

Bush Fire Investigation Report

PRIMARY FESA FIRE INVESTIGATOR	Gary BAXTER
FIRE INVESTIGATORS - OTHER AGENCIES	WA Police Arson Squad – Six Detectives
INVESTIGATORS - OTHER AGENCIES	Department of Commerce – EnergySafety Western Power
INCIDENT NUMBER	2009141266
INCIDENT DATE	29/12/2009
LOT NUMBER	8 (Rural # 435)
STREET / ROAD NAME	River Road
SUBURB	TOODYAY
MAP AND GPS REFERENCE	Folewood and River Roads TOODYAY 116 24.834' – 3134.00' WGS84
TIME OF CALL	FESA Incident Report created at <u>1259 Hours</u> .
STATIONS ATTENDING	Bushfire with significant response by the Fire Emergency Services Authority (FESA) particularly Goldfields Region supported by Metropolitan District, Local Government and the Department of Environment and Conservation.
OTHER AGENCIES	Given the size and magnitude of this bushfire a range of combat and support agencies responded to assist the Shire of Toodyay in the initial stages and FESA once the incident was handed over.
CAUSE DETERMINATION	ACCIDENTAL - Electrical cause.
BRIEF DESCRIPTION OF CAUSE	<p>Cause – Accidental: All potential causes have been eliminated other than electricity.</p> <p>Suspected cause is power pole failure and energised conductors dropping onto the ground causing arcing to occur and igniting vegetation.</p> <p>An unknown foreign airborne object contacting the conductors and producing combustible material dropping onto the dry vegetation below, although unlikely, remains a possibility.</p>
SUPPORT RECORDS FOR THE REPORT	<p>EnergySafety report</p> <p>Western Power report</p> <p>Fire Weather Warnings 29 December 2009 (Appendix 1)</p>
FIRE WEATHER CONDITIONS	<p>Australian Bureau of Meteorology Western Australia (BOM)</p> <p>Fire Weather Forecast – Inland Sub-District of the Lower West District of Western Australia - SEVERE</p> <p>Note: Catastrophic Conditions were observed locally at the time of the fire.</p>

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Furthermore, it is not the intention of this report to pass judgment on, or fix liability for, the loss of property or the effects upon the occupants, following the fire.

This report is based upon the evidence and information that was available at the time of investigation. It does not preclude other possible sources of ignition, given the production of additional factors or evidence after that date and at the time of writing this report.

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BASIS FOR INVESTIGATION AND REPORT

The Bush Fires Act 1954 Section 14.1 appoints Fire Investigation Officers as Bush Fire Liaison Officers. Section 14 (e) states that; A member of the Authority, an officer who is authorised by the Authority may enter land or buildings for the purpose of the act at any time to - Investigate the cause and origin of a fire which has been burning on the land or building.

Fire Brigades Act 1942 Section 34 (i) states; He may cause the debris and also any premises where any fire, hazardous material incident or rescue operation has occurred, and every part of such premises, to be searched, and may remove and keep possession of any materials which may tend to prove the origin of such fire or hazardous material incident or the cause of the accident or incident which required the rescue operation.

1. BACKGROUND:

At 1257 hours on Tuesday 29 December 2009 the Fire and Emergency Service Authority of Western Australia (FESA) Communications Centre received a series of "000" emergency calls reporting a bushfire in the vicinity of Folewood and River Roads in Toodyay.

The FESA Communications Centre dispatched local Shire of Toodyay Bush Fire Brigades to investigate the area and suppress any fire. The Bureau of Meteorology (BOM) had issued a catastrophic fire danger rating for many areas of WA however the Toodyay area was forecast as Severe. Catastrophic conditions were observed locally at the time of the fire (see figure 1).

It took firefighters more than 8 hours to bring the fire under control and several days to patrol and totally extinguish the fire.

Four people were injured during the fire; these included a local woman who was transported to Royal Perth Hospital with burns to 10 per cent of her body, two firefighters suffered smoke inhalation and one who was severely dehydrated requiring medical attention.

The fire destroyed 38 homes, three holiday cottages, 20 sheds and burnt 2,900 hectares of bush and farming land. In addition, the fire also partially damaged three homes, killed approximately 100 sheep and destroyed farm machinery along with kilometres of fencing and vegetation, both natural and planted.

There was also significant damage to critical infrastructure and losses to electricity distribution lines across the area.

2. FIRE RESPONSE:

The first arriving fire crew requested additional firefighting resources as the fire in the paddock bounded by Folewood and River Roads in Toodyay was developing quickly fanned by very strong winds with flames estimated up to two metres high. Fire was spreading rapidly through barley stubble, grass, scrub and bush towards properties in the Lloyds Hill sub division and surrounding areas downwind of the fire.

FESA Regional staff were also despatched from the FESA Regional Office at Northam to support local volunteer fire crews.

The Shire of Toodyay transferred incident control to FESA at 1615 hours to manage command and control functions. A wide range of resources and technical expertise from FESA and other agencies were already on hand when transfer of control to FESA occurred. Further resources were mobilised as required.

On the first night of the fire, more than 200 firefighters including volunteer Bush Fire Brigades, career and volunteer Fire and Rescue Service and Department of Environment and Conservation staff were involved in fire containment. Many of the responding firefighters were from areas outside the Toodyay district.

3. WEATHER CONDITIONS:

Temperatures in Toodyay were estimated to be in excess of 40° with local reports of very strong winds predominantly from the West North West. Similar weather conditions had been experienced in the days leading up to the 29 December bushfire. FESA in conjunction with the BOM had issued warnings to the community two days prior to the bushfire. FESA advice to the community was that under these climatic conditions, some fires will be unpredictable, difficult to control and move very fast. The safest place is to be away from the fire.

The nearest automatic weather stations (AWS) are located at Muresk Agricultural College (DAFWA site) and Northam (BOM site). Advice from BOM is the Muresk site observations would be more representative of the likely conditions in Toodyay. This site is located approximately 31 Km from the fire site. Hourly observations from the Muresk AWS DAFWA, 29 December 2009 are contained in **Fig: 1**. It should be noted wind speed values at Muresk are recorded at 3m and the observed values have been converted by an up-scaling factor of 1.16 to bring them into line with BOM observations which are recorded at 10m.

<i>Time (WST)</i>	<i>Temperature (°C)</i>	<i>Dew point Temperature (°C)</i>	<i>Relative Humidity (%)</i>	<i>Wind Dir (degrees)</i>	<i>Wind Speed knots (km/h)</i>	<i>FDI</i>
0900	37.1	4.0	12	070	10 (19)	22
1000	39.2	1.4	9	010	19 (34)	68
1100	41.0	0.5	8	005	20 (37)	83
1200	42.8	0.6	7	350	22 (41)	113
1300	42.9	0.9	7	345	22 (41)	114
1400	42.1	3.3	9	320	19 (34)	73
1500	39.4	4.8	12	315	18 (32)	54
1600	34.8	5.2	16	300	18 (32)	43
1700	34.1	4.6	15	305	15 (28)	33
1800	33.2	5.1	17	300	13 (24)	23
1900	30.8	6.3	21	300	15 (28)	26
2000	29.7	6.8	23	305	16 (30)	27
2100	25.4	11.8	42	300	17 (32)	19

Fig: 1. Hourly observations at Muresk DAFWA, 29 December 2009.

There was no lightning activity reported in the Toodyay area on 29 December 2009.

The first arriving firefighters observed very strong winds with variable gusts in the area. At approximately 1700 hours, fire investigators conducting the initial scene examination recorded wind gusts of 45 km/h at ground level using a portable Kestrel wind speed meter while Muresk observations show an average wind speed of 28 km/hr.

4. INITIAL INVESTIGATION:

Given the size and magnitude of the bushfire, the FESA Fire Investigation and Analysis Unit (FIAU) mobilised to the scene to establish the origin and cause of the fire.

While travelling to Toodyay, FESA Fire Investigation Officers Gary BAXTER and James BELL spoke to the on-call Police Officer from the Arson Squad as per the standard response arrangements between FESA and WA Police.

Fire Investigators attempted to contact the first arriving fire crew to establish the origin of the fire however the crew was committed to fire suppression activities. Information was subsequently obtained on their observations on arrival at the fire.

A review of information from FESA incident records revealed one of the first responding fire crews in the area had indicated power lines required isolation. Contact was made with a Western Power Linesman who was in Toodyay and arrangements were made to meet at Folewood and River Roads.

On arrival at the corner of Folewood and River Roads, contact was made at approximately 1615 hours with a witness who was one of the first persons to observe the fire and made the initial "000" emergency call reporting the fire to the FESA Communication Centre.

Initial on site investigations commenced with the assistance of the witness who detailed his observations of the fire in its early stages in his neighbour's farm paddock and identified a general area of the fire origin. This area was observed from River Road at approximately 75 metres from the road side.

5. IDENTIFICATION OF A GENERAL AREA OF ORIGIN:

The witness provided observations of the fire development which included identifying smoke above the tree line to the south of his property and indicated a general area of fire origin. The witness invited FESA Fire Investigation Officers to the balcony of the premises where he first observed the fire. The witness also permitted fire investigators to take photographs of the general area of origin from this location.

Fire Investigation Officers photographed a series of digital images taken from this location at 1649 hours. From the balcony there was no view of the ground level in the area where the fire was observed to have started. A mobile field bin in the paddock where the fire started was clearly visible and was used as a reference point (RP). **Fig: 2.**

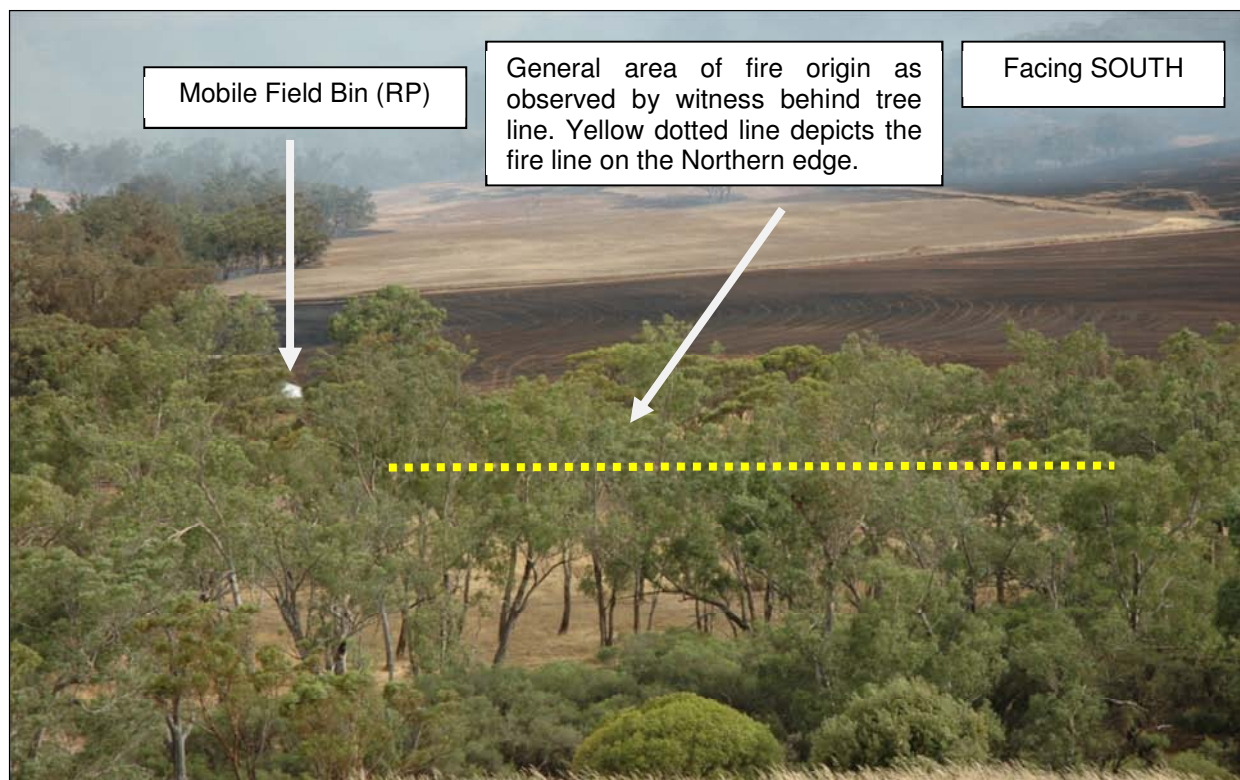


Fig: 2. Photo taken from witness' balcony.

The witness who made the initial "000" emergency call reporting the fire in the farm paddock, described and estimated the size of the general area of origin. This was later measured by fire investigators. (Facing south from River Road)

- Starting at 275 metres west of the intersection of River and Folewood Roads,
- Finishing 650 metres from the start point mentioned above, and
- Starting 75 metres south of River Road extending a further 50 metres beyond the fallen conductors in the paddock of recently harvested barley crop.

The fire had burned back to the edge of the farm paddock track which was 50 metres south of River Road.

FESA Fire Investigators returned to River Road and met at this location with WA Police Arson Squad Detectives and Western Power linesman to discuss power isolation in the paddock.

FESA and WA Police Arson Squad conducted an external area examination along River Road on foot. This area was photographed – (**Figs: 3. and 4.**).

The external examination of the surrounding vicinity did not identify any potential sources of accidental, incendiary or natural ignition.

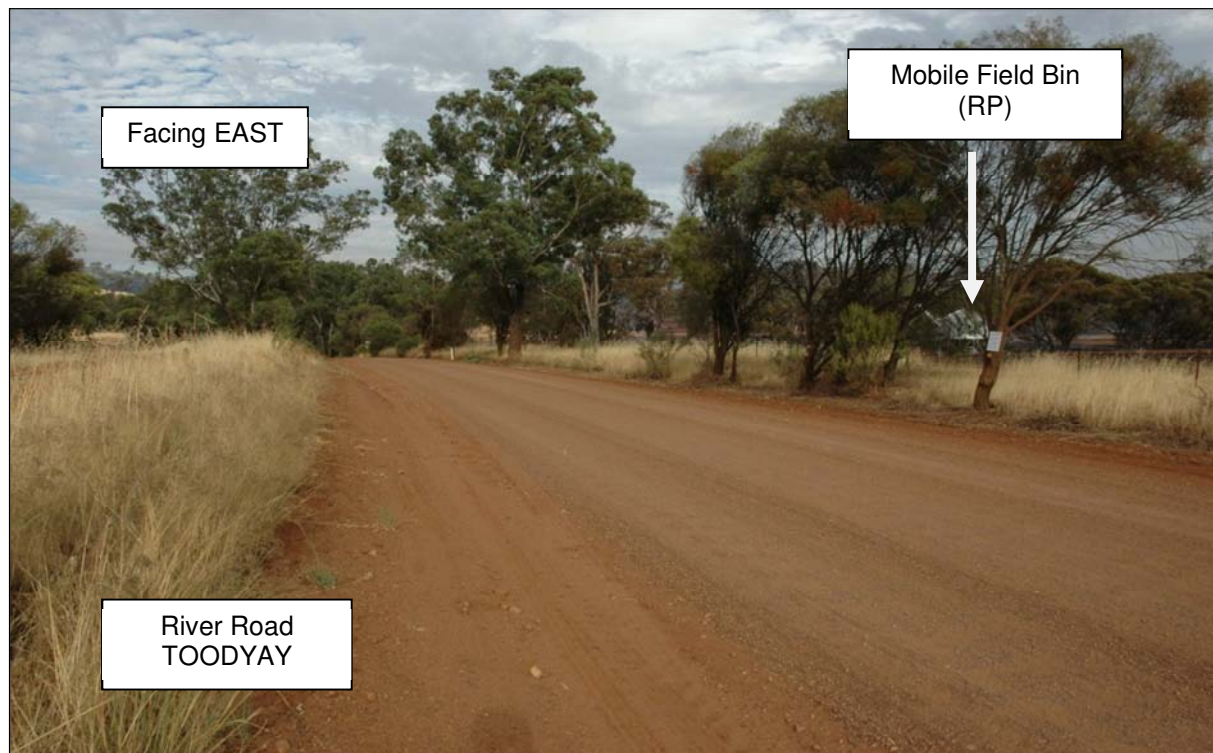


Fig: 3. Photo River Road Eastward.

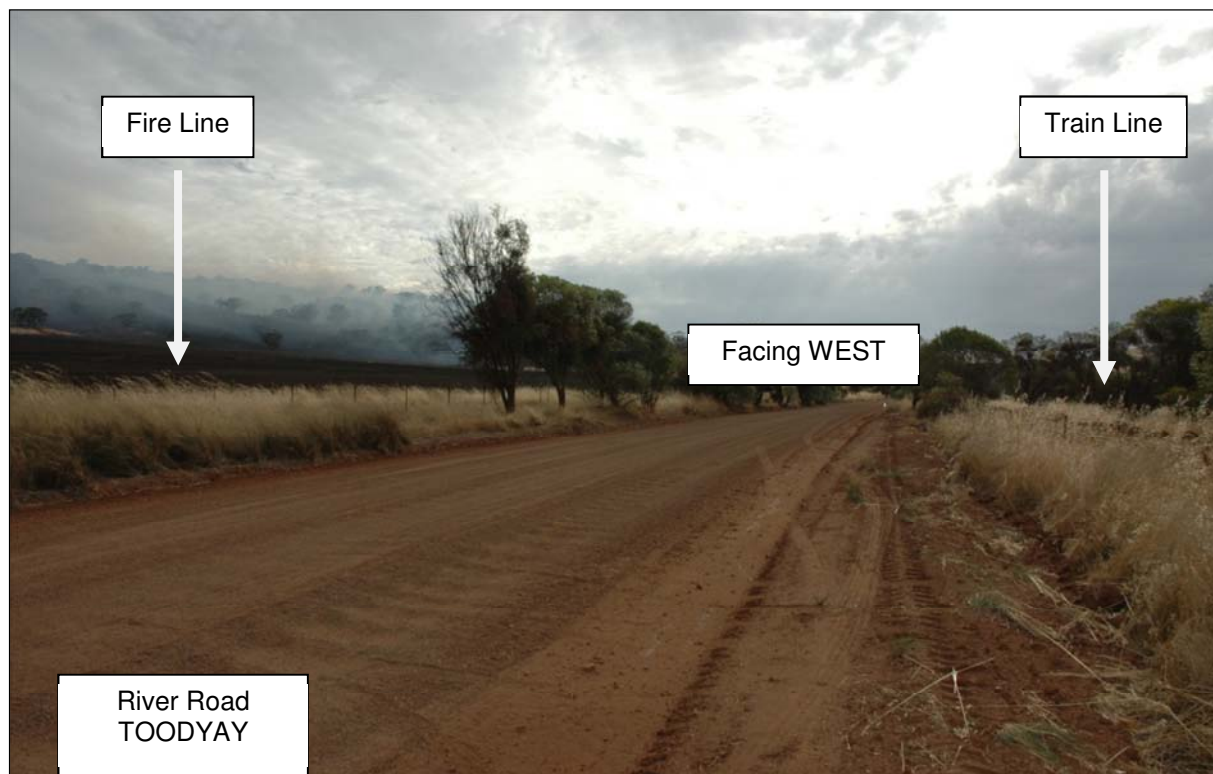


Fig: 4. Photo River Road Westward.

Within the general area of origin there was one spur line consisting of two conductors lying on the ground with two timber power poles still burning, also on the ground.

The general area of origin can be seen highlighted in a yellow broken line on the aerial photo of this location in **Figs: 5 and 11**.

The Area of Origin was photographed and recorded as GPS reference 116 24.834' – 3134.00' WGS84.

Fig: 5 details the features of the Area of Origin and the proximity of the location where the witness made the initial "000" emergency call from.

6. JOINT FIRE SCENE EXAMINATION:

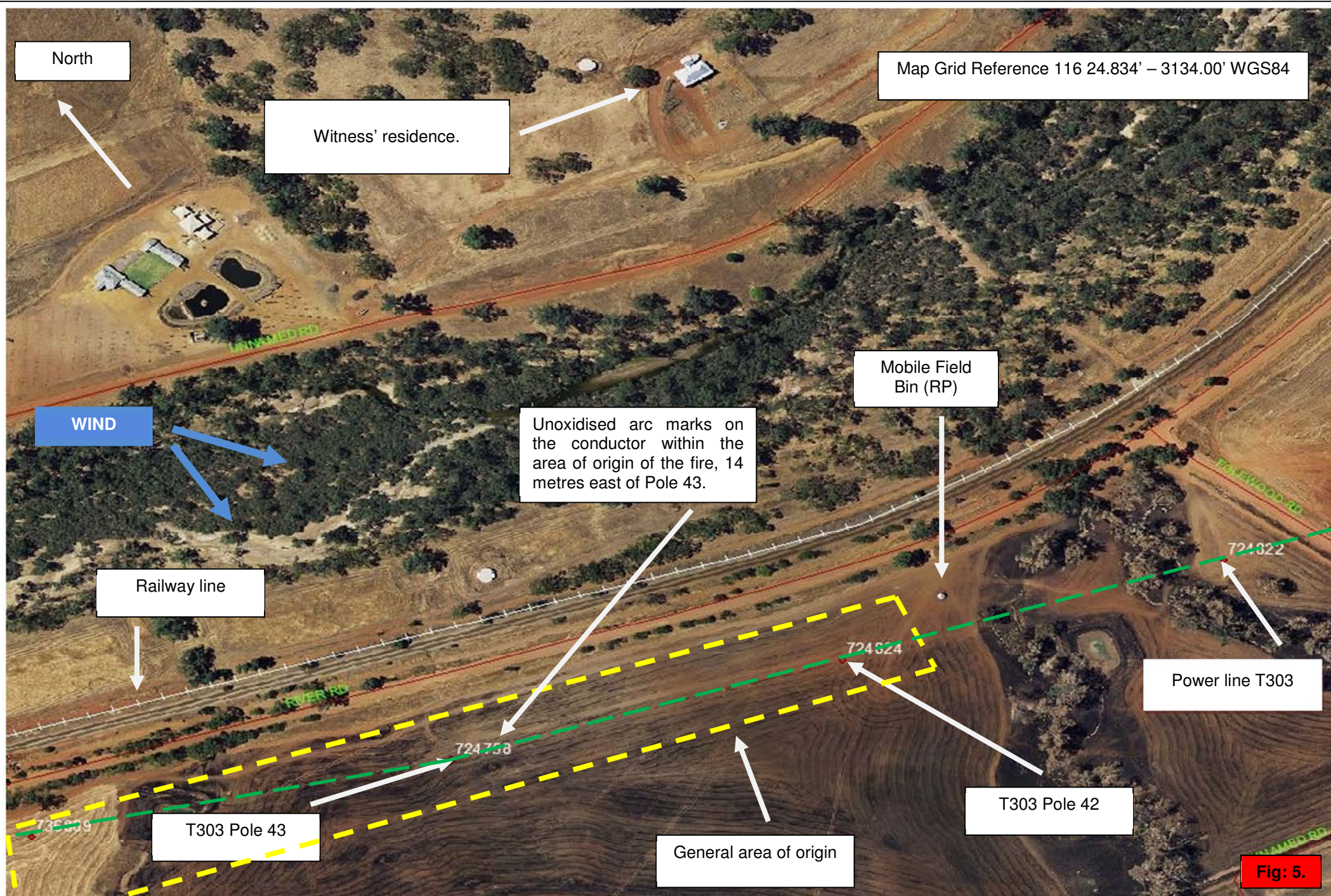
Given the location of the power lines to the general area where the fire started, FESA initiated a joint fire scene examination with Western Power (the electricity supplier) and Department of Commerce – EnergySafety (the electricity safety regulator). This is in line with the Memorandum of Understanding (MOU) FESA has with State Government agencies to enable all parties with a regulatory role to investigate the fire and view the evidence first hand.

FESA Fire Investigators and members of the WA Police Arson Squad commenced an initial joint investigation gathering information and evidence from the general area of origin on the evening of 29 December 2009. Actions undertaken in the initial stages of the investigation included;

- Obtaining photographs
- Extinguishing burning pole butts and removal of soil from around poles T303-42 and T303-43
- Gathering physical evidence from the remaining pole butt T303-43

The first joint meeting of FESA, WAPOL, Energy Safety and Western Power investigators took place at the fire scene on the morning of 30 December 2009.

Information was shared between agencies involved in this fire cause investigation during the preliminary scene examination and the collection of the evidence.



7. REFINING THE AREA OF ORIGIN:¹

With power confirmed as isolated at approximately 1830 hours on 29 December 2009, FESA and WA Police fire investigators commenced to track the path of the fire in the paddock. The objective was to review all indicators and reduce the initial general area of origin as identified by the witness, to a more specific area of origin in an effort to ultimately establish the point of origin² for the fire.

Using all remaining combustible and non combustible indicators and physical barriers on the ground, investigators were able to reduce the initial general area of origin as described by the witness, to a more defined area of origin. Tracking the path of the fire was also conducted over the following days.

These physical barriers included:

- Rocks
- Trees
- Fallen debris
- Remaining barley crop stubble, crop heads
- Windrows
- Introduced features such as water tank/trough, reticulation piping, mobile farm equipment, fencing, timber power poles and energised conductors.

An assessment of smoke and scorch staining patterns on the physical barriers such as rocks, water/trough, reticulation piping, mobile farm equipment and fence posts, also the direction of stubble fall and the presence of unburnt foliage around rocks and windrows assisted investigators to reduce the original area of origin.

Harvesting had taken place in this paddock, finishing on Wednesday 23 December 2009. **Fig: 6.** This reduced the fuel load in the paddock and producing aerated windrows 5-6 metres in width running in an east – west direction with barley crop stubble approximately 500mm high. See **Fig: 7.** It was clear from fire behaviour indicators the fire had spread along the wind rows and at approximately 45 degrees (South East) to the windrow fanned by the north westerly wind.



Fig: 6. Recently Harvested paddock, to the west of the area of origin

¹ Area of Origin – The room or area where a fire began (National Fire Protection Association (NFPA) 921 – Guide for Fire and Explosion Investigation – 2008 Edition).

² Point of origin – The exact physical location where a heat source and a fuel come in contact with each other and a fire begins (NFPA 921-2008 Edition).

The very strong winds contributed to fire development and intensity by pushing the fire across the available barley stubble fuel in a southerly direction and the headfire continued to burn freely up slopes to the west of the farm paddock before moving south easterly towards Folewood and Sandplain Roads.

The fire also travelled in an easterly direction parallel to the windrows into a gully located 270 metres west of Folewood Road. The fire indicators within this gully are consistent with a flanking fire of moderate intensity. Tracking the fire path to and around the gully location, both externally and internally, was simplified due to more available physical barriers than the open paddock. The same methodology when observing fire patterns within the gully were used to eliminate this location as a potential area of origin.

An analysis of the available fire patterns and indicators led investigators to form a view the fire had originated in the area between Western Power poles T303-42 and T303-43. This physical fire scene assessment corroborated the evidence of the witness who observed the early stages of fire development and made the initial 000 emergency call.

Consequently, the initial area of origin was reduced from the corner of Folewood and River Roads, south to the paddock fence line and westerly to the water catchment dam 800 metres west of Folewood Road.

This conclusion of the area of origin was also supported by Mr Mark Pollard, the consultant fire investigator engaged by Western Power.

“The area of origin of the fire is located in a paddock in which wheat³ had recently been harvested from, which is bounded by Folewood Road and River Road, Toodyay Western Australia”.

“From the examination of the fire scene and information provided by witnesses, I am of the opinion that the fire has started in the area of pole 42 and 43”.

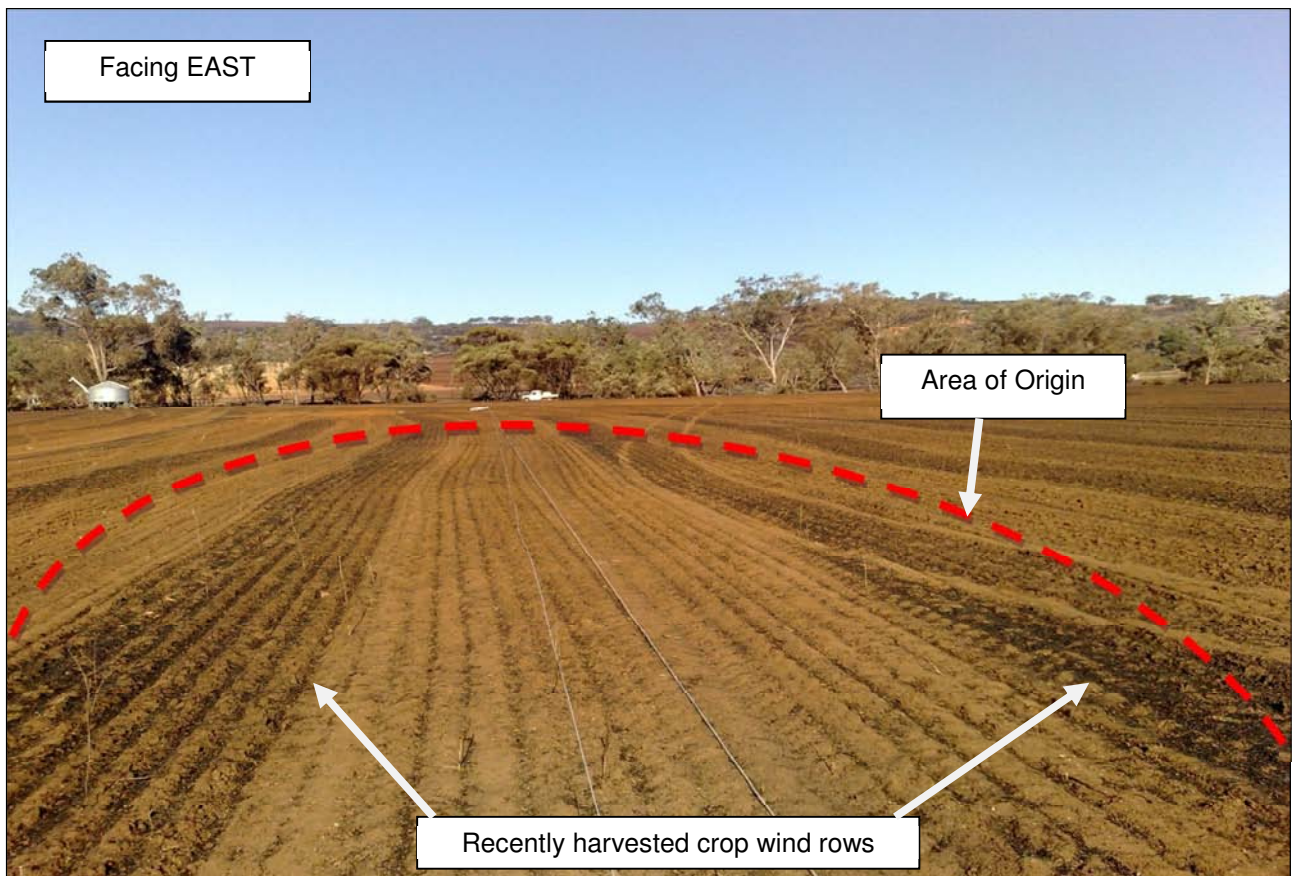


Fig: 7. Photo of Area of Origin facing East with conductors on ground and wind rows from harvesting.

Within the area of origin there was a Western Power electrical supply line with two adjacent timber power poles laying on the ground. This power line is referred to as spur line T303 (12,700 volts) with the poles closest to the Area of Origin being referred to as Westerly Pole T303-43 and Easterly Pole T303-42. GPS locations for these poles were recorded as:

³ The existing crop in the paddock of origin was barley not wheat as suggested by Mr. Pollard.

- T303-43. 31 34.1625' 116 24.7842' WGS84
- T303-42. 31 34.0691' 116 25.0988' WGS84

The untreated Jarrah hardwood poles were installed in 1976 according to Western Power records and carry two galvanised steel conductors 5.75 mm in diameter. The conductors were configured one above the other with a separation distance at the pole of 1.2 metres. **Fig: 8.**

Electrical infrastructure design and maintenance of this particular nature are referred to in the Government of Western Australia Department of Commerce, EnergySafety **2008 DISTRIBUTION WOOD POLE AUDIT REVIEW. A review of Western Power's response to the 2006 Regulatory Compliance Assessment of Western Power's Distribution Wood Pole Management Systems.**

http://www.docep.wa.gov.au/EnergySafety/Content/Publications/Reports_and_discussion_papers.html

Given the proximity of the power line conductors through the Area of Origin, they were identified early in the investigation as a potential source of ignition. With the very strong wind conditions throughout the afternoon, it was considered possible that either the poles may have failed or wind may have caused foreign objects to come into contact with the conductors, or the conductors contacting each other.

The recloser on the T303 spur line detected a fault at 1253 hours, attempted three rapid re-close operations and then locked out at 1254 hours. The T303 spur line was and remained de-energised from that time.

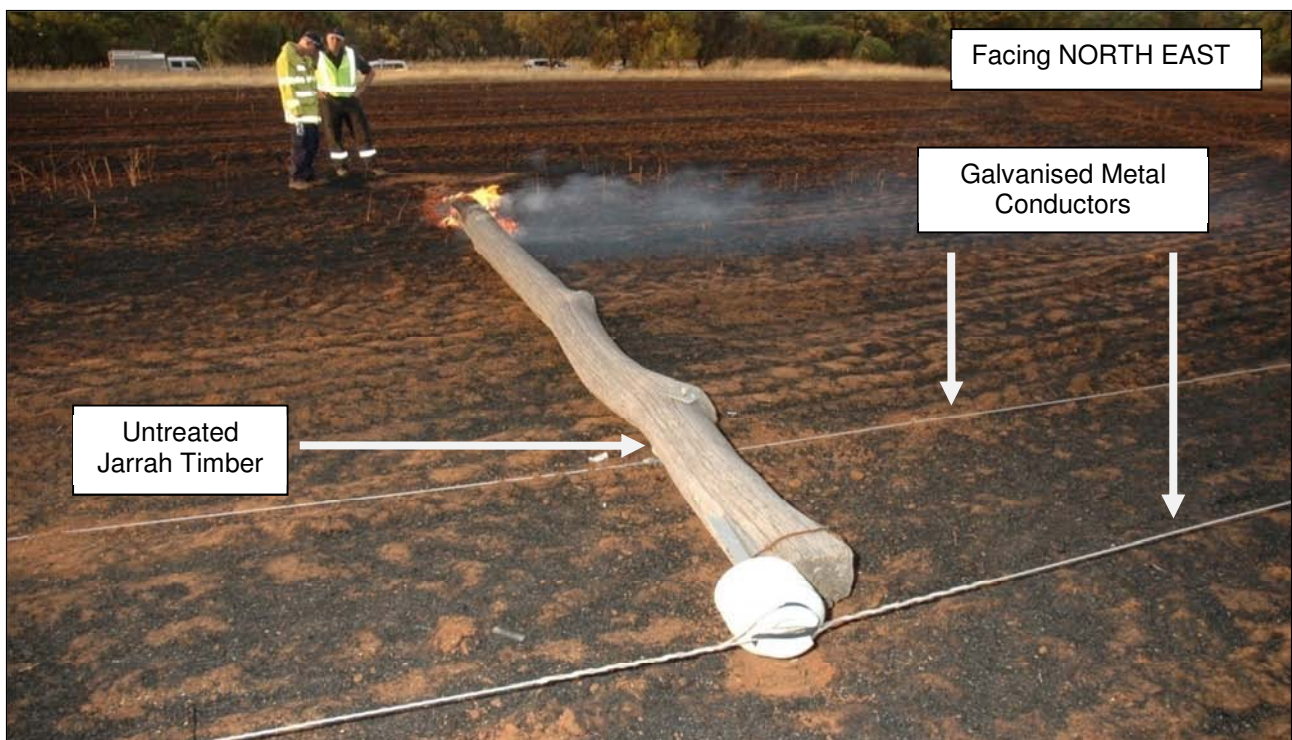


Fig: 8. Photo of Timber pole (T303-42) and galvanised steel conductors taken at 1903:26 hours on 29/12/2009.

8. POINT OF ORIGIN:

The very strong wind conditions and available fine fuels consumed during the early stages of the fire removed much of the upright crop stubble which would have aided fire behaviour analysis.

There was evidence of decomposition of the two timber poles that were found laying on the ground in the area of origin and with the strong winds reported, this was an initial focus of the investigation. Evidence considered included a technical analysis by a Forest Products Commission Scientist engaged by Western Power of the timber pole butts removed from the ground also by Western Power. This opinion was that the poles were burnt as a consequence of the fire.

Witnesses identified by FESA who provided statements that the poles were still standing during firefighting operations were re-interviewed several times by both FESA and EnergySafety investigators to clarify their observations.

After reviewing all information provided by the witnesses, there is certainty that T303 pole 42 was standing when firefighters entered the paddock to commence fire suppression operations. However, FESA deemed it

was not possible to conclusively conclude the status of T303 pole 43 due to the smoke and distance between the entry point to the paddock and T303 pole 43.

Constrained by the lack of physical indicators or further evidence, no specific point of origin for this fire could be identified. However, FESA and EnergySafety investigators continued to gather information and examine all possible ignition sources within the area of origin.

9. OTHER AREA OF INTEREST IN THE FIRE SCENE:

Following the publication of the EnergySafety report in February 2010, which used the area of origin as determined by FESA, there were reports from Toodyay residents that additional information was available that may change the area of origin of the fire in the paddock. As a result EnergySafety convened a meeting with a small group of local residents in Toodyay on Thursday 4 March with FESA and the WA Police Arson Squad also attending. The meeting was chaired by Mr Charlie Wroth, the Shire of Toodyay Recovery Co-ordinator.

The possibility of the fire originating in a gully area 450 metres east of the area where FESA had identified the area of origin was introduced. It was suggested that conductors had come into contact with vegetation from trees located in the gully area. New evidence was presented in the form of two pieces of vegetation found on the ground in the gully area, a 1.5 metre (approx) long unburnt branch with signs of rubbing and a 450 mm (approx) burnt twig with three indentations (2 large and 1 small). Also, there were references to smoke staining on rocks and assertions this supported the fire occurring in the gully.

From that meeting, FESA committed to reviewing the new evidence and information provided by the local residents as part of the investigation of origin and cause of the fire.

The following actions were undertaken:

- A further review of the fire behaviour indicators in the gully area;
- A forensic examination of two branches from the second area of interest
- A survey of the electrical infrastructure in the vicinity of the gully to determine clearance of vegetation to the conductors before the fire;
- Additional witnesses who had early observations of the fire were interviewed. In addition, previous witnesses who had provided statements were given the opportunity to submit supplementary statements in light of the new information introduced by the Toodyay residents.

9.1 Fire Behaviour in the gully area:

The fire's path was assessed on several occasions, initially when entry to the paddock was gained on the evening of Tuesday 29 December 2009 and more thoroughly in the following days.

With the assistance of the FESA Manager Bush Fire & Environmental Protection, a further assessment was conducted on Tuesday 16 March when further physical indicators were assessed, to consider the possible option of a second area of interest in the gully. **Fig: 9.**

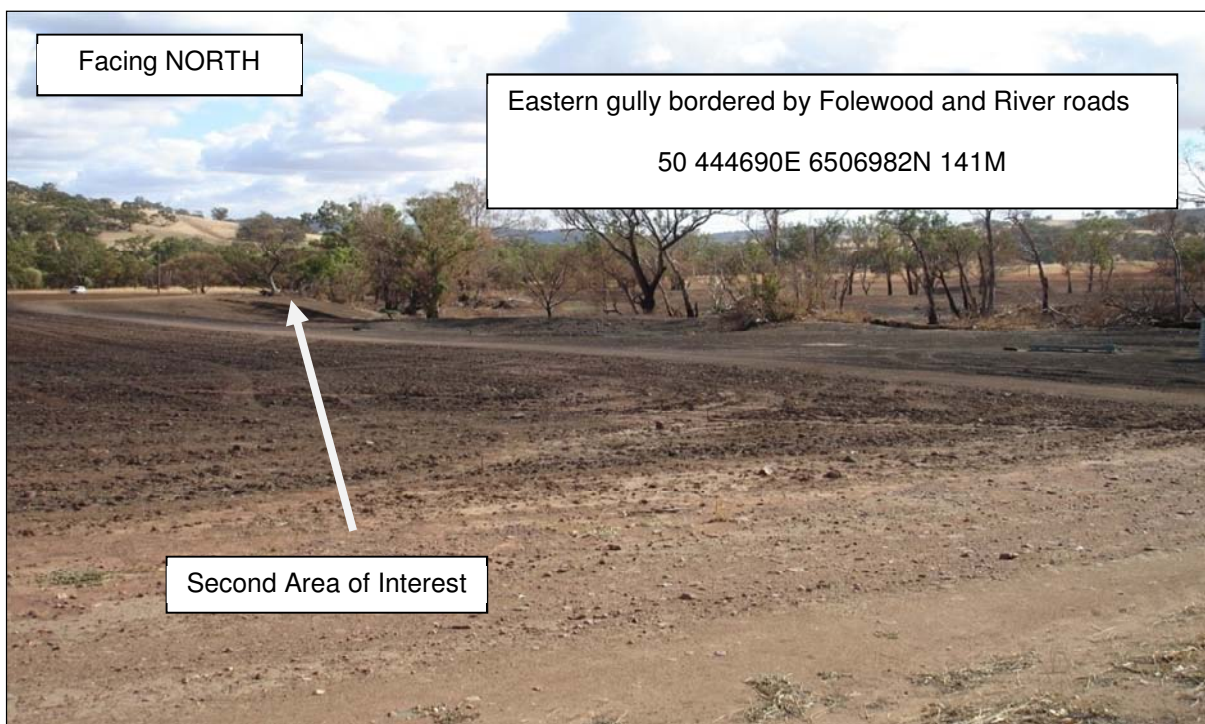


Fig: 9. Second area of interest

The physical indicators assessment considered the impact of fire on non-combustible materials. From that assessment, a determination on the head fire run was possible.

The physical indicators evidence established that the gully located to the east of the paddock approximately 270 metres west of Folewood Road (approximate map reference 4445250 / 6507400) was involved in a flanking fire which was of moderate intensity. The fire's consumption of the total fine fuels is consistent with the extended drought that had preceded the bushfire. The impact on a number of standing trees and near surface roots confirmed that the soils and fuels were very dry where the weakened tree boles had burnt down and some near surface roots had burnt.

The scorch height in the trees remaining within the creek located approximately 270 metres west of Folewood Road indicated that the fire was not a crowning fire but rather a more moderate fire. The trees were not defoliated which would be expected when a tree is subject to extreme bushfire behaviour. The trees were however scorched, and in a number of cases to the top of the crown.

This assessment assists in confirming the initial fire area of origin as determined by FESA is accurate however, it must be noted that this further assessment of the fires path was conducted some 11 weeks after the commencement of the fire.

Fig: 10. Depicts the directional fire spread in the second area of interest. The patterns and indicators observed and assessed by investigators are consistent with a flanking fire moving in an easterly direction towards Folewood Road. Once the fire reached the gully its intensity increased due to the available fuel levels. The fires momentum has increased and burned along the gully in a southerly direction. The assessment of physical indicators such as rocks, trees, fallen debris and introduced features contributed to this determination.

9.2 Forensic Examination of the two branches from the second area of interest:

FESA engaged the services of a Research Scientist from the Forest Products Commission of WA to undertake an analysis of the two branches from the second area of interest. Mr. Paul Allardyce provided to the WA Police Arson Squad during the meeting with Toodyay residents in March.

The Research Scientist provided the following assessment:

On inspection of the *first branch ID# 280210 1145 9597/0001* I found it to be an unburnt branch broken from a living tree with an abrasion mark approximately 260mm long on the bark. This abrasion had slight striation marks along its length and removed a portion of the bark and the sapwood along the length. This was a relatively recent event as there is no weathering discoloration of the area or any wound/heal response. The branch has no discernible residue along the abrasion mark and there is a slight smoothing of the bark surface in some areas suggesting a rubbing motion.

On a detailed inspection of the whole length of the branch I found no indication of any carbon residue or any singeing of any of the fibres even around the abrasion where there are fine fibres around the edge of the mark.

On branch ID# 280210 1145 9597/0001 there were no marks other than the abrasion mark mentioned in the report. There was no carbon residue, burn or scotch marks on its entire length. This branch has never been close to or in high temperature heat source or fire. There is no evidence of arcing or spark burns along the entire length.

On inspection of the second branch ID# 280210 1145 9597/0002 I found it to be a charred, dry branch approximately 530mm in length with a large end diameter of 14mm. There are two smoulder marks on the branch approximately 30mm apart, the nearest one being 130mm along the branch from the large end. The approximate diameter of the branch at this point is 10mm. There are also two very small smoulder marks (less than 5mm) near to the two major ones. The charring of this branch is only on one side; the other side being free of any marks except carbon residue.

On branch ID# 280210 1145 9597/0002 there is carbon residue indicating it has been close to, but not in a fire or passed over by a fast moving fire. The two smoulder marks, as stated in the report, were not caused by a flame but through contact with a very hot, but not flaming, heat source such as coals of a burnt piece of wood. The size of the Branch ID# 280210 1145 9597/0002 would mean that it would burn completely away if it had been exposed to a flame for any appreciable time. The underside of this branch is completely unburnt. Apart from the smoulder marks there are no other burn marks on the surface and no evidence of arcing or spark burns.

Conclusion obtained from clarification of these two examinations as follows;

If either of these branches had been near an electrical source with arcing I would have expected to see a sputter effect of sparks. This is a collection of small spark burns spread around the area nearest the source of the sparks.

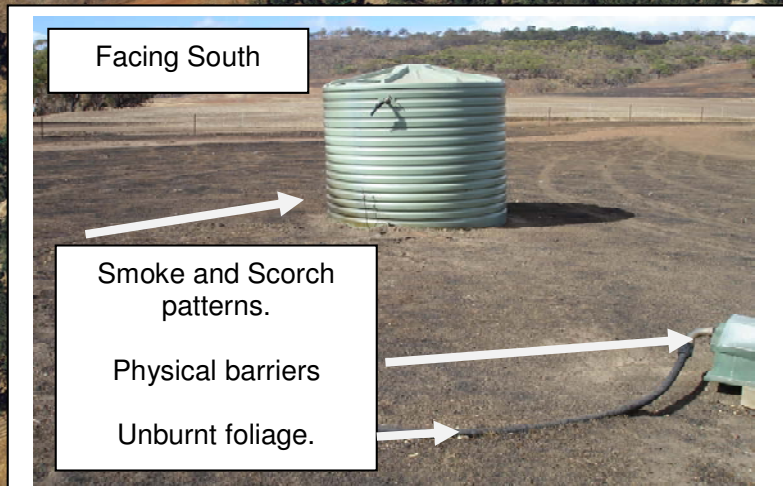
As stated before branch ID# 280210 1145 9597/001 has no marks at all and if branch ID# 280210 1145 9597/0002 had been involved in an arc i.e. the electricity had arced between it and a wire, the branch would have ignited and burnt away due to the smaller diameter of the branch and the extreme heat caused by the arc.

9.3 Survey of the electrical infrastructure in the vicinity of the gully to determine clearance of vegetation to the conductors before the fire;

Analysis of vegetation near the conductors in the gully area identified by residents as an area of interest was completed in the initial assessment of the fire scene and was determined to be within the clearance distances specified by the relevant standard.

Following the meeting with local residents, FESA requested EnergySafety complete a further analysis.

EnergySafety have advised that commissioned studies proved conclusively that the conductors could not have clashed and could not have swung sufficiently to make contact with any trees. This analysis also confirmed vegetation clearances were within the standard.



Introduced physical indicator. Water tank/trough/reticulation

An example of physical features such as introduced barriers provide accurate and clear indications of fire travel. In the case above the unburnt crop foliage is evident on the north side of the reticulation piping, indicating that if the head fire travelled from the gully the foliage would have been totally consumed by the fire. These indicators provide evidence that the fire travelled from the west and this area was involved in a flanking fire. This is consistent with the wind conditions at the time of the fire in this area.

Fire travel in the second area of interest.

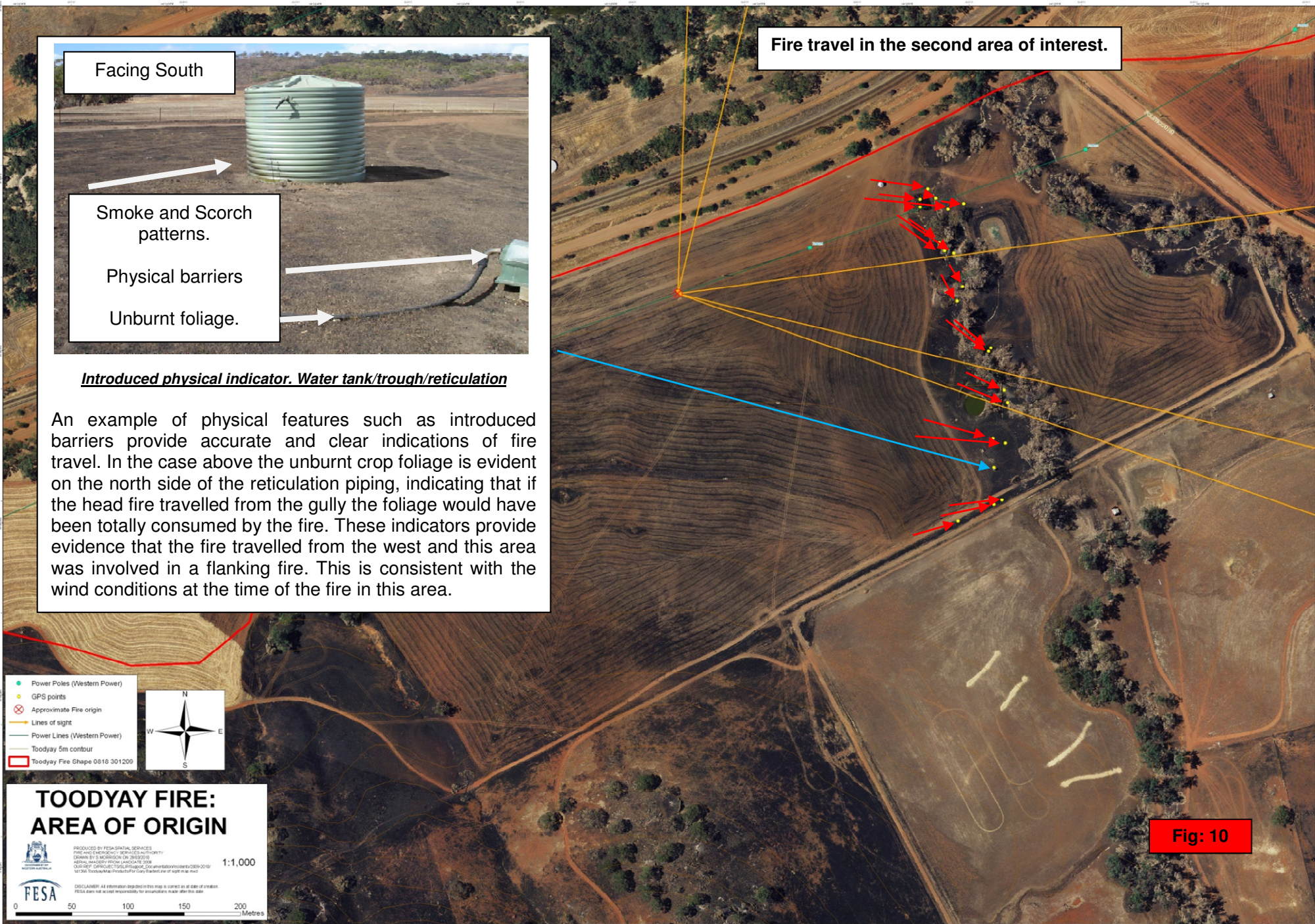
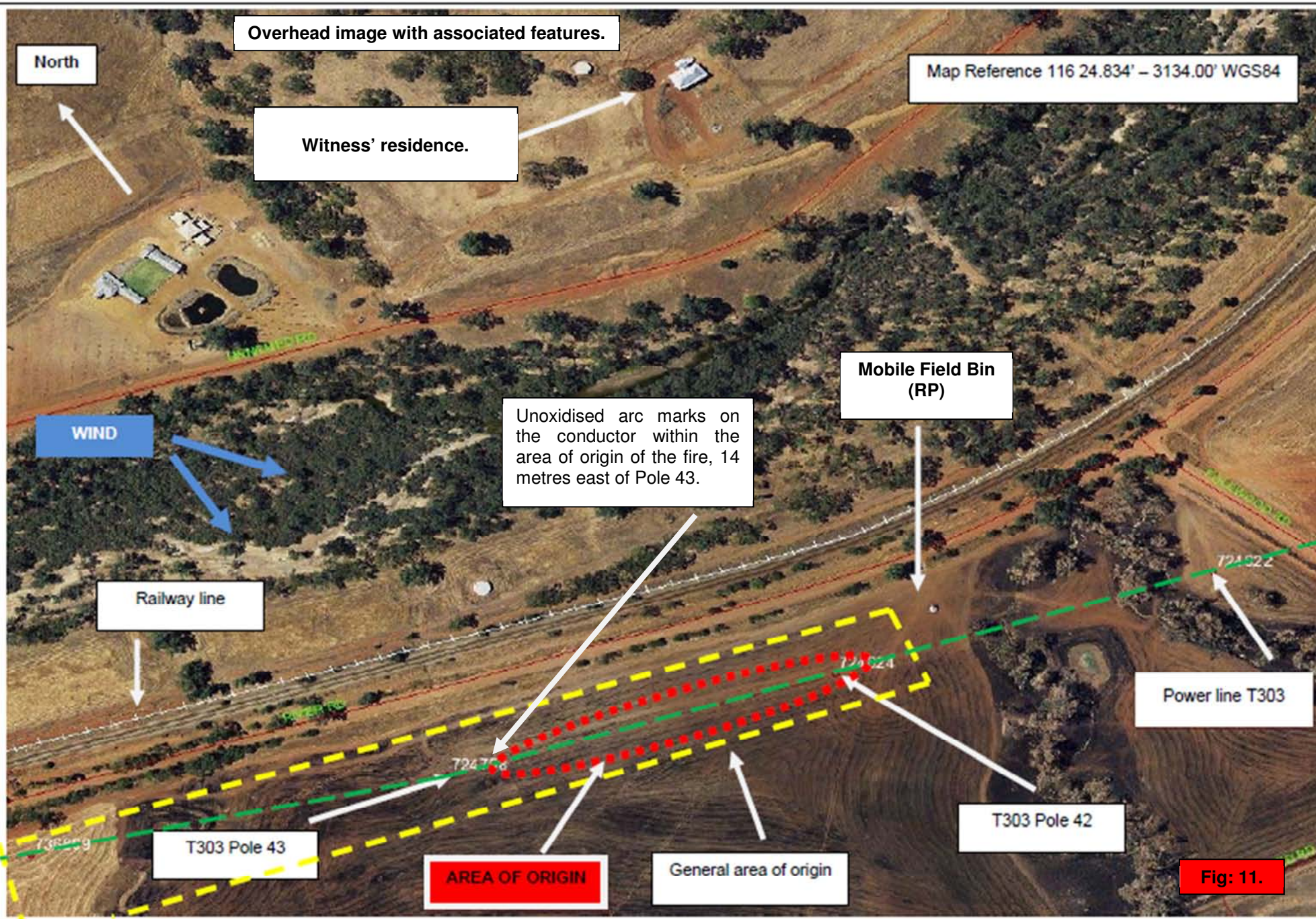


Fig: 10



10. FIRE SPREAD AND DAMAGE:

With the assistance of a North West wind the fire has spread from the area of origin in a south easterly direction.

Initially located in the farm paddock bordered by Folewood and River Roads, the fire burnt through the continuous barley crop stubble windrows in the paddock for 600 metres. Strong wind gusts pushed the fire uphill and through valleys. The fire crossed Folewood and Sandplain Roads leaving paddocks and entering adjacent remnant vegetation.

With a change in wind direction, the fire changed and headed in an easterly direction.

The fire rapidly spread to the Lloyds Hill subdivision area, Wicklow Estate, Dumbarton and Nairn Roads. There were significant losses to property, fences, and other infrastructure in these areas. **Fig: 12.**

FESA recorded the damage to date as being:

- 38 homes, three holiday cottages,
- 20 farm sheds,
- 2,900 hectares of bush and pasture,
- Partially damaged three homes,
- Stock losses,
- Farm machinery,
- Farm fencing,
- Natural and planted vegetation
- Road signs,
- Power infrastructure,
- Fauna
- Vehicles
- Caravans
- Outbuildings
- Pools



Fig: 12. Photo of total property loss at Lloyds Hill sub division.

11. POTENTIAL IGNITION SOURCES WITHIN OR NEAR THE AREA OF ORIGIN:

The investigation team considered a number of accidental, incendiary and natural ignition sources within or near the area of origin including:

- **Lightning:** No lightning on the day of the fire as recorded by BOM.
Eliminated as a cause.
- **Vehicle movements:** Witnesses had not seen any vehicles in the farm paddock prior to the fire. Road and train routes are too far from the area of origin to be considered possible ignition sources by moving vehicles.
Eliminated as a cause.
- **Cigarette:** The fire line north of the area of origin is too far from River Road for a discarded cigarette to be the cause of the fire. No other fire seats were located between the road side and the fire line in the farm paddock.
Eliminated as a cause.
- **Camping or camp fires:** No evidence of camping or camp fires were present.
Eliminated as a cause.
- **Spontaneous heating:** No hay or residue of product that could have self heated was found in the area of origin.
Eliminated as a cause.
- **Chemical:** A harvest mobile field bin parked in the corner of the paddock where the area of origin is located was also examined for "Phoxtoxin Tablets" used for weevil fumigation. These "Phoxtoxin Tablets" have been identified as an ignition factor in previous fires. Nothing was found.
Eliminated as a cause.
- **Vandalism:** No evidence of vandalism within the area of origin. (E.g. wire or metal chain thrown over the conductors).
Eliminated as a cause.
- **Arson:** No suspicious circumstances or local fire lighting identified by FESA or the Police Arson Squad.
Eliminated as a cause.
- **Impact onto the conductors by the mobile field bin:** Harvesting equipment was inspected and showed no signs of contact with electrical conductors or arc marks. In particular the mobile field bin parked in the paddock where the area of origin is located. This piece of machinery was measured for height and the auger thoroughly inspected for arc marks.
Eliminated as a cause.
- **Grain harvesting:** No farm machinery was used, transported or maintenance carried out on the day of the fire in the area of origin. This information was confirmed by the lessee of the property who advised investigators that harvesting activities had ceased on Wednesday 23 December 2009. The lessee detailed and provided a summary of movements. The harvesting equipment was not fitted with GPS recordings equipment.
Eliminated as a cause.
- **Refractional light:** The area of origin was inspected for broken glass fragments and other glass/metal products that may have created a lens effect from the sun. Nothing was found.
Eliminated as a cause.
- **Arcing caused by bushfire smoke:** The possibility of fire gases creating an arc across conductors was considered. When smoke is present, the conductivity between air-insulated conductors can increase, and possibly lead to shorts or arcs. The fire underneath the conductors was in crop stubble and was only a backing fire burning towards River Road. The fuel load of stubble in windrows and the prevailing very strong winds would have produced limited smoke and fire gases crossing the area of the conductors. FESA's experience is that fire gases creating a short circuit across conductors is only likely to occur when there is dense live foliage under or around the conductors. This view was also supported by EnergySafety.
Eliminated as a cause.

- **Power pole failure:** There was evidence of decomposition of the timber poles 42 and 43 - more so pole 43. With the strong winds reported power pole failure was an initial focus of the investigation. Evidence considered initially included a technical analysis by a Forest Products Commission Scientist engaged by Western Power of the power pole butts removed from the ground also by Western Power. This opinion was that the poles were burnt as a consequence of the fire.

Subsequent analysis and opinion published by EnergySafety have indicated power pole failure prior to the fire has caused the fire.

There is however, witness evidence indicating that power pole T303-43 was standing after ignition. Whilst these observations are challenged⁴, in light of this evidence FESA cannot conclusively determine that power pole failure was the cause of the fire.

FESA is of the opinion though that power pole failure and the dropping of energised conductors onto the ground causing arcing to occur and igniting vegetation is the most likely cause of the fire.

Foreign objects: Arc marks were identified on the galvanised steel conductors on the T303 spur line within the area of origin. A consideration in the investigation was the possibility that the very strong winds may have caused an airborne object to come into contact between the conductors (causing the arc) and blown clear afterwards.

Advice received from EnergySafety was the arc marks present on the conductors were minimal in size and created with low energy and were unlikely to be caused by the conductors clashing which would have produced a more substantial arc mark. The most prominent arc marks were only on the downwind side of the active conductor when the poles were erect⁵.

Investigators searched for signs of material that may have impacted with the conductors that could have contributed to a conductor short. (Eg. branches, metal sheeting, wire and metal strapping.) Nothing was located. There was also no evidence of birds, reptiles or animals that may have climbed onto or flown into the conductors.

It is most likely any wind borne foreign object would contact the windward side of the conductor. However, with the erratic strong swirling winds observed on the day, a foreign object could have contacted the conductor on the downwind side as it travelled past producing small molten globules and leaving arc marks. Although this is unlikely, it cannot be completely ruled out.

On the evidence available to review, FESA cannot completely eliminate foreign objects contacting the conductors as a possible cause.

EnergySafety in their review of the Toodyay fire commissioned a number of specialist reports including metallurgical analysis of the conductors and wood scientists analysing the timber power poles butts. FESA understand these reports contain crucial evidence relating to the possibility of air borne foreign objects causing this fire. FESA requested copies of these technical reports from EnergySafety, both verbally and in writing, to assist with elimination of potential causes. EnergySafety advised these reports could not be provided to FESA under confidentiality clauses contained in the *Energy Coordination Act 1994*. EnergySafety did provide detailed verbal briefings on the contents of the reports to FESA fire investigators.

However, without the ability to directly review the range of technical evidence relating to foreign airborne objects coming into contact with the conductors, although considered unlikely, FESA could not completely eliminate this as a potential cause of this fire.

FESA sought advice from the BOM in respect to the wind conditions after local residents' observations that wind speeds on the day were higher than forecast. The residents' observations were supported by the wind speed reading taken by fire investigators which was considerably higher than the wind speed the BOM predicted.

⁴ EnergySafety Final Electrical Incident Report Bushfire Near River and Folewood Roads Toodyay Western Australia 29 December 2009, published 10 August 2010 pages 9, 11 and 12.

⁵ EnergySafety Final Electrical Incident Report Bushfire Near River and Folewood Roads Toodyay Western Australia 29 December 2009, published 10 August 2010

BOM provided a spot forecast to FESA to assist in fire suppression planning which predicted 30 km/h winds at 1700 hours. However fire investigators recorded 45 km/h gusts in the paddock on the Kestrel wind speed meter at around this time. The type of damage that was likely to be experienced in winds of this magnitude is contained in the Beaufort Scale which bases wind speed on observed conditions and can be seen in the table below.

Beaufort Scale – <http://www.bom.gov.au/lam/glossary/beaufort.shtml>

Beaufort scale number	Descriptive term	Units in km/h	Units in knots	Description on Land
6	Strong winds	40 - 50 km/h	22-27 knots	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty.
7	Near gale	51 - 62 km/h	28-33 knots	Whole trees in motion; inconvenience felt when walking against wind.

Other possible wind phenomena.

Note: Dust Devil: A dust devil is a strong, well-formed, and relatively long-lived whirlwind, ranging from small (half a meter wide and a few meters tall) to large (more than 10 meters wide and more than 1000 meters tall).

The primary vertical motion is upward. Dust devils are usually harmless; however there have been instances where they have been intense enough to threaten both people and property.

Reference:

Australian Government, Bureau of Meteorology (BOM). <http://www.bom.gov.au/weather/wa/>

12. FIRE TIMELINE:

The following timeline details the series of events, the witnesses interviewed and the evidence considered in the early stages of the fire.

TIME	EVENT	WITNESS/VERIFICATION	EXTRACTS FROM WITNESS STATEMENTS
1253 to 1254 hours	Western Power circuit protection activates, is recorded electronically and locks out de-energising the T303 spur line.	<i>From Energy Safety Report: The recloser on the T303 spur line detected a fault at 1253 hours, attempted three rapid re-close operations and then locked out at 1254 hours. The T303 spur line was and remained de-energised from that time.</i>	
			<p>Witness: On 29th December, 2009 my nephew, informed me of smoke that could be seen from the South facing veranda of the farm house on Spring Gully Farm at approximately 12:50pm.</p> <p>My first sight of the smoke was light grey in colour which indicated to me that it was burning light timber and/or grass/stubble. The smoke was about 200m high and had not started to move greatly to the East. There was a very strong wind blowing from a Westerly direction. The fire had not travelled to my line of sight, I could not see flames and could still see Arthur North's old farm house.</p>
1253 to 1257 hours (time estimated by the witness)	Witness observes smoke in paddock and subsequently calls "000" emergency to report the fire.	<i>Witness observes smoke from the fire at approximately 1253 hours from their balcony. The witness did not have a clear view of the paddock and conductors in the paddock however, saw the fire over the trees along the river in the foreground. This witness later indicated that the fire started between poles T303-42 and T303-43.</i>	<p>Witness: At 12.53 pm I noticed smoke billowing from the property across the road on the other side of the river. I was not able to see flames as the trees in the Avon River were blocking my view. I was aware that a fire causing that much smoke would require the intervention of the fire brigade.</p> <p>I rang 000 from my mobile phone as I went outside to get my Ute, I am able to say that the time I made this call was at 12.54 as it was recorded on my mobile.</p>

TIME	EVENT	WITNESS/VERIFICATION	EXTRACTS FROM WITNESS STATEMENTS
1257 hours	FESA Communication Centre receives the first “000” emergency call from witness who reports a fire.	<i>FESA Call Line Identification recording is obtained of the caller and time of the call is confirmed.</i>	
1259 hours	FESA generates a fire incident and despatches local Bush Fire Brigade. When firefighters arrive they find the head fire burning in an easterly direction and backing fire towards River Road.	<i>FESA Fire Investigation Officer Gary BAXTER identifies and obtains statements from the first arriving fire suppression crews indicating initial observations and subsequent actions.</i>	
1300 hours <i>(time estimated by the witness)</i>	Another witness observes smoke at approximately 1300 hours. Alerts Uncle who calls “000” emergency. Believes fire is coming from Deepdale Farm.	<i>FESA Fire Investigation Officer Gary BAXTER obtains statements from witness and the witness’ Uncle indicating initial observations and subsequent actions.</i> <i>Witness provides mobile phone image and description of smoke plume.</i>	<p><u>Witness:</u> At approximately 13:00 hours while I was sitting at the rear of the house looking in a South Westerly direction I glanced to my left and noticed a smoke plume approximately 30 to 40 metres wide, 50 metres in height just above the level of the hillside located to the South of my view point.</p> <p>The smoke appeared to be in the area behind the Deepdale Farm house or the River Road area. The plume was one consistent shade of light white smoke and did not consist of any other coloured smoke.</p>

TIME	EVENT	WITNESS/VERIFICATION	EXTRACTS FROM WITNESS STATEMENTS
			<p>Witness: Shortly before one o'clock I received a phone call from, local farmer and former Lieutenant in the local brigade advising me that there was a fire just down from the Deepdale Homestead. I asked him if he had called triple zero which he advised he hadn't.</p> <p>At 13:02 I received another page for a fire at Folewood Road.</p> <p>At this point as I looked up the Folewood Road the fire was running on the Western side of Folewood Road and had not crossed the road. It was burning through the timber and starting to come out onto the grass on my right. It was approximately 500 metres up the hill.</p>
1305 hours	Another witness observes smoke plume from their property on Folewood Road.	Witness takes photograph with mobile phone of the plume coming from the valley south of the property. Fig: 13.	<p>Witness: Around about this time, I became aware of the smell of smoke in the air and have gone outside to investigate.</p> <p>It was then around this time I saw a plume of smoke coming from the north west of our property. I couldn't be sure which side of the river it was.</p> <p>I took a photo of the smoke I could see rising up from "Longford". I have provided that photo to Police.</p>
1320 hours	Same witness who takes image of fire at 1305 hours evacuates and re-locates to neighbouring property.	Witness takes another photograph with mobile phone of smoke plume coming from the valley south of their property. Fig: 14. (Witness takes the only two available images of fire in the early stages of its development).	<p>Witness: I then took another photo of the fire on my phone. I have provided that photo to Police.</p> <p>I could see the fire coming up the creek, and thought that once it gets in there, it's going to go.</p>

TIME	EVENT	WITNESS/VERIFICATION	EXTRACTS FROM WITNESS STATEMENTS
1334 hours	Property under threat in the Lloyds Hill sub division.		
			<p><u>Witness:</u> I reported to the JULIMAR Fire Shed at approximately 13:10 hours and prepared the JULIMAR 1.4R and dressed in my PPE ready for turnout.</p> <p>We arrived at the corner of Folewood and River Roads making contact with the Deputy Chief Bushfire Control Officer.</p> <p>While crossing the burnt paddock travelling under the power lines I did not observe any other vehicles in the paddock or any suspicious activities.</p> <p>We were following our original path to the gate when we observed the Western Power lines were on the ground flat.</p> <p>At this time I believe to be approximately 13:51 hours I contacted control indicating this hazard and asked for Western Power to be notified to isolate power at this location.</p> <p>I decided to travel in an Easterly direction to avoid the Power lines until I got to a gully. While travelling in this direction I noticed the power pole in this vicinity was on the ground.</p> <p>There was a considerable amount of burning matter in the gully so I decided not to enter it.</p> <p>I turned the unit around travelling in a Westerly direction towards another gully located further up the paddock noticing the power pole in this vicinity was also down on the ground.</p>



Fig: 13. Image taken by witness on Tuesday 29 December 2009. First observations. This image was taken at 1305 hours, approximately 12 minutes after fire ignition.

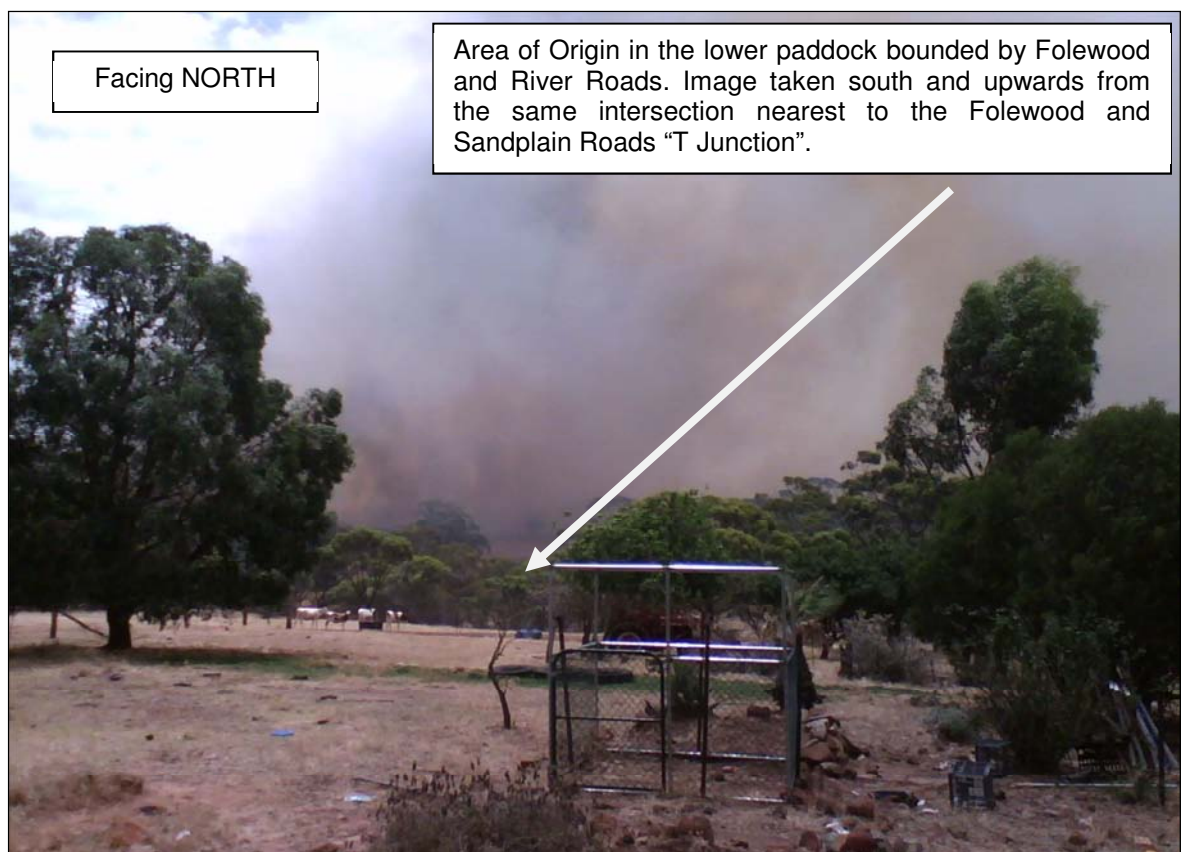


Fig: 14. Image taken by witness on Tuesday 29 December 2009. Second location. This image was taken at 1320 hours, approximately 27 minutes after fire ignition.

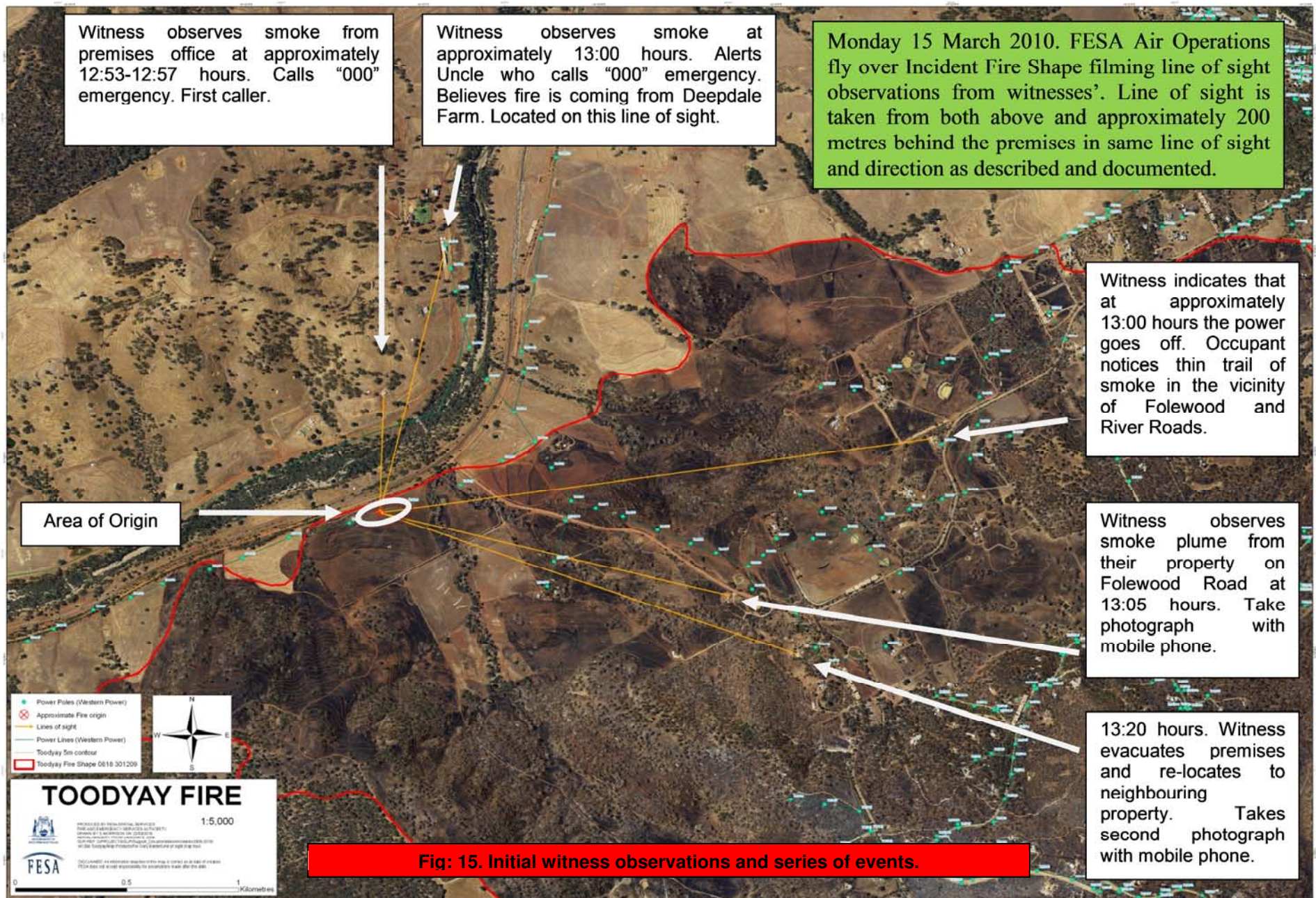


Fig: 15. Initial witness observations and series of events.

Timeline.

1259 hours
FESA generates
a fire incident
and despatches
local Bush Fire
Brigade.

1257 hours FESA
Communication
Centre receives
the first "000"
emergency call
from witness who
reports a fire.

1253-1257 hours
Witness
observes smoke
in paddock and
subsequently
calls "000"
emergency to
report the fire.

1253 hours Western
Power circuit
protection activates,
is recorded
electronically and
locks out de-
energising the T303
power line.

1300 hours
Witness
observes
smoke at
approximately
1300 hours.
Alerts Uncle
who calls
"000"

Witness
indicates that
at
approximately
1300 hours
the power
goes off at
home.

1200

1300

1400

42.8 Degrees
41 Km/hr
winds

42.9 Degrees
41 Km/hr winds

1305 hours
Witness
observes smoke
plume from their
property on
Folewood Road.

1320 hours
Witness evacuates
premise and re-
locates to
neighbouring
property.

1334 hours
Property under
threat in the
Lloyds Hill sub
division.

42.1 Degrees
34 Km/hr winds

13. DAMAGE TO ELECTRICAL CONDUCTORS IN AREA OF ORIGIN:

EnergySafety as part of their investigation provided FESA information that there was fresh unoxidised arc marks on the conductor within the area of origin of the fire, 14 metres east of Pole 43. **Fig: 17.** These marks were on the underside of the conductors.



Fig: 17. Photo of arc marks on the active conductor within the Area of Origin.

These recent arc marks, combined with the operation of electrical protection equipment on line T303 just prior to the time the fire was first observed, is an issue that has been extensively reviewed by all agencies involved in this fire investigation.

Western Power initially endorsed a metallurgist examination of the electrical conductors and EnergySafety also engaged a metallurgist. EnergySafety also commissioned a second metallurgist review of the electrical conductors and the arcing damage.

FESA works closely with EnergySafety as the electricity regulator and seeks technical expertise for these types of incidents where electricity may be a possible cause. Following the fire FESA has received information from EnergySafety advising the outcomes of tests they had undertaken on circuit protection within the transmission lines passing through the area of origin.

After the release of their February report, EnergySafety advised FESA they had re-examined the conductors in the vicinity of power pole T303-43. They identified the conductors were marked with a carbon like residue that could not be removed. This staining or blackening of the conductor was only present on the conductors near this pole.

At the request of EnergySafety, FESA fire investigators assisted with a simulated burn test within the recognised area of origin on Monday 24 May 2010 at the corner of Folewood and River Roads Toodyay.

The aim of the test was to identify situations that produced blackening on the electrical conductors to occur. The test involved electrical conductors with the same features as the conductors present on the day of the Toodyay fire. The test revealed that blackening of the conductors only occurred when the conductors were a short distance from the flames of the burning stubble. These findings were invaluable in highlighting the location of the conductors attached to power pole T303-43 during the early stages of the fire.

For this blackening to occur in the vicinity of power pole T303-43, it was concluded the conductors were close to the ground, but not on the ground, during the early stages of the fire.

This is consistent with both possible causes of the fire identified. In the case of power pole T303-43 failing causing the conductors to contact the ground then the conductors rebounding and remaining suspended just above ground level, this would have allowed flame contact on the conductors to produce the blackening.

In the less likely possible cause where airborne foreign objects contacted the conductors producing fine molten metal particles falling to the ground starting the fire, power pole T303-43 could have failed from fire impact shortly after ignition, leaving the conductors suspended above the ground where they would have been exposed to flame causing the blackening to occur. Again, FESA bases this on the evidence available and acknowledge information from the specialist technical reports commissioned by EnergySafety may alter this theory.

14. CONCLUSION:

The weather conditions leading into and on the day of the fire, the available fuels, the nature of initial fire development in an open paddock and the topography of the surrounding area, all contributed to a major fire event.

The methodical process in determining a fire cause determination in this instance involved;

- An initial review of the electronic data prepared within the FESA Fire Investigation Analysis unit
- Fire scene assessment
- Fire path tracking and analysis of barriers and indicators
- The collection of witness observations
- The collection of fire suppression crew observations
- The collection of FESA Air Intelligence
- A shared stakeholder investigation
- Fire scene reconstruction
- Corroboration of witness and fire suppression crew observations
- Expert testing and analysis
- Collation of Geospatial Information Services

Based on the systematic fire scene examination, the elimination of heat sources externally, further corroboration from witness interviews and observations, the investigators could only identify one potential heat source within the area of origin; the T303 spur line.

15. CAUSE

There is evidence to support that electrical conductors on the Western Power T303 spur line have been involved and caused the fire.

FESA has concluded: All potential causes other than electricity have been eliminated. However, on the evidence available FESA is not able to definitively conclude how the electrical conductors in the vicinity of timber power pole T303-43 caused this fire. Two possible causes remain.

- Power pole failure and the dropping of energised conductors onto the ground causing arcing to occur and igniting vegetation is the suspected cause of the Toodyay fire.
- An unknown foreign airborne object contacting the conductors and the subsequent arcing producing combustible material dropping onto the stubble, dry grass and other fine fuel starting the fire, although unlikely, remains a possibility.

FESA has not been able to establish the exact point of the fire's origin therefore, in the absence of direct evidence to identify the ignition source FESA is to record the cause of this fire to be ACCIDENTAL – Electrical.

AUTHOR:



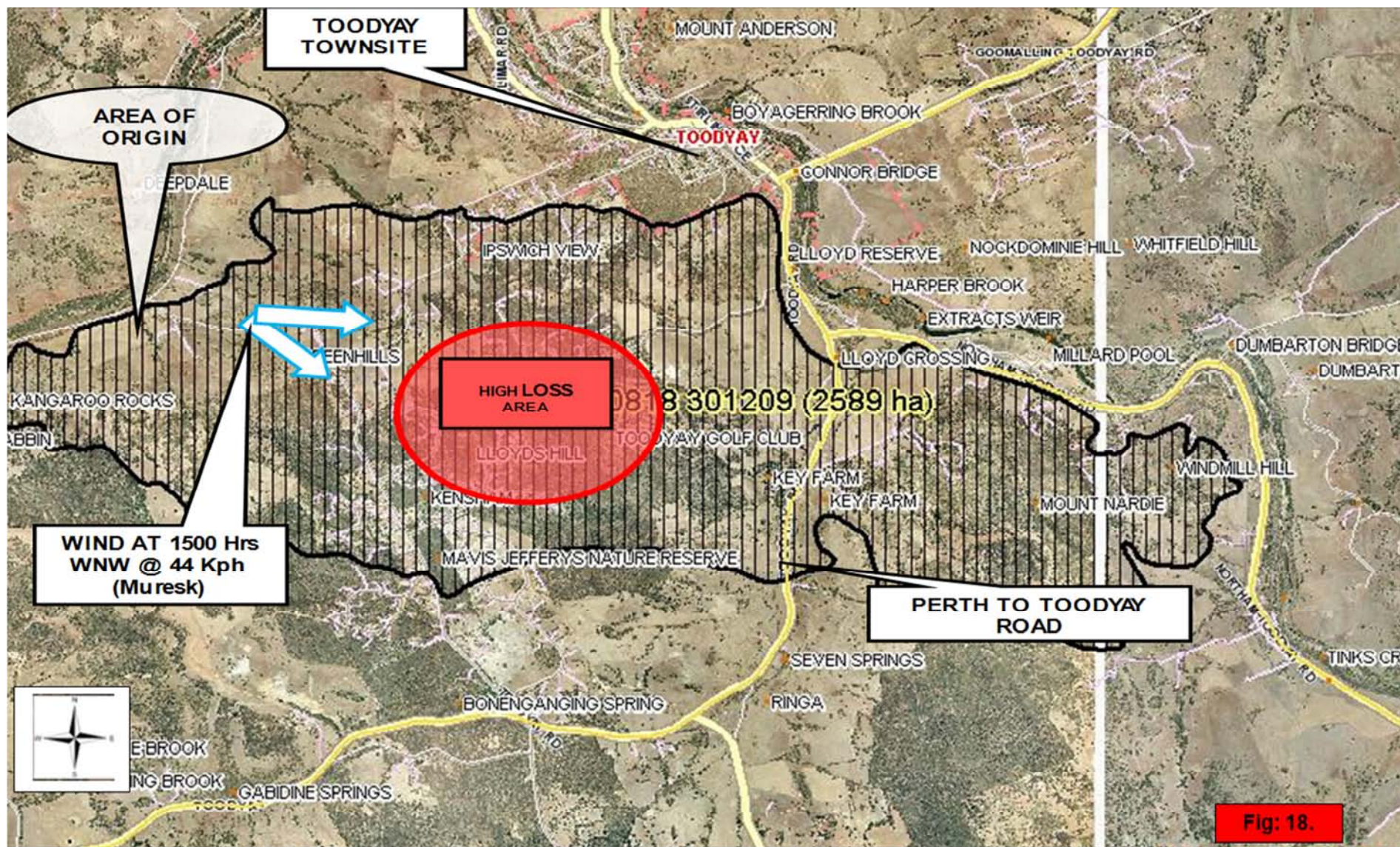
Gary Baxter
FESA Fire Investigation Officer

REVIEWED by:



Phill Cribb
FESA Fire Investigation Officer

Date: 30 August 2010



Map of the bushfire showing Area of Origin and fire shape.

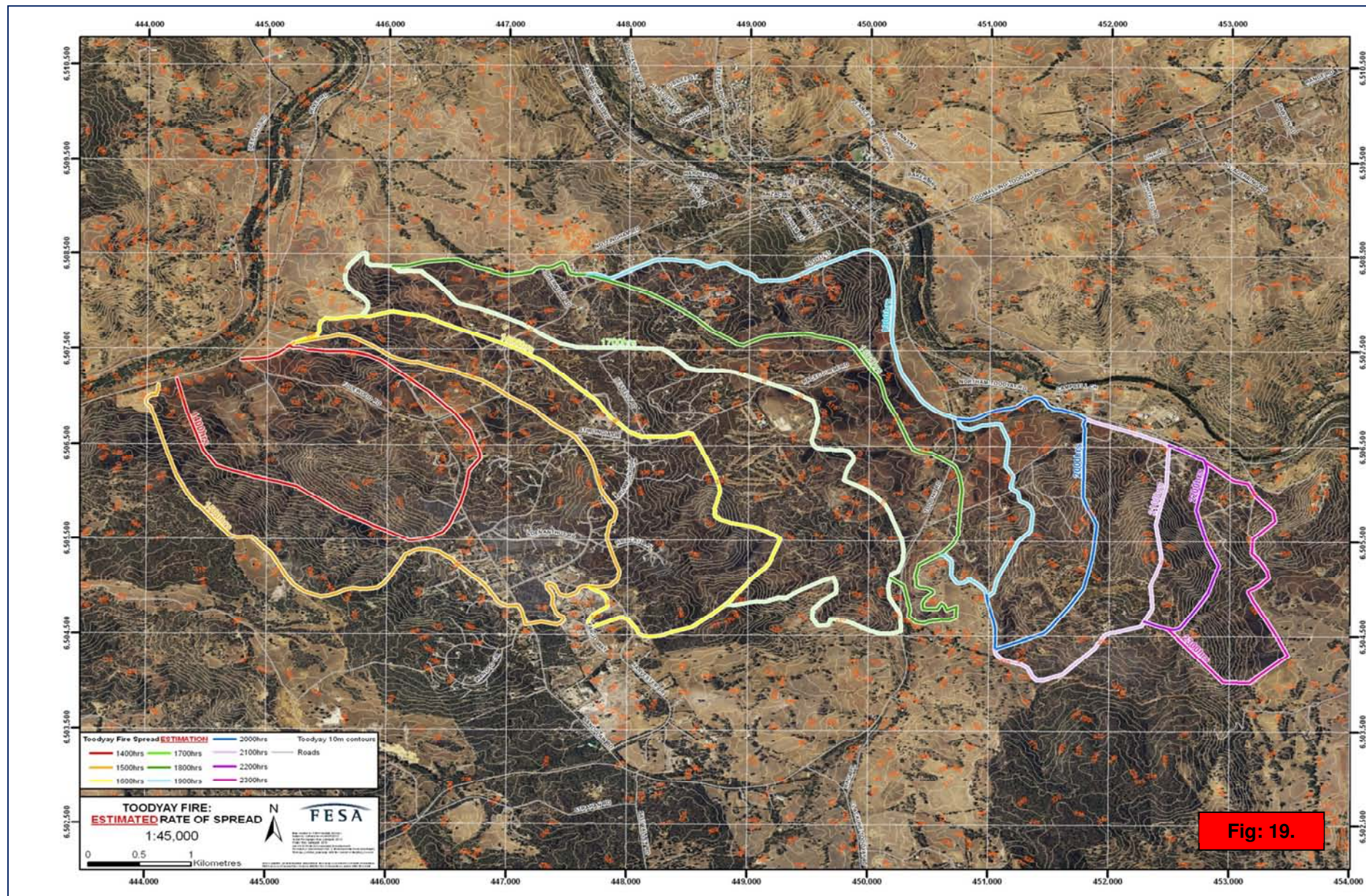


Fig: 20. TOODYAY FIRE: Estimated Rate of Spread.

Appendix 2 Fire Weather Warnings 29 December 2009.

IDW30000

Australian Government Bureau of Meteorology
Western Australia

FIRE WEATHER WARNING

Issued at 11:05 am WST on Monday, 28 December 2009

For the remainder of Monday

A SEVERE Fire Danger [GFDI 50-74] is forecast for the Central Wheat Belt and Central West districts.

For Tuesday

A CATASTROPHIC Fire Danger [GFDI 100+] is forecast for Central Wheat Belt, Great Southern, South Coastal and Southeast Coastal districts, and the inland sub-district of the Central West.

A SEVERE Fire Danger [GFDI 50-74] to EXTREME Fire Danger [GFDI 75-99] is forecast for inland sub-district of the Lower West, including the Metro Hills, and the coastal sub-district of the Central West.

If you are in a CATASTROPHIC Fire Danger area:
FESA advises some fires will be unpredictable, difficult to control and move very fast.
The safest place is to be away from a fire.
You may choose to leave for a safer place the night before or early on the day.

If you are in an area of SEVERE to EXTREME Fire Danger area:
FESA advises some fires will be unpredictable, difficult to control and move very fast.
If a fire starts and you plan to go to a safer place, leave hours before a fire reaches you.
Only stay if your home is well prepared and constructed, and you can actively defend it.
If you are in doubt about defending your home, leave.

For further bushfire advice and information on total fire bans go to:
www.fesa.wa.gov.au

Synoptic Situation

Very hot conditions with fresh N/NE winds, becoming strong and gusty NE/NW'ly on Tuesday.

The next warning will be issued by 4.00 pm WST Monday.

This warning is also available through TV and radio broadcasts; the Bureau's website at www.bom.gov.au or call 1300 659 213.
NNNN

IDW30000

Australian Government Bureau of Meteorology
Western Australia

FIRE WEATHER WARNING

Issued at 3:40 pm WST on Monday, 28 December 2009

For the remainder of Monday

A SEVERE Fire Danger [GFDI 50-74] is forecast for the Central Wheat Belt and Central West districts.

For Tuesday

A CATASTROPHIC Fire Danger [GFDI 100+] is forecast for Central Wheat Belt, Great Southern, South Coastal and Southeast Coastal districts, and the inland sub-district of the Central West.

A SEVERE Fire Danger [GFDI 50-74] to EXTREME Fire Danger [GFDI 75-99] is forecast for inland sub-district of the Lower West, including the Metro Hills, and the coastal sub-district of the Central West.

If you are in a CATASTROPHIC Fire Danger area:
FESA advises some fires will be unpredictable, difficult to control and move very fast.
The safest place is to be away from a fire.

You may choose to leave for a safer place the night before or early on the day.

If you are in an area of SEVERE to EXTREME Fire Danger area:

FESA advises some fires will be unpredictable, difficult to control and move very fast.

If a fire starts and you plan to go to a safer place, leave hours before a fire reaches you.

Only stay if your home is well prepared and constructed, and you can actively defend it.

If you are in doubt about defending your home, leave.

For further bushfire advice and information on total fire bans go to:
www.fesa.wa.gov.au

Synoptic Situation

Very hot conditions with fresh N/NE winds, becoming strong and gusty NE/NW'ly on Tuesday. Isolated high based thunderstorms are also possible over some parts.

The next warning will be issued by 4.00 am WST Tuesday.

This warning is also available through TV and radio broadcasts; the Bureau's website at www.bom.gov.au or call 1300 659 213.
NNNN

IDW30000

Australian Government Bureau of Meteorology
Western Australia

FIRE WEATHER WARNING

Issued at 3:15 am WST on Tuesday, 29 December 2009

For Tuesday

A CATASTROPHIC Fire Danger [GFDI 100+] is forecast for Central Wheat Belt, Great Southern, South Coastal and Southeast Coastal districts, and the inland sub-district of the Central West district.

A SEVERE Fire Danger [GFDI 50-74] to EXTREME Fire Danger [GFDI 75-99] is forecast for inland sub-district of the Lower West district, including the Metro Hills, and the coastal sub-district of the Central West district.

If you are in a CATASTROPHIC Fire Danger area:

FESA advises some fires will be unpredictable, difficult to control and move very fast.

The safest place is to be away from a fire.

You may choose to leave for a safer place the night before or early on the day.

If you are in an area of SEVERE to EXTREME Fire Danger area:

FESA advises some fires will be unpredictable, difficult to control and move very fast.

If a fire starts and you plan to go to a safer place, leave hours before a fire reaches you.

Only stay if your home is well prepared and constructed, and you can actively defend it.

If you are in doubt about defending your home, leave.

For further bushfire advice and information on total fire bans go to:
www.fesa.wa.gov.au

Synoptic Situation

Very hot conditions with fresh N/NE winds, becoming strong and gusty NE/NW'ly on Tuesday. Isolated high based thunderstorms are also possible over some parts.

The next warning will be issued by 4.00 pm WST Tuesday.

This warning is also available through TV and radio broadcasts; the Bureau's website at www.bom.gov.au or call 1300 659 213.
NNNN

IDW30000

Australian Government Bureau of Meteorology
Western Australia

FIRE WEATHER WARNING

Issued at 3:50 pm WST on Tuesday, 29 December 2009

For the remainder of Tuesday

A CATASTROPHIC Fire Danger [GFDI 100+] continues for the Central Wheat Belt, the Upper Great Southern, Roe and Lakes sub-districts of the Great Southern, the eastern South Coastal and the Southeast Coastal districts, and the inland