



appendix 19

Bushfire Report

**Section 96 modification  
Stage 2 Peninsula Gardens Retirement  
Village**

**Bushfire Protection**

*prepared 2nd October 2003 by*

Rod Rose

of

**Bushfire and Environmental Services**

**Bushfire Planning and Management Consultants**

**7/128 Island Point Road St Georges Basin NSW 2540**

**tel : (02) 4443 5555 fax: (02) 4443 6655**

**Bushfire Protection Assessment  
Section 96 modification of Stage 2  
Peninsula Gardens Retirement Village**

## **1. Introduction**

1.I have been asked to review various matters related to the proposed Section 96 modification of Stage 2 of Peninsula Gardens, summarised in drawing S96-003.

2.The proponent, Australian Super Developments, seeks to make some minor modifications to the approved 'Stage 2' development. These minor changes involve:

- i. Small extensions to balconies.
- ii. Conversion of areas previously designated for storage into habitable floor area.
- iii. Alteration of the arrangement of upper and lower floor areas on two of the unit clusters.
- iv. These changes are accompanied by a reduction in the total number of self-care units to be provided in Stage 2 from the 112 permitted by the development consent, to 73 self care units.

3.This reduction in the total number of units is achieved through rearrangement of internal walls of the approved buildings to replace one-bedroom units with two bedroom units.

4.I am very familiar with the site having inspected the existing retirement village and the location of the Stage 2 development as well as the surrounding bushfire prone lands on at least three occasions over the past twelve months.

5.I have reviewed the following approved conditions:

- Conditions of Consent;
- Exhibit 2;
- Exhibit H;
- Exhibit M; and
- SK006.

6.I have also reviewed the following plans

- s96 –001;
- s96-002;
- s96 – 003; and
- DD 001 – DD 025.

7.The subject land is currently occupied in part by an existing retirement village (constructed in the 1980s) that constitutes the first stage of an approved retirement village development on the site. The existing retirement village is located in the

southern part of the site, and includes a mini-golf course and detention basin through the centre of the site.

8. The Stage 2 development area occupies the northern part of the subject land, which slopes in a southerly direction from the rear of existing development along Cabbage Tree Road down to the detention basin and a disturbed watercourse through the centre of the site.

9. Stage 2 of the retirement village development at Bayview was approved in 1982 by the NSW Land and Environment Court. This report addresses the modifications (to the original approval) as shown in drawing S96-003 that have a bearing on bushfire risk or hazard, that is small extensions to balconies.

10. I have considered various bushfire related data in the preparation of this report including aerial photographs, slope and vegetation maps, fauna and flora studies, development modifications, Landscape Plan, roading and fire history.

11. My Curriculum Vitae is provided as Appendix 1. I have read the Expert Witness Practice Direction 2002.

## 2. Bushfire hazard

12. Bushfire hazard is defined as the potential severity of a fire, usually measured in terms of intensity. The factors that influence a bushfire hazard include climate and weather patterns, vegetation (fuel quantity, distribution and moisture) and slope (RFS 2001). A similar definition of fire hazard would have been used (possibly with a stronger emphasis on fuel levels) at the time the development was approved and during most of the intervening period. Therefore using this definition the bushfire hazard is discussed below:

13. **Climate and weather patterns:** It is important to ensure the development is able to withstand a worst-likely fire intensity. This is considered to be associated with a 1 in 50 year fire event and the equivalent of a fire burning under a fire danger rating of extreme and a Forest Fire Danger Index (FFDI) of 80. This FFDI is used to calculate the potential fire intensity (below).

14. **Vegetation:** The fuel types on and adjoining the approved development site are mostly gully forest or closed forest/rainforest, with rainforest species predominating in the understorey of vegetation on the lower slopes and along the drainage line. Typically these fuel types are not often available to burn because of its higher moisture content and typically carry higher fuel loads when left in a natural condition.

15. The moister forest communities found on the subject site also occur on the adjoining lands, although this has been considerably modified by development associated with the existing buildings within the retirement village and existing development on surrounding lands. These existing developments have significantly reduced the bushfire threat from most directions.

16. **Slope:** Steep uphill slopes occur in all bushfire prone directions away from the approved development. These slopes will reduce the intensity of an approaching bushfire to at least 25% of that likely to occur on level ground (McArthur, 1962). This is based on an 'effective slope' uphill away from the building line in the

northwestern corner of the approved development of about 41° and about 11° upslope in the other primary direction of threat to the southwest.

17. **Potential fire intensity:** The potential fire intensity resulting from a fire burning under an FFDI of 80 and approaching from the northwest through moist forest (max. fuel load of 30t/ha) and down the 41° slopes is 2,835 kW/m. This is a relatively low intensity fire with flame heights of probably less than 3 m.

18. The potential fire intensity from the other primary direction of fire threat (the southwest) is 15,600 kW/m (based upon a max. fuel load of 25t/ha for a more open forest and an 11° upslope). This is a higher intensity fire but comes from a less likely direction and is mitigated by pockets of rainforest and existing vegetation management on adjoining land.

19. **Risk potential:** There is no known record of fire impacting the site over the past 50 years. This is not unexpected as the site is located within a basin that requires fire to descend steep slopes and through moister vegetation types including rainforest. The surrounding area also includes a number of roads and existing development each of which further mitigate fire reaching the subject land.

20. Bushfire risk is defined by current Planning for Bushfire Protection guidelines (NSW RFS 2001) as "the chance of a bushfire igniting, spreading, and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset". Using these criteria my assessment of the bushfire risk is that it is minor.

21. The minor classification is based upon the fire history, the steep downhill slopes over which fire would need to travel to reach the site, the location of pockets of rainforest and vegetation with a rainforest understorey, the clearing associated with existing development on neighbouring lands, and the strategic location of roads in areas above the subject land which can be used as fire control lines.

22. A Bushfire Prone Land map has been prepared by Pittwater Council under s146 of the *Environmental Planning and Assessment Act 1979* and has endorsed by the Commissioner of the NSW Rural Fire Service. The western portion of the development site is mapped as 'bushfire prone land – vegetation category' and the eastern side is 'bushfire prone land – vegetation buffer'.

### 3. Review of existing approved bushfire protection

23. Records of the original approved bushfire protection measures are incomplete with Appendix 5 referred to in the letter referred to in condition 50 of the development consent unable to be located. I have therefore made some assumptions about the approved bushfire protection measures based upon the site and nature of the approved development, knowledge of bushfire management practices at that time and the experience of the bushfire consultant who undertook the assessment, and available documents. My conclusions are summarised below:

- i. 24. As the approved development involves placing buildings, access roads and paths over a large proportion of the subject site, there will be a considerable reduction of the fuel loads on the site. This reduction will be to an extent that the residual risk of fire spread over the subject site (*i.e.* after construction) will be

minor and the remaining fuel between buildings and access ways will, with minimum attention, result in the whole site being of an appropriate standard for an Asset Protection Zone (APZ).

- ii. 25. In correspondence dated 16<sup>th</sup> February 1982 from the Warringah Shire Council Shire Clerk to the Architects and Planners (of the development) reference was made to Council's Fire Control Officer comments as follows:

26. "a) Wherever natural bushland is found in Warringah Shire it must be recognised that under certain fire weather conditions extreme bushfire risk will be present.

27. b) A substantial part of the lots is within a small valley. The valley runs west to east and is protected from most winds.

28. c) The site is not within a known bushfire path, major fires in the areas in the past have diminished considerably in an areas west of the site.

29. d) Providing the fire protection measures outlined on the sheet marked "Appendix 5" of your letter are implemented it is considered that a reasonable safety standard would exist."

30. Unfortunately the Appendix 5 information referred to cannot be located. However it is possible to make reasonable assumptions on its content as discussed in the next dot point. It is apparent that Council's Fire Control Officer based upon his knowledge of the fire history and likely fire behaviour was satisfied the proposed protection design for the development would provide a "reasonable safety standard".

31. I consider the Fire Control Officer's comments a) to c) as useful and valid for a current bushfire assessment. Although bushfires in 1994 have occurred in the region, and substantial development in the region has further mitigated the potential for bushfire spread.

32. However based upon the likely "fire protection measures" in the missing "Appendix 5" (see below) I believe the safety standard referred to in point d) should be improved (see Section 7).

- iii. 33. Stephen Bowers, Architect of Original 1982 development application (2003 pers. comm.) advised that Mr Harry Luke prepared the missing "Appendix 5" bushfire assessment and the fire protection strategies referred to by Council's Fire Control Officer. In 1982, Harry Luke was regarded as one of the leading bushfire researchers and consultants in Australia. Although I have not sighted Mr Luke's report, I am confident it would be of quality and of a comprehensive nature.

34. A fire intensity assessment by Mr Luke would have used the same formulae I have used in my assessment of the potential fire intensity (above), this formulae was developed well prior to 1982. I therefore believe that Mr Luke's fuel management strategy (within the development site) to reduce the fire intensity would have been very similar to that of contemporary practices.

35. However, Mr Luke's assessment may have recommended a lesser sized Asset Protection Zone than contemporary guidelines for areas around the boundary of

the subject site as some buildings are located closer to the subject land boundary than would be current practice. This may have been because his assessment placed a greater emphasis on the protection benefits available from factors such as: rainforest, fire having to approach down steep slopes, and existing and proposed development. Also a more flexible system of fire protection approval and design was available in 1982 and less research existed on building ignition factors.

36. The Asset Protection Zones and other protection measures for the buildings located on the boundaries of the development site are therefore not considered adequate. These inadequacies can be overcome by the measures described in Section 7.

37. Other buildings within the site boundary would have received an appropriate APZ because of the relatively close spacing of buildings and the amount of fuel reduction across the site associated with the buildings and roadways *etc.*

- iv. 38. If any assessment of the building construction standards for bushfire protection had occurred in 1982, it would not have had the advantage of the considerable research in this field in recent decades. Building construction standards based upon a current best practice are provided in Section 7.

#### **4. Nature and extent of the bushfire protection required for the development as originally approved**

39. As discussed in Section 3 the exact nature and extent of the bushfire protection required for the development as originally approved is not known, as it is presumably located within the missing "Appendix 5". However based upon my evaluation of the site and knowledge of methodology likely to be applied by Mr Luke in 1982, the bushfire protection requirements approved by the Land and Environment Court would have at least included the following requirement:

- 40. "With the exception of rainforest areas, a reduction of litter and shrub fuel loads over the entire development site to 8 t/ha".

41. Typically other approved bushfire conditions would have been included, but these would have varied considerably from one site and one assessor to another. Presumably other requirements would have included:

42. Access that at least allowed the physical movement of tankers to an appropriate operational site nearby buildings;
43. Building construction, and;
44. Maintenance regimes, such as keeping gutters clean of leaf build up.

#### **5. Effects of modification of development and its impacts on bushfire risk and bushfire protection**

45. The effects of the proposed small extensions to balconies are minor alterations and pose no additional risk to the buildings and do not affect the bushfire hazard of the site. Appropriate protocols on what items can be placed on the balconies (*e.g.*



restricted to non-combustible items that cannot be blown around to cause damage in strong winds) will need to be added to the village management's use requirements of the buildings by residents.

## 6. Adequacy of approved bushfire protection measures

<sup>46</sup>As the approved bushfire protection measures have not been sighted the assumptions made in Section 3 and 4, and the assessment of the bushfire hazard and risk (Section 2) are used to draw the following conclusions:

- i. <sup>47</sup>The size of the APZ is adequate for all buildings not adjoining the northern and western boundary of the subject land;
  - ii. <sup>48</sup>Buildings adjoining the northern and western boundary do not have an adequate sized APZ within the subject land boundary. Measures in addition to an APZ on the subject site are required to provide an adequate bushfire protection for the buildings adjoining the northern boundary (see Section 7). It is not known whether these additional measures were part of the original approval. Section 7 identifies potential future options related to the protection of the buildings along the western boundary.
  - iii. <sup>49</sup>Access for fire vehicles is considered adequate for the following reasons:
    - a. <sup>50</sup>Road surfaces will be sealed;
    - b. <sup>51</sup>Main access road grades do not exceed 11.3<sup>0</sup>, and secondary access roads do not exceed 12.5<sup>0</sup> (these are well within acceptable limits for fire tankers);
    - c. <sup>52</sup>Adequate tanker turnaround areas exist;
    - d. <sup>53</sup>An alternate egress is available for firefighters (see Drawing Number DD-001 revision C by SD Masterplan);
  - iv. <sup>54</sup>Adequate water supply exists;
- <sup>55</sup>The adequacy of some issues is not clear from the data available; these issues include the emergency response plans and building construction standard.

## 7. Improvements and clarification of the proposed measures

<sup>56</sup>Whilst most of the existing approved measures appear to provide an adequate standard of protection, the lack of some detail means it not possible to determine whether all protection issues have been addressed fully. Therefore the following additional requirements are considered desirable and help provide some missing detail:

- i. <sup>57</sup>A radiant heat barrier (a 1.8 metre high fence) on the northern boundary (*i.e.* including the southern boundary of Lot 9) and on the western boundary from the northwestern corner to at least 30 m south of Unit 138. This barrier needs to be opaque and non-combustible *e.g.* steel or masonry construction, and of a subdued colour compatible with the surrounding environment so as to minimise glare and visual impact.

- <sup>58</sup>The radiant heat barrier on the northern boundary of the subject land (in conjunction with the on-site APZ, see par. 60) will be sufficient to protect buildings along the northern boundary from any bushfire occurring in the residual vegetation at the rear of the adjoining properties. If fire were to occur on these adjoining allotments to the north it will be of low intensity as a result of downhill fire spread through existing development and their associated Asset Protection Zones. The residual vegetation on these adjoining allotments is also discontinuous, being broken up by rock boulders and cleared areas associated with lawns and gardens.
- <sup>59</sup>On the western boundary, the radiant heat barrier and the on-site APZ will not-by-itself provide sufficient property protection for some of the proposed buildings, and further protection measures are required (see par. 61). These further measures are required because the vegetation on the adjoining Lot 120 is more extensive than that occurring on lands adjoining the northern boundary of the subject land and this vegetation has a greater connectivity to other nearby bushfire prone lands.
- ii. <sup>60</sup>Management of the total area identified for the development in Stage 2 (as shown on the site location map submitted with the Section 96 report) as an Asset Protection Zone;
- iii. <sup>61</sup>The units along the western boundary require an Asset Protection Zone (APZ) of 20 m wide to the west from the western most building line of each unit. A 20 m wide APZ in conjunction with a radiant heat barrier (see par. 57 and 59) will provide adequate bushfire protection because any fire approaching the proposed buildings from the west will need to descend steep slopes and/or move through pockets of rainforest and highly disturbed lands (including roadways and waterbodies). Under these conditions the proposed development at the western boundary of the subject land will be adequately protected by the 20 m APZ, radiant heat barrier and building construction standard.
- <sup>62</sup>At present this APZ cannot be accommodated within the existing boundaries of the subject site for units numbered 111, 112, 114, 115, 116, 117, 118, 119, 138 and 139 in Plan No. S96-003 (the "affected buildings"). The affected buildings should therefore not be constructed until the required APZ of 20 m can be provided for those buildings.
- <sup>63</sup>The APZ required for the affected buildings could be provided in the future in the following ways:
- a. <sup>64</sup>Lot 120 in DP 590574 could be developed in such a way that the development on Lot 120 provided part or all of the APZ required for the affected buildings;
- b. <sup>65</sup>The APZ for the buildings could be constructed and maintained on Lot 120 pursuant to a legally binding and enforceable arrangement; or
- c. <sup>66</sup>The boundaries of the subject site and Lot 120 could be adjusted to accommodate the required APZ for the affected buildings.

- iv. <sup>67</sup>An Asset Protection Zone extending 30 metres to the south of the southern most building line of the buildings containing units numbered 138, 139, 140 and 141 in Plan No S96-003.
- v. <sup>68</sup>The fuel management requirements within the APZ for the entire development should be as follows:
- a. <sup>69</sup>No trees need to be specifically removed for bushfire protection purposes. After the site is developed and the fuel management listed below occurs within the APZ, the fuel carried by the remaining trees on site will have a negligible to minimal effect on the potential bushfire threat to buildings.  
  
<sup>70</sup> Note: the trees identified as 'may be able to be retained' in the Statement of Evidence by Arborist Tony Lydon are also appropriate for retention from a bushfire protection perspective and the 'Landscape Masterplan and drawings', by Jon Shinkfield of Pittendrigh Shinkfield Bruce Pty Limited, incorporates my APZ requirements (paragraph 66 – 70) and is acceptable from a bushfire perspective;
  - b. <sup>71</sup>The fine fuel levels (*i.e.* < 6mm in diameter) are to be maintained by selectively mulching the elevated fuels and ground fuels and leaving the mulched material on the ground.
  - c. <sup>72</sup>No mulch is to be located within 5 m of any building or any other combustible structure within the APZ, unless the mulch is comprised of only larger fuel particles that are difficult to ignite by burning debris. Ongoing mulching is to occur as required to prevent any regrowth of fine fuel, and is to occur at least annually in August or September.
  - d. <sup>73</sup>Endemic rainforest plants may be retained with the zone provided they do not provide a continuous, or near continuous, link between sclerophyll vegetation outside the asset protection zone and buildings.
  - e. <sup>74</sup>Select plantings of low fire hazard plants strategically placed within the APZ are permissible, provided a qualified bushfire consultant approves the species and design.
- vi. <sup>75</sup>Building construction standards for each unit have been identified based upon the likely intensity of a fire upon reaching the APZ under extreme weather conditions. This can be determined from the nature of the nearby vegetation types (fuel load) and the gradient and direction of slope over which the fire is required to travel. As a result of the steep upslopes away from the proposed units fire spread towards the units will be down a steep grade and as a consequence result in a significant reduction in fire intensity.  
  
<sup>76</sup>Based upon this situation, in my view to provide adequate protection from bushfire, all units adjoining the northern and western boundary, and Units 140 and 141, should be constructed to a level 2 standard under AS 3959 and all other buildings within 80 m of the western boundary constructed to a level 1 standard. All other buildings not included in the preceding description do not require a bushfire-related building construction standard.

- vii. 77. Hydrants are to be installed such that a fire at the furthest extreme of any building can be attacked by a tanker using a 60 m hose and 10 m jet of water. Therefore, allowing for the tanker to be parked in line, a clear unobstructed path between the hydrant and the most distant point of the building should not exceed 90 m.
- viii. 78. An 'Emergency Incident and Emergency Evacuation Plan' to be prepared by Bushfire and Environmental Services for the residents of all units and this is to be in place before units are occupied. The Plan will take into account the requirements of the evacuation plan for the balance of the village.

## 8. Conclusion

<sup>79</sup>The improvements listed in Section 7 of this report in conjunction with the existing proposed development design will provide an appropriate level of bushfire protection for the usage proposed.



**Rod Rose**  
**Managing Director**

**2<sup>nd</sup> October 2003**

### References

NSW Rural Fire Service (RFS). 2001. Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners. Australian Government Publishing Service, Canberra.

Standards Australia 2000, *Construction of buildings in bushfire-prone areas, AS 3959, Second edition 1999 and Amendment 1, 2000*, Standards Australia International Ltd, Sydney

Luke, R.H. and McArthur, A.G. 1978.

*Bushfires in Australia*. Australian Government Publishing Service, Canberra.

Tony Lydon (Aug, 2003) *Arborist's Report, Expert Statement of Evidence* (to Land and Environment Court), Peninsula Gardens Retirement Village Stage Two, TLC Tree Solutions, Sydney

### Personal Comments

Bowers, Stephen (March 2003). Architect involved in current planning. Mr Bowers was also the architect of the original 1982 development application and was involved in on-site assessment work by the presumed author of Appendix 5, Mr Harry Luke.

## **Appendix 1: Curriculum Vitae: ROD ROSE**

### **Managing Director: Bushfire and Environmental Services Pty Ltd, and Bush and Land Care Services T/a**

#### **Qualifications:**

- Associate Diploma with Distinction in Environmental Control;
- Bushfire Certificates for: Bushfire Controller, Group Leader, Crew Leader and Basic Firefighter Levels and Incident Control System (AIIMS);
- Bushfire Instructor Level Two;
- Higher School Certificate

#### **Professional affiliations**

- Member of Australian Fire Protection Association (A.F.P.A.);
- Member of Australian Institute of Emergency Services (M.A.I.E.S.);
- Member of International Association of Wildland Firefighting;
- Member of Rural Fire Brigades - Shoalhaven City;
- On mailing lists with: Emergency Management Australia, CSIRO (Forestry, Forest Products and Plant Industry), Australian Fire Authorities Council (AFAC)

#### **Recent conference papers**

- Rose, R., Lang S, (2001) 'Fire decision support' a significant improvement to the practical application of GIS in fire management and planning. Proceedings of the Australasian Bushfire Conference Bushfire 2001. Christchurch, NZ, July 2001;
- Rose, R., Wiltshire, G., Lang, S. (1999) The importance and application of spatial patterns in the management of fire regimes for the protection of life and property and the conservation of biodiversity. Proceedings of the Australian Bushfire Conference Bushfire '99. Albury, 7–9 July 1999.
- Rose, R. GIS use for large sized areas. Paper presented to the "The Big Red Truck Turns Green", bushfire conference of the Nature Conservation Council Conference of New South Wales, Sydney, 27-28 February 1998.
- Rose, R., Chafer, C. (1997) GIS and decision-tree modelling as a framework for the preparation of fire management plans in NSW conservation reserves. *Proceedings of the Australian Bushfire Conference Bushfire '97*. Darwin, 8-10 July 1997.

#### **Overview of employment history and experience**

- Managed more than 1600 bushfires in NSW;
- 8.5 years as a specialist bushfire consultant;
- 6 years as Fire Control Officer for the City of Shoalhaven;
- 17 years with NSW National Parks and Wildlife Service (NPWS) in various professional field management positions; included extensive fire management;
- Prepared bushfire protection plans or advice for more than 450 projects in NSW, including LES, Masterplans, subdivisions, tourist resorts, residential and commercial properties;
- Prepared bushfire protection strategies for more than 100 towns and villages in NSW and many more rural communities;

- Prepared a major bushfire protection strategy for over 170 kilometres of the urban interface for the City of Blue Mountains Council;
- Prepared an award winning Asset Protection Zone strategy for the total urban bushland interface of Wollongong City (282 kilometres);
- Prepared a comprehensive bushfire protection strategy for Thredbo Village, as a joint project with the CSIRO, and provided on-site technical oversight and training for Thredbo Village during the bushfire attack and evacuation in 2003;
- Analysed the cause/spread of Appin Section 44 bushfire for Integral Energy;
- Prepared Fire Management Plans for more than 50 NPWS national parks and nature reserves;

**Employment details:**

- **Managing Director, Bushfire and Environmental Services and Bush and Land Care Services**, 1994 to present
- **Fire Control Officer, State Emergency Service Controller, Land Management Officer, Shoalhaven City Council**, 1989 to 1994; Duties included: extensive bushfire planning, management, training and suppression duties. Risk analysis, land use planning, statutory emergency plans, State Emergency Service Local Controller, Local Emergency Management Officer, use of GIS, Executive Member Southern Regional Fire Association and Steering Committee Member for Regional Threat Analysis and Corporate Plan.
- **Land Management Officer, Shoalhaven City Council**, 1989; Duties included: bushfire hazard and risk assessment for development proposals.
- **Officer-in-Charge, Narooma District NSW NPWS** 1985 to 1989; Duties included bushfire management and suppression duties, planning, training, extensive land management and environmental assessment experience.
- **Senior Ranger - Planning, Blue Mountains District NPWS**; 1983 to 1985
- **Senior Ranger, Blue Mountains District - East NPWS**; 1980 to 1983
- **Ranger in Charge, Armidale-East Area, NPWS**; 1977 to 1980
- **Ranger at Blowering, Yarrangobilly Caves, Thredbo; NPWS** 1973 to 1976

**Other professional experience and expertise**

- Prepared numerous Fire Action Plans, Bushfire Management Plan and Fuel Management Plan and Evacuation Plans
- Executive Member NSW Southern Regional Fire Association, Corporate Plan and Regional Bushfire Threat Analysis Steering Committee Member (1994)
- Annual hazard reduction planning in most regions of N.S.W.
- Plans of Management prepared for 7 NSW NPWS National Parks
- Displan (Disaster Plan) - Shoalhaven City
- Disaster Hazard Analysis - Shoalhaven City
- Bushfire Controller for over 1600 bushfires within NSW
- Extensive practical knowledge / experience in all bushfire fighting techniques
- Primary operational role in 6 declared bushfire '41F emergencies'
- Land and Environment Court appearances as a bushfire expert
- Developed many pioneering GIS models for fire management

- **Bushfire Trainer; presented over 1000 hrs training, includes all levels of firefighting, bushfire assessment techniques for Council Planners and Building Inspectors, Remote Area Fire Fighting and various Emergency Exercises**



