regimes, and is one of the fundamental factors determining the distribution of vegetation communities at a regional scale. Some regions of the State have experienced significant shifts in climate over the past three decades and there is an expectation amongst the scientific community that the rate of climate change may accelerate in the future. Fire management should therefore be based on an understanding of climatic trends and adapt to meet changing circumstances.

***Principle 8.***

All available knowledge including life histories, vital attributes of the native flora and fauna and knowledge of indigenous traditional fire regimes will be used to develop ecologically-based fire regimes.

***Principle 9.***

Fire management policies and practices should adapt to new knowledge gained through strategic long-term and short-term research and monitoring programs. This adaptive approach to fire management should be flexible to any changes to community values and expectations.

***Principle 10.***

Fire management planning on lands managed by the Department must address the threats and impacts of wildfire, accommodate the use of planned fire and provide for the achievement of specified land management objectives.

***Principle 11.***

The response to the threat of wildfire on Departmental lands must consider legal requirements, be thoroughly planned, safe, effective, cost-efficient and environmentally sensitive. All fire management activities, including fire suppression and prescribed burning, must be conducted in accordance with clearly defined procedures that provide for safe work practices and have outcomes monitored and recorded.

***Principle 12.***

Planning an appropriate response to the occurrences of wildfires must include an assessment of the threat to human life, community assets and services, and natural values, and consider these in conjunction with the management objectives of the area.

***Principle 13.***

Principles of environmental care must guide all preparedness, suppression, recovery and prescribed burning activities.

**APPENDIX 7**

## Fire Operational Guidelines

Latest Fire Operational Guidelines (FOG) formally called Fire Protection Instructions (FPI) (as at February 2009)

| Status | Number | Title | FMS Custodian | Version | Review |
|---|---|---|---|---|---|
| | FOG 00 | Preparation and Publication of Fire Operational Guidelines | Senior Planning | Jan-08 | Jun-09 |
| | FOG 01 | Preparation and Publication of Fire Protection Forms | Senior Planning | Sep-07 | Jun-09 |
| Under Review | FOG 02 | Checklist of Officer Responsibility and Knowledge | Senior Training | Nov-02 | |
| | FOG 03 | Minimal Requirements for Incident Action Plan (IAP) | Senior Planning | Aug-07 | Sep-09 |
| | FOG 04 | Search and Rescue Procedures | Aviation Manager | Sep-07 | Jun-10 |
| Draft | FOG 05 | Red Carding - Role Accreditation for ICS | | | |
| Under Review | FOG 06 | Requirements and Responsibilities of a Tower Person | Senior Operations | Nov-02 | |
| | FOG 07 | Guidelines for the preparation of Incident Preparedness and Response Plans | Senior Planning | Aug-07 | Jun-09 |
| | FOG 08 | Standards for Fire Warning Signs | Senior Operations | Sep-07 | Jun-09 |
| Under Review | FOG 09 | Emergency Hire of Equipment for Fire Suppression Operations | Senior Operations | Nov-02 | |
| | FOG 10 | Required Sections of Spotter Aircraft Operations Manual | Aviation Manager | Sep-07 | Jun-10 |
| Under Review | FOG 11 | Fire Protection Guidelines for Plantation management within DEC | Senior Planning | Nov-02 | |
| Updated | FOG 12 | Guidelines for Fatigue Management in All Fire Operations Including Prescribed Burning | Senior Planning | Feb-09 | Jun-11 |
| | FOG 13 | Instructions for the Use of Flamethrowers | Senior Operations | Sep-07 | |
| Under Review | FOG 14 | PreSeason Fire Management Checklist | Senior Operations | Sep-05 | Jun-09 |
| Updated | FOG 15 | Minimum Fire Equipment Stock Levels | Senior Operations | Jan-09 | Jun-09 |
| | FOG 17 | Heavy Vehicle Transportation | Senior Operations | Aug-07 | Jun-09 |
| Draft | FOG 18 | Guidelines for Weather and Spot Forecasts | | | |
| New | FOG 19 | Preparation and Publication of Fire Management Guidelines | Senior Planning | Jan-09 | Jun-10 |
| New | FOG 21 | Fire Behaviour Guidelines for Mallee-Heath and other shrublands in Sthn | Senior Operations | Jan-09 | Jun-09 |

| Status | Number | Title | FMS Custodian | Version | Review |
|---|---|---|---|---|---|
| | | WA | | | |
| Updated | FOG 22 | Predicting Fire Behaviour Using The Field Guide For Dry Eucalypt Forest (2007) | Senior Operations | Jan-09 | Jun-09 |
| Under Review | FOG 23 | Measurement of Forest Fuel Quantity | Senior Planning | Nov-02 | |
| Draft | FOG 24 | Prescribe Burn and Wildfire Security - Patrolling and Mopup | Senior Operations | Jan-08 | Jun-09 |
| | FOG 25 | Windproof and Waterproof Matches (Fusees) | Senior Operations | Jan-08 | Jun-10 |
| Under Review | FOG 27 | Aerial Burn Plan Legend | Aviation Manager | Nov-02 | |
| Under Review | FOG 28 | Water Point Construction and Maintenance | Senior Operations | Nov-02 | |
| Under Review | FOG 29 | Burn Nomenclature | Senior Planning | Nov-02 | Jun-09 |
| Under Review | FOG 30 | Liaison with Bush Fires Board Staff, Local Authorities and the Volunteer Bush Fire Brigades | Senior Planning | Nov-02 | |
| | FOG 31 | After Action Reviews and Post Incident Analysis | Senior Planning | Aug-07 | Jun-09 |
| Under Review | FOG 33 | Pine Hazard Plans | Senior Operations | Nov-02 | |
| Under Review | FOG 34 | Training and use of Contractors for Fire Control | Senior Operations | Nov-02 | |
| Hotlink | FOG 36 | SEMAC Policy Statement No. 5 - Bushfire Evacuation Decision Policy | FESA | N/A | N/A |
| Under Review | FOG 37 | Slash Burning Guidelines | Senior Planning | Nov-02 | |
| | FOG 38 | Measurement of Profile Moisture Content | Senior Operations | Feb-08 | Jun-10 |
| Under Review | FOG 39 | Direct Measurement of Surface Litter Moisture Content | Senior Planning | Nov-02 | |
| Under Review | FOG 40 | Edging | Senior Planning | Nov-02 | |
| Under Review | FOG 41 | Limitations on Applications of Forest Fire Behaviour Table Calculations | Senior Planning | Nov-02 | |
| Under Review | FOG 42 | Guidelines on Aircraft Performance | Aviation Manager | Nov-02 | |
| Under Review | FOG 45 | Burning Conditions for Burns During Prohibited Burning Time | Senior Operations | Nov-02 | |
| Under Review | FOG 47 | Tower Equipment - Care and Maintenance | Senior Operations | Nov-02 | |
| Under Review | FOG 48 | Care and Maintenance of Fire Towers | Senior Operations | Nov-02 | |
| Under | FOG 50 | Installation of Fence Post Sighters | Senior | Nov-02 | |

| Status | Number | Title | FMS Custodian | Version | Review |
|---|---|---|---|---|---|
| Review | | | Operations | | |
| | FOG 52 | Suspected Deliberately Lit Wildfires | Senior Operations | Aug-07 | Jun-09 |
| Under Review | FOG 54 | Standards for Coupe Preparation for Post Harvest and Regeneration Burning | Senior Planning | Jul-04 | |
| Draft | FOG 55 | Role Based Login Procedures for Duty Officers | IM/IT Officer | Nov-07 | Jun-09 |
| Draft | FOG 56 | Role Based Login Procedures for IMT | IM/IT Officer | Nov-07 | Jun-09 |
| Draft | FOG 57 | Recording of Fire Areas | IM/IT Officer | Nov-07 | Jun-09 |
| Under Review | FOG 58 | Use of Contractors at Fires | Senior Operations | Nov-02 | |
| | FOG 59 | Dispatch Details for Resources Sent to Incidents | Senior Operations | Sep-07 | Jun-09 |
| | FOG 60 | Explosives Magazines Involved in Bushfires | Senior Operations | Sep-07 | Jun-10 |
| Hotlink | FOG 62 | SEMAC Policy Statement No. 10 - Procedures for Activating State Support Plans | FESA | N/A | N/A |
| | FOG 63 | Protection of Structures and the Users of Long Distance Walk Trails | Senior Planning | Sep-07 | Jun-09 |
| Under Review | FOG 64 | Roadside Signage at Prescribed Burns and Wildfires | Senior Planning | Jul-04 | Jun-10 |
| | FOG 65 | Procedure for Walking of Public Roads for Hazardous Tree Identification during Burning Activities and Wildfires | Senior Planning | Nov-07 | Jun-09 |
| Under Review | FOG 67 | Protection of Telstra Elevated Joints within DEC's Burn Area | Senior Planning | Nov-02 | Jun-09 |
| | FOG 68 | Identification of DEC Vehicles | Senior Planning | Nov-07 | Jun-09 |
| | FOG 69 | Maintenance of Fire Pumper Units | Senior Operations | Sep-07 | Jun-10 |
| | FOG 70 | Marking of Liquid Containers | Senior Planning | Aug-07 | Jun-09 |
| | FOG 71 | Transportation of Fuel | Senior Planning | Jul-07 | Jun-09 |
| | FOG 72 | Maintenance of Fire Fighting Hose | Senior Operations | Oct-07 | Jun-10 |
| | FOG 73 | Personal Protection Equipment for Fire Operations | Senior Planning | Aug-07 | Jun-09 |
| Updated | FOG 75 | Closure of Roads Associated with Wildfire Fire Suppression Operations | Senior Operations | Jan-09 | Jun-10 |
| | FOG 76 | Guidelines for Use of Suppressants (Foams) and Retardants in Fire | Operations Officer | Aug-07 | Jun-09 |

| Status | Number | Title | FMS Custodian | Version | Review |
|---|---|---|---|---|---|
| | | Control Operations | | | |
| | FOG 78 | Safety Incident at Wildfires | Senior Planning | Aug-07 | Jun-09 |
| | FOG 79 | Prescribed Fire Plan | Senior Planning | Jul-08 | Jun-10 |
| | FOG 80 | Roles and Responsibilities of Rostered Officers, Duty Officers (DO), Duty Officers in Training (DOIT) and Fire Service Availability (FSA) | Senior Operations | Aug-07 | Jun-09 |
| Under Review | FOG 81 | Radio Call signs and resource designations for Emergency Incidents and Prescribed Fire Operations | Senior Operations | Dec-06 | Jun-09 |
| | FOG 82 | Procedures for daily teleconferencing calls during the South West fire season | Senior Operations | Nov-08 | Jun-09 |
| | FOG 83 | Declaration of Wildfires | Senior Operations | Oct-08 | Oct-10 |
| | FOG 84 | Prescribed Fire and the Community Engagement Process | Senior Planning | Aug-07 | Jun-09 |
| | FOG 85 | Provision of Supplementary Rations For Fire Fighting | Senior Operations | Aug-07 | Jun-09 |
| | FOG 86 | Unexploded Ordnance | Senior Planning | Aug-07 | Jun-09 |
| | FOG 88 | Delegation of Responsibility to an IC | Senior Planning | Oct-08 | Jul-09 |
| | FOG 90 | Identification of Hazardous Trees | Senior Operations | Aug-07 | Jun-09 |
| | FOG 91 | Preparedness and Mobilisation of PreFormed AIIMS Teams | Senior Planning | Oct-08 | Jul-09 |
| Draft | FOG 92 | Preseason Skills Enhancement | Senior Training | Nov-07 | |

**APPENDIX 8**

WESTERN AUSTRALIA

Department of Environment and Conservation
Our environment, our future

FESA
Fire & Emergency Services Authority of Western Australia

# GUIDELINES FOR THE OPERATION OF ROAD CLOSURES DURING BUSHFIRES

WA POLICE

mainroads WESTERN AUSTRALIA

# GUIDELINES FOR THE OPERATION OF ROAD CLOSURES DURING BUSHFIRES

This guidance document provides advice to agencies that may be required to operate or manage road closures during bushfire emergencies. These guidelines apply to all major public roads including local government, tourist and state controlled roads where fire or smoke present a significant threat to the safety of the public and emergency services personnel.

This guidance document has been produced by Western Australia Police in consultation with the following authorised agencies:-

- Department of Environment and Conservation
- Fire & Emergency Services Authority of Western Australia
- Main Roads Western Australia.

For additional information regarding specific aspects of an agency's response to bushfire, refer to the WESTPLAN - Bushfire and District /Local Arrangements.

**Definitions**

*Authorised Agency* means Western Australia Police (WAPOL), Department of Environment and Conservation (DEC), Fire & Emergency Services Authority of Western Australia (FESA), Main Roads Western Australia (MRWA) and Local Government Authorities (LGA), or organisations or persons delegated roles and responsibilities by an authorised agency for the purpose of maintaining a road closure (e.g. contractors).

*Major Roads* are defined as major and minor sealed roads as indicated on the UBD Metropolitan and Country Road Atlas.

## 1 GENERAL PRINCIPLES

1.1 WAPOL, DEC, FESA and MRWA, have developed these guidelines to assist in the control and management of road closures in the vicinity of the scene of a fire.

1.2 WAPOL, DEC, FESA and MRWA all acknowledge that the safety of both emergency services personnel and the public is the overriding interest in the operation of traffic, both pedestrian and vehicular, in the vicinity of the scene of any fire.

1.3 WAPOL, DEC, FESA and MRWA acknowledge that, for a number of reasons, travel through a fire area is dangerous and potentially fatal. Therefore, such travel should be controlled and minimised.

1.4 However, WAPOL, DEC, FESA, and MRWA also acknowledge there are certain circumstances where the impact of fire on the community can be reduced by allowing certain categories of people to travel on roads in the vicinity of the scene of a fire, including both before the fire impacts and after the fire has passed.

1.5 Each organisation undertakes to implement appropriate procedures and training to give effect to the guidelines.

1.6 Vehicle Control Points (VCPs) can be established under the following legislation: Emergency Management Act 2005, FESA Act 1998, Fire Brigade Act 1942, Bush Fires Act 1954 and Criminal Investigation Act 2006.

1.7 Nothing in these guidelines limits or removes the independent discretion that is available to police officers in the exercise of their duties and functions.

1.8 The welfare of people who are affected through closure of roads needs to be a consideration of the Hazard Management Agency (HMA), in consultation with WAPOL and Department of Child Protection (DCP).

1.9 Short term welfare and minor inconvenience issues may be dealt with by the HMA by utilising resources for short term relief (i.e. incidental water/food).

1.10 For extended term and major welfare issues, consideration by the HMA, in consultation with Police and DCP, should be given to the establishment of a Welfare Centre or Welfare point (i.e. Community Centre or Roadhouse location) or other agreed arrangements.

1.11 DCP has responsibility for the co-ordination of services provided under WESTPLAN-Welfare in relation to the welfare needs of those affected.

## 2 VEHICLE CONTROL POINTS

2.1 These guidelines detail implementation procedures for Vehicle Control Points (VCP). The purpose of a VCP is to regulate the flow of road traffic (pedestrian and vehicular) into an area where a fire has the potential to occur, is occurring or has occurred.

2.2 Authorised agencies may implement **two** types of VCPs:-

### 2.2.1 Full Road Closure

- Implementing road closures and the removal of road closures are under the authority of the Incident Controller.

- Full Road Closure should be applied where there is a significant risk from fire or smoke to motorists, or from passing motorists to fire fighters and other emergency services personnel. Accordingly a risk assessment should be undertaken to determine appropriate measures at implementing and maintaining road closures during and after the course of the incident.

- The ONLY people permitted entry are responding fire agency personnel engaged in fire fighting operations on fire appliances which includes agency fire fighting vehicles and vehicles used by fire agency personnel for the management of fire fighting operations (whether the

vehicle is owned or leased by the fire agency or privately owned by DEC or FESA or Bushfire Brigades of LGA).

- Entry by WAPOL and emergency medical authorities and key lifeline agencies (eg power utility, TELSTRA) will be at the discretion of the Incident Controller.

- Authorised agencies all have an operational discretion to implement a Full Road Closure independently according to the situation at the time. The Incident Controller shall be advised as soon as practical.

### 2.2.2 Partial Road Closure

- Implementing road closures and the removal of road closures are under the authority of the Incident Controller.

- A Partial Road Closure may be applied where the risks of fire and smoke to motorists are low, and there is a strong requirement for specified categories of people to be able to enter into or travel through the fire risk area. Accordingly a risk assessment should be undertaken to determine appropriate measures at implementing and maintaining road closures during and after the course of the incident.

- The Incident Controller may authorise specified individuals or groups to travel through a VCP and the conditions under which such access is authorised (including route and destination). Consideration must be given by the Incident Controller of the need to for an escort to be provided for convoy where there remains a risk to motorists.

- Only persons or groups authorised by the Incident Controller may pass a Partial Road Closure. The Incident Controller's considerations for such access will include (but are not limited to):-

  - The purpose for which they need to pass the VCP;
  - The location(s) to which they wish to travel;
  - Contact arrangements with the personnel passing through the VCP;
  - The time of the day and the current and forecast fire conditions;
  - The current road conditions;
  - The expected fire and road conditions, and
  - Whether an escort vehicle is required especially where a convoy is to be allowed to pass through the fire area.

- People who could be authorised to pass through a Partial Road Closure at a VCP include (but are not limited to):-
  - Participating emergency service personnel travelling by car;
  - Utility providers;
  - Persons on private fire fighting equipment;
  - Media personnel;
  - People with a pecuniary interest wishing to defend their property, and

– Police conducting urgent official duties (i.e. search, pursuit of offenders/arsonist, evacuation etc).

2.2.2.1 **Critical Decision Recording** - where the Incident Controller makes a decision to change a Full Road Closure to a Partial Road Closure or re-open a road, this is to be recorded and signed off by the Incident Controller. The decision to change the status or open a VCP must be recorded in a critical decision log, running sheet or similar document by the HMA.

## 2.3 VCP Communication Protocols

- If the Incident Controller initiates a VCP, he or she must pass all the information about VCPs required under these Guidelines as appropriate to:-
  - WAPOL, Police Operations Centre or Police Commander at the scene – **131 444**.
  - FESA Operations Centre, and FESA State Duty Coordinator – **1800 198 140**, **(08) 9323 9333.**
  - DEC Operations Centre or DEC State Duty Officer, **0418 933 815.**
  - MRWA Customer Care Centre – **138 138,**
  - The Local Government Authority – FESA Operations Centre -**1800 198 140**, **(08) 9323 9333**.
  - St John Ambulance, Manager, Operations Centre on (08) 9334 1226.

- If for operational reasons WAPOL initiate a VCP independently, the Incident Controller must be notified as expeditiously as possible so that the appropriate Traffic Management Plan can be developed and a WAPOL Liaison Officer must be appointed to liaise closely with the Incident Management Team.

- Person/s attending and operating a VCP are referred to as VCP Staff.

## 3 ACTIVATION OF VEHICLE CONTROL POINTS

3.1 The Incident Controller has responsibility for deciding and managing the location and status of a Full and Partial Road Closure at a VCP. The Incident Controller should also carry out a full risk assessment to determine if the road remains open or closed. A risk assessment to determine the full extent of these risks should be documented by the Incident Controller.

3.2 It is anticipated that WAPOL will operate all VCPs particularly in the immediate response phase to an emergency. WAPOL, in an emergency, may request MRWA and other authorised agencies to assist in the operation of road closures.

3.3 The fire HMA can initiate and manage the VCP where this is considered necessary for safety of the public and fire fighters until the arrival of WAPOL.

3.4 If the Incident Controller determines that a VCP should be established, he or she will contact Police Operation Centre/Police Commander (as applicable) and request WAPOL to establish the VCP and deploy a Police Commander to the scene as soon as possible.

3.5 The key information required to be provided to the WAPOL contact includes:

- Agency requesting;
- Incident Controller, Name/contact;
- Location of incident;
- Location of Forward Command Post;
- Reason for the VCP request and type of VCP ( Full or Partial);
- If Partial Road Closure, include the conditions and restrictions that are to apply;
- Suggested location of VCPs , and,
- Anticipated duration of VCP.

3.6 If WAPOL make an operational decision to initiate a VCP independently of the incident controller due to the prevailing situation:-

- This decision must be communicated to the Incident Controller as soon as possible, and
- The VCP will be a Full Road Closure unless the VCP is varied by the Incident Controller (refer to item 4.2 below).

3.7 WAPOL will immediately notify MRWA of establishment/location of VCP.

3.8 WAPOL will act as key point of contact with MRWA regarding status of VCP.

3.9 MRWA will consider alternative routes for heavy haulage routes and advise WAPOL, the Incident Controller and the public of the alternate routes and arrangements.

3.10 MRWA will arrange for provision of public advice and information on the road closures and alternate routes.

3.11 FESA will notify appropriate Local Government Agencies of road closures.

## 4 OPERATION OF A VEHICLE CONTROL POINT (VCP)

### 4.1 Immediate Actions

4.1.1 When requested by an authorised agency WAPOL will establish a VCP at a point determined in consultation with the Incident Controller or as directed by the Police Commander .

4.1.2 When a Police Commander is in place all decisions in relation to the VCP, and directions must be communicated through him / her unless there is an extraordinary circumstance preventing it.

4.1.3 When immediately establishing a VCP it will be a Full Road Closure (refer section 2 & 6 of these guidelines).

4.1.4 VCP Staff must ensure that they have established communications with the Police Operations Centre (POC) and/or Police Commander and advise of the following:-

- Location of the VCP;
- Call sign and names of officers at VCP;
- Time VCP established, and
- Any issues relating to management of VCP (e.g. anti-social behaviour or welfare issues of public in vicinity).

The police commander will then advise the incident controller of the VCP status.

4.1.5. When establishing a VCP, WAPOL or authorised agencies should consider:-

- Proximity to hazard and direction of smoke plume, spill, run off or other material generated by the hazard or emergency services activity (up wind, up hill, up stream);
- Visibility of VCP to oncoming traffic;
- Nature of the terrain, vegetation and road alignment;
- Escape routes should the VCP come under threat;
- Turn around points for traffic including heavy vehicles;
- Communication issues such as black spots or interference from power lines etc;
- Access to alternate routes or infrastructure such as airports required by the public if safe and permissible;
- Welfare of persons in vicinity of VCP and access to shelter and necessities of life if applicable;
- Possible duration of VCP, and
- VCP should be sited so that only authorised persons will need to pass through the VCP regardless of the reason.

4.1.6. A Traffic Management Plan must be developed in consultation between the Police Commander and the MRWA senior representative. This Traffic Plan must take into consideration the items listed in 4.1.5 and the plan will be approved by the Incident Controller. The Plan must be reviewed and revised in light of changes to the fire risk.

## 4.2 Operation of Established VCP

4.2.1 Once a VCP is established it will remain in place until advised by the Incident Controller it is no longer required. This decision to re-open the road must be made by the Incident Controller following consultation with the Police Commander.

4.2.2 VCP staff will ensure communications are maintained and monitor the situation.

4.2.3 VCP staff will provide SITREPS to the Police Commander in accordance with the Police Commanders instructions.

4.2.4 If there is an issue at a VCP the POC or Police Commander will be advised immediately.

4.2.5 If a VCP needs to be moved, authorisation must be sought from the Incident Controller and communicated by the Police Commander unless it is an urgent situation such as the VCP coming under threat.

4.2.6 The Police Commander must be advised ASAP if a VCP is moved.

4.2.7 VCP staff will maintain a running sheet to document and record the establishment, occurrences and note any matters relating to the operation of the VCP (Police notebook entry minimum).

4.2.8 Provide this documentation (or copy) to the Police Commander at the completion of the VCP or debrief.

4.2.9 If a VCP is required to be maintained by police for extended periods a 'relief in place' can occur.

4.2.10 Where the Incident Controller decides to allow persons past a Partial Road Closure a plan will be devised to ensure the safety of those persons and escorting officers. The plan will be the responsibility of the Hazard Management Agency and Incident Controller.

4.2.11 When a relief in place occurs it is to be:

- Authorised by the Police Commander;
- Briefing of incoming staff is conducted by the Police Commander;
- A physical handover of the VCP occurs with relief staff, and
- New VCP staff will advise the Police Commander when a relief in place is completed in accordance with 4.1.4.

4.2.12 Once VCP staff have been advised by the Police Commander that the VCP is no longer required they are to return to normal duties.

### 4.3 Handover / Handback of VCP

Following consultation with the Incident Controller, WAPOL may handover operation of the VCP to another authorised agency.

4.3.1 If handover of a VCP is authorised, Police will ensure:

- A full briefing is conducted with the relieving agency as to the status of the VCP (SMEAC);
- Running sheet entry is completed recording the information provided;
- A reliable WAPOL contact point is provided to the relieving agency and communication established after hand over completed, and
- Incident Controller is advised WAPOL have handed over the VCP to another authorised agency and provide those details.

4.3.2 Dependent of the situation or at the request of the Incident Controller WAPOL can reassume control of a VCP.

4.3.3 When reassuming control of a VCP, WAPOL should:

- Obtain the reason why and relevant information through the POC or Police Commander;
- Obtain a full briefing from the outgoing agency as to the status of the VCP (SMEAC), and
- Record a running sheet entry of the information provided.

## 5 ADVISING VCP STAFF OF THE APPLICABLE CONDITIONS OF ACCESS

### 5.1 Prior to Attendance

5.1.1 If a VCP is initiated by the fire HMA, the Incident Controller must advise WAPOL of the following details prior to the WAPOL assuming responsibility for the VCP:

- The type of VCP (Full or Partial); and
- Any conditions that apply to a Partial Road Closure.

5.1.2 If no conditions are specified, the VCP will be a Full Road Closure and a Traffic Management Plan initiated.

### 5.2 Change of Conditions of Entry during Attendance

5.2.1 If the Incident Controller changes the conditions of a VCP during the operational period of the VCP, the Incident Controller must immediately advise Police Commander of all of the relevant details.

5.2.2 VCP Staff may *request* a change in access from a Full to a Partial Road Closure, at any time from the Incident Controller.

5.2.3 The processes detailed at item 6 of these Guidelines outline the discretion VCP Staff have to change conditions of entry during attendance.

## 6 DISCRETION BE EXERCISED BY PERSONS OPERATING VCPs

6.1 VCP Staff :

- DO have a discretion to change a Partial Road Closure to a Full Road Closure where the risk assessment warrants such change and is confirmed by the Incident Controller ;
- DO NOT have a discretion to allow non-authorised persons to pass a Partial Road Closure;
- DO NOT have discretion to change a Full Road Closure to a Partial Road Closure.

6.2 **Changing a Partial Road Closure to a Full Road Closure**

6.2.1 The principle behind this discretion is to prioritise the safety of persons and can be summarised as **'if in doubt, keep them out.'**

6.2.2 Without limiting the circumstances in which this discretion may be exercised, the VCP staff could refuse access to authorised persons:

- requesting entry who appear not to be appropriately prepared or are distressed;
- where there is doubt as to the bona fides of the identity, or intended actions, of the individual/s;
- when there is unexpected and/or anticipated changes in fire or weather conditions;
- If VCP Staff can not obtain information from the Incident Controller, for example if there are communication difficulties and VCP Staff are unsure of what was occurring at the fire, and
- If communications cannot be established or has been lost during the operation of a VCP, it will revert to a full road closure.

6.3 **Allowing non-authorised persons to pass a Partial Road Closure**

- ONLY the Incident Controller can make this decision.
- VCP Staff who seek this change MUST obtain the permission of the Incident Controller.

6.4 **Changing a Full Road Closure to a Partial Road Closure**

- ONLY the Incident Controller can make this decision; after the appropriate risk assessment is conducted.
- VCP Staff who seek this change MUST obtain the permission of the Incident Controller.

6.5 **Changing Full or Partial Road Closure to road fully open**

- ONLY the Incident Controller can make this decision.
- Decision to open road must be done in consultation with WA Police and MRWA following consideration of:
  - Safety of public travelling once re-opened;
  - Necessary signage;
  - Necessary speed restrictions;
  - Communications plan to public and media, and
  - State of the road, status of bridges.

## 7 COMMUNICATION TO THE PUBLIC

7.1 WAPOL will be responsible for advising MRWA of location of the VCP and what roads are subsequently closed. MRWA is responsible for advising the public of the Road Closures and the alternate routes.

7.2 Such notifications must include the following information:

- Name or names of road(s);
- Location of road closure(s);
- Type of disruption;
- Anticipated duration of disruption, and
- Alternate routes (including heavy vehicles).

7.3 **MRWA Customer Care Centre**

7.3.1 **MRWA Telephone Numbers.**

- The dedicated, priority number for the Centre is **(08) 9428 2222.** This number **must not** be provided to the public.
- MRWA Customer Care Centre will also act as the primary public contact point for road closure information. The telephone number for the public is: **138138.**

7.3.2 **Database**

- MRWA Traffic Operations Centre is responsible for ensuring MRWA'S database/website is updated with information about road closures in a timely manner.

7.4 **Information to the Public**

7.4.1 MRWA will provide information to the community about the location and level of a VCP and alternative route details as well as likelihood and timing of road opening via the following mediums:-

- Local radio, in accordance with existing protocols with that organisation,
- MRWA website

http://www.mainroads.wa.gov.au
- Local Shires,
- The FESA Website
  http://www.fesa.wa.gov.au/internet/Alerts/default.aspx#
  This information will be compatible with the information being disseminated by MRWA.

## 8 INAPPROPRIATE BEHAVIOUR BY MEMBERS OF THE PUBLIC

8.1 It is acknowledged that some members of the public:
- argue with personnel operating a VCP;
- do not comply with directions at a VCP;
- take action to avoid a VCP, and
- Take unauthorised actions once they have been permitted to pass a VCP.

8.2 In the event a person does breach a VCP, VCP Staff must immediately:-
- Notify (including all available details),
  - the Incident Controller; **and**
  - Either the on site Police Commander or Police Operations Centre (POC).

8.3 Breaches must be logged
- VCP Staff and Police Operation Centre/Police Commander (as applicable) **each must log any breach.**

- A log must include, to the fullest extent possible, all available details.

## 9 PROTOCOLS FOR PARTICULAR VCPs

9.1 Because of urgent or unusual circumstances, Authorised Agencies may agree on specific protocols for VCPs in a particular area. These protocols will be communicated by the Incident Controller at the time.

## 10. COSTS

10.1 For MRWA roads, where WAPOL through MRWA Customer Care Centre handover control to MRWA contractors, no cost to WAPOL is incurred.

10.2 For non MRWA roads, where WAPOL handover control to contractors on WAPOL request, the commercial cost will be borne by the appropriate police district.

10.3 For LGA controlled roads where local arrangements (through the DEMC or LEMC) for using commercial contractors exist and police have been authorised to use the contractors costs are determined through those local arrangements.

The Guidelines for the Operation of Road Closures during Bushfires were approved by the relevant organisational heads on the day of 2008.

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