

TREE HAZARD PICTORIAL GUIDE

LOOK UP - LOOK DOWN - LOOK AROUND



FOREST FIRE
MANAGEMENT VICTORIA

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FIRST ATTACK GUIDE – SYSTEM OF WORK



INITIAL ATTACK

Clear & Present Danger (CPD) trees, also known as Killer (K) trees must be identified continuously using Dynamic Risk Assessment (DRA).

Consider moving the control line to an area with reduced numbers of hazardous trees.

IDENTIFY then **EXCLUDE** or **REMOVE** and **COMMUNICATE**



All crews can and should identify K trees as part of DRA

THE K SYMBOL



Marked on two
sides of tree if
safe to do so



30cm
K symbol only



Clearly visible
from control line

1.5m off the ground or
at visible height



K TREES

- Identify on foot
- Crews must be isolated from the hazard by establishing an exclusion zone or other method (eg. road closure)
- If falling the tree, the use of appropriate machinery is the preferred and safest method
- Accredited fallers are the next safest option (advanced or intermediate)

2 tree lengths

Shorter away from lean

Longer with downslope lean

EXCLUSION ZONES

- Perimeter clearly marked
- Generally 2 tree lengths around a Killer tree, could be more if tree will slide towards work area, or less if tree will fall away from work area
- Block access
- Ensure responder safety
- Use yellow and black tape
- Remove when no longer a hazard

POST FIRE FIELD GUIDE - SYSTEM OF WORK

BEFORE MOP UP

Tree hazard must be thoroughly assessed on foot and methodically treated.

ASSESS then EXCLUDE or REMOVE



Only **qualified** or **experienced** persons can **assess** trees **after** initial attack phase is complete

HOW FAR?

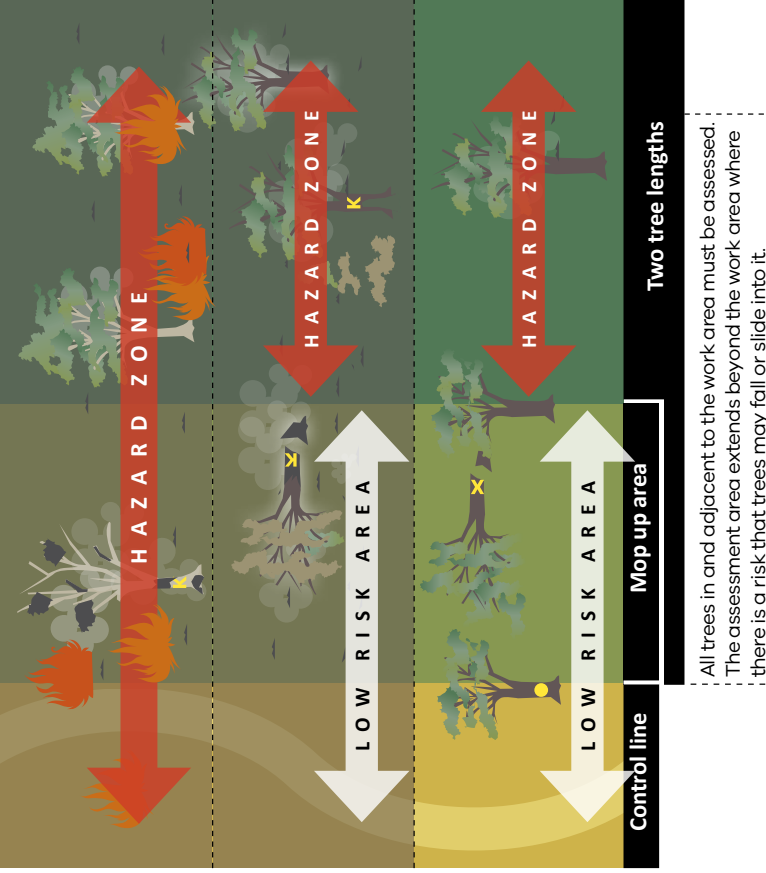
- Proposed 'work area' (eg: mop up depth)
- Where there is a risk of trees falling or sliding downhill into the work area, that area must also be assessed and treated.
- Example: Killer Trees that have likely impact zones in the work area though heavy lean or significant slope are excluded for the duration of the operation.
- Consider topography and forecast weather conditions when planning for areas to be assessed and treated.
- Consider excluding low priority work areas (eg: internal roads / tracks) completely that are not priority work areas, but could be accessed by personnel for various reasons (eg: shortcut across fire)

"A **low risk** work area is an area that has had a level of hazardous tree treatment (risk reduction) performed. There may still be some risk of falling limbs or branches and as such DRA and Situational Awareness must be maintained."

Initial attack use
DRA, identify
and treat all K
trees as they are
found

Post fire with
assessment and
treatment of the
work area

Preparing for
backburning



CLEAR & PRESENT DANGER (CPD) TREE OR KILLER TREE



BEFORE APPROACH, ASSESS DIRECTION OF FALL

 DEFINITION	A tree or branch that is likely to fall within the expected timeframe of the current operation and impact personnel in its potential impact zone.
 HAZARD STATUS	 EXTREME
 MARKING SYMBOL	 YELLOW K

DESCRIPTION

Tree is on fire (actively burning) and not able to be extinguished safely and reliably and will be weakened to failure point by fire. **or**

Tree has incurred severe structural damage by recent fire and appears very unstable. **or**

Tree has been impacted by some other factor and appears likely to fail within the timeframe of the current operation (backed into by bulldozer, damaged by nearby tree fall).

INSTRUCTIONS



**HT
ASSESSMENT
CREW**

Only approach and mark tree if safe to do so. Mark with a yellow 'K' and establish an exclusion zone around potential impact zone. Another treatment option is to re-route the control line away from the potential impact zone.



**FIRELINE
PERSONNEL**

Already too dangerous to work under. Ensure taped-off exclusion zone for personnel and vehicles (unless specifically approved for the task of removing the tree) is established and maintained until the tree falls or can be removed.



**PLANT
OPERATOR
OR FALLER**

Remove with extreme caution only when safety can be assured.

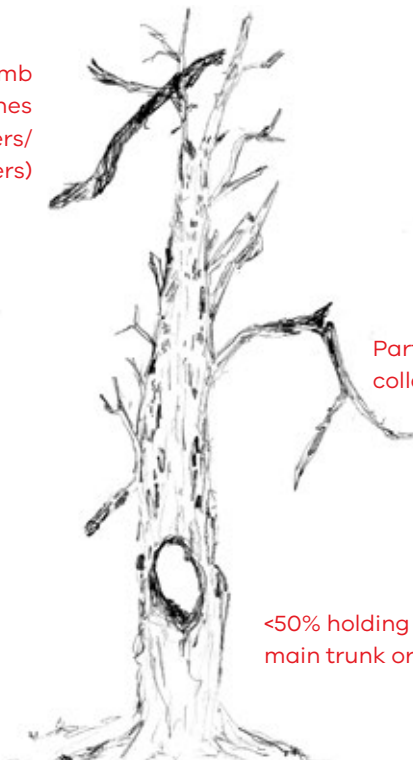
Wherever possible removal by plant is preferred to hand falling.

CHARACTERISTICS OF A KILLER TREE



Characteristics describe specific features of individual trees that can affect the structural stability of that tree. Refer to the below characteristic examples for 'Killer trees' (K trees).

Suspended limb
or branches
(Widow makers/
hangers)



Partial limb
collapse

<50% holding wood on
main trunk or major limb

Dead trees, or majority
dead crown (>50%)

Heavy
directional
lean

Active fire burning
continually inside tree or
at major limb junction

Ground heave
(indicates
unstable roots)

Eroded or very loose soil around tree roots (very evident post fire)

POTENTIAL CPD – PROTECTION NOT ASSURED



Q DEFINITION

A tree which in its current state **does not appear hazardous**, but **may become a CPD tree** if it catches alight or is impacted by wind or other fire related disturbance. It **does NOT have a high probability of surviving the fire** intact based on the proposed protection measures and likely response resources available. or

A tree which in its current state may in part or wholly **fall and impact personnel in its potential impact zone** (but is not considered to do so during the expected time frame of the current operation).



**HAZARD
STATUS**



INCREASED HAZARD

Deemed to have, or present evidence of increased hazard.



**MARKING
SYMBOL**



YELLOW CROSS

DESCRIPTION

Trees with a stem or branch greater than 10cm in diameter above shoulder height and are assessed to be at risk of partial or total collapse based on (but not limited to) one or more of the following indicators:

- Dead and /or decaying.
- Suspended loose or broken branches.
- Significant lean with a recent cause or indicators of failure.
- >50% decrease in sound and solid cross section at any point in the main trunk or major branch.
- Evidence of longitudinal cracking, or a weak fork.
- Evidence of the roots lifting, or an under cut or disturbed root system.

INSTRUCTIONS



HT ASSESSMENT CREW

Mark with a yellow 'X' for removal. If there is doubt about the tree being hazardous or not, apply a 'safety-first' approach and mark for removal. Note: Small trees may burn through quickly. Trees may fall uphill under the influence of strong wind.



FIRELINE PERSONNEL

Ensure tree removal as soon as practicable. If tree has deteriorated, reclassify to CPD and create an exclusion zone. Tree presents significant additional risks but is currently assessed as unlikely to fall during the current operation; may be worked under with caution following dynamic risk assessment during fire emergencies as necessary. Monitor condition to ensure tree has not caught alight or deteriorated to a Killer tree.



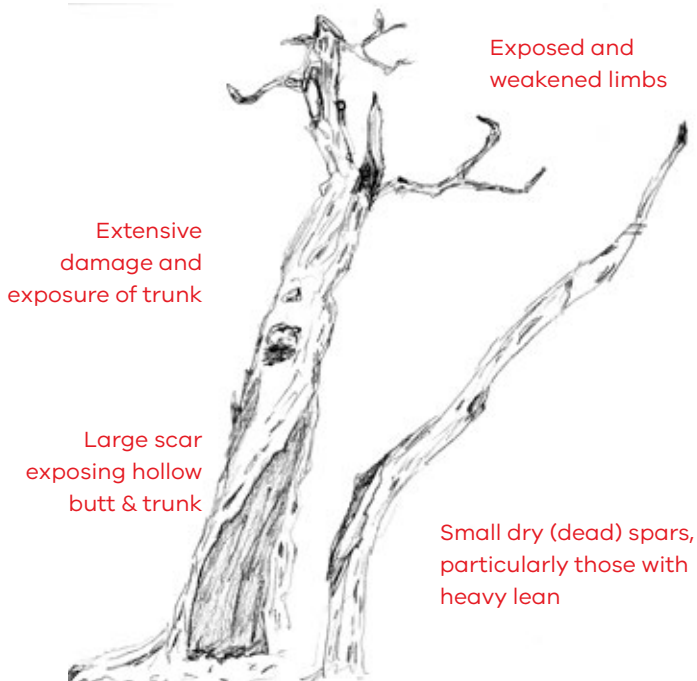
PLANT OPERATOR OR FALLER

Remove, provided the operator or faller deems it safe to do so.

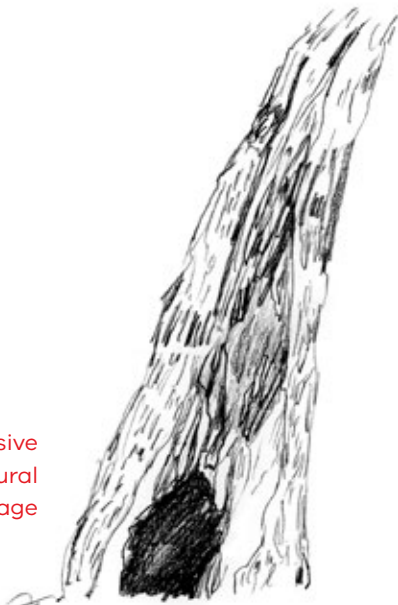
CHARACTERISTICS OF A POTENTIAL CPD – PROTECTION NOT ASSURED TREE



Characteristics describe specific features of individual trees that can affect the structural stability of that tree. Refer to the below characteristic examples of 'Protection NOT assured' trees (X trees).



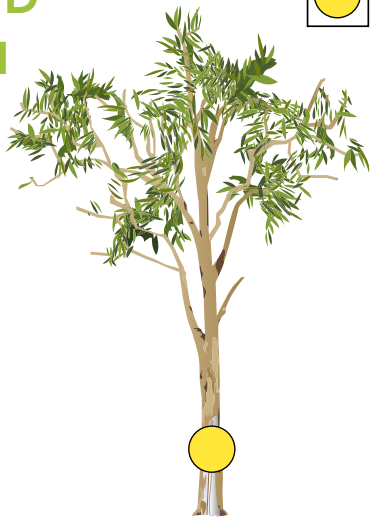
Extensive
structural
damage



CONSIDER:

- Removal of these trees before fire reduces the number of Killer trees crews need to exclude and treat during and after fire.
- What treatment resources will you have during and after fire to treat Killer trees?
- Does the tree have any particular value (eg: habitat or high conservation values, aboriginal scar tree) to justify retaining it? Can protection of crew from the tree be assured?
- Could trees fall from outside the work area and impact the work area?

POTENTIAL CPD – PROTECTION ASSURED



Q DEFINITION

A tree which in its current state does not appear hazardous, but may become a CPD tree if it catches alight or is impacted by wind or other fire related disturbance.

The tree has a high probability of surviving the fire intact based on the proposed protection measures and likely response resources available.



HAZARD STATUS



LOW

But the risk could rapidly rise if tree becomes fire affected or through other operations.



MARKING SYMBOL



YELLOW DOT

DESCRIPTION

Tree has a number of the following:

- Exposed butt scars
- Hard to reach elevated hollows
- Small diameter and surrounded by accumulated heavy fuel.

INSTRUCTIONS



HT ASSESSMENT CREW

Mark with a yellow '•' provided tree can be reliably protected from fire by measures and resources available. If not able to be protected, tree should be marked for removal. Tree can be safely worked under.



FIRELINE PERSONNEL

Pre-Fire - Clear around and protect from fire; **normal precautions**; ensure tree does not catch fire; tree may be worked under. Additional actions such as **ground applied retardant** or wetting down, **pre-fire candling** under controlled conditions and intensive patrol may be requested.

Post Fire - If protection fails and tree catches alight, it should be fully extinguished as soon as possible, if safe to do so. If the tree cannot be reliably and fully extinguished, and threatens the work area, it becomes a CPD tree and is treated accordingly (marked and excluded) with a K.



PLANT OPERATOR OR FALLER

Provide adequate width of mineral earth break around tree to protect it from anticipated fire conditions. This must be achieved without damage to the tree, including the roots.

CHARACTERISTICS OF A POTENTIAL CPD – PROTECTION ASSURED TREE



Characteristics describe specific features of individual trees that can affect the structural stability of that tree. Refer to the below characteristic examples of 'Protection assured' trees (Dot trees).



Small scar
exposing
hollow butt



Small Scar or 'Dry side'
exposing dead trunk wood



Heavy bark fuels loaded in limb forks
(These can catch fire and cause limbs
to weaken and fall)

CONSIDER:

- What is the overall fuel hazard in the area?
- What is the likely fire behaviour going to be near the tree to be protected?
- What resources will be available to actively protect trees in this area?
- What characteristic of the tree are you protecting from fire?
- Can patrol crews sufficiently protect this tree during a fire?

THE DOT SYMBOL IS NOT USED TO MARK TREES THAT MAY CAUSE FIRE CONTROL ISSUES (EG: SPOTTING)

CONSIDER THE USE OF GROUND APPLIED RETARDANT, A WINTER CANDLING OPERATION OR MODIFY THE IGNITION PATTERN AND BRIEF / TASK CREWS TO ADDRESS BARK SPOTTING CONCERNS

GOOD TREE PROTECTION STRATEGIES SHOULD HAVE THE FOLLOWING ELEMENTS:

- Thorough pre-fire preparation works , sufficient for the local fuel loads.
- Experienced lighting crew (adjusting lighting pattern to limit fire exposure to protected trees).
- Active patrol crews, to stop protection assured trees becoming involved to fire.

SOUND TREE



DEFINITION

An assessed sound tree that is **not currently hazardous** and is not likely to become a CPD tree when exposed to fire or other disturbance associated with the incident.



**HAZARD
STATUS**



LOW



**MARKING
SYMBOL**

NO MARK

DESCRIPTION

Tree appears 'sound' with no obvious defects which would significantly weaken the trunk or allow entry of a fire.

No large dead branches or widow makers present.

INSTRUCTIONS



**HT
ASSESSMENT
CREW**

- Carefully check both sides of tree for criteria matching potential CPD or CPD trees.
- Assessed and deemed sound.
- If in doubt regarding its soundness, err on the side of firefighter Safety.



**FIRELINE
PERSONNEL**

Normal precautions, tree may be worked under.

Dynamic Risk Assessment (DRA)



**PLANT
OPERATOR OR
FALLER**

None (although tree removal may be required for other control line construction purposes).

TREES WITH HANGERS

Hangers are limbs which are hooked up or tangled in other limbs and can be dislodged by external factors (wind, impacts from machinery other trees, fire) during the operation.

BEFORE FIRE

Hangers should be assessed by a qualified or experience person.

INSTRUCTIONS



**HT
ASSESSMENT
CREW**

When assessing trees with hangers consider:

- If the hanger falls will it impact the work area?
- How well secured is the hanger?
- How sound is the tree itself?
- What affects could the fire or operational influences have on the hanger?
 - Could it burn through?
 - Can the updraft from the fire loosen it?
 - Could it be impacted by other trees, or other means?
- What treatment options are available?

Reducing the number of hangers in the proposed work area before fire will reduce the number of hangers potentially collapsing during and after fire.



**MARKING
SYMBOL**



Mark the tree containing the hanger an 'X' and a yellow arrow pointing to the location of the hanger.

Do not mark trees with hangers with a 'H' as this is the mark for Habitat trees.

DURING & AFTER FIRE

Hangers that are assessed as being at risk of collapse during the timeframe of operation and have potential to impact the work area need to be marked and treated, if safe to do so.

Trees with hangers do not necessarily need to be felled, but the hazard needs to be marked and excluded with hazard tape as a minimum treatment.

? MARKING SYMBOL



Mark the tree with the hanger with an 'K' and an arrow pointing toward the hanger.

Treatment options include:

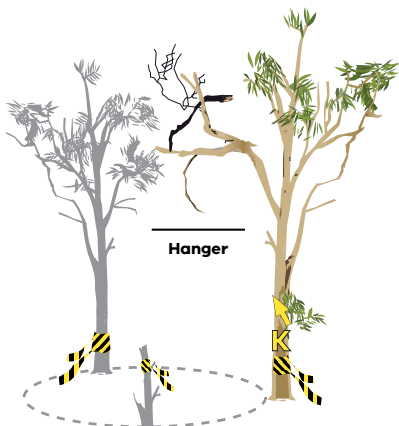
Elimination of the hazard Remove the hanger, or the tree with the hanger

Isolation of the risk by exclusion zone

Exclude personnel and vehicles from the potential impact area using yellow and black barrier tape.

Isolation Relocate the work area away from the hanger.

If the tree containing the hanger is also structurally unsound, apply the mark and treatment options for a Killer tree.

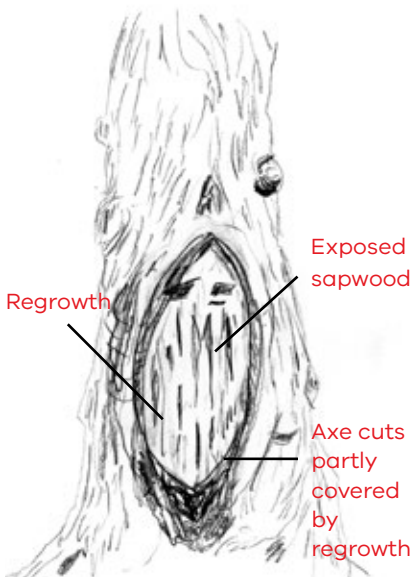


ABORIGINAL SCARRED TREES

WHAT IS A SCARRED TREE

Aboriginal people caused scars on trees by removing bark for various purposes. The scars, which vary in size, expose the sapwood on the trunk or branch of a tree.

Scars can be caused by other means, such as lightning strikes, branch tears, fire damage, insect damage, abrasion – caused by natural and un-natural events (example: prolonged rubbing of one tree on another, or a sudden and massive impact from another tree or other solid object) and early European settlers.



HOW TO IDENTIFY ABORIGINAL SCARRED TREES

When determining if a scar is deliberate in nature, look for the following characteristics:

- Is the scar symmetrical in nature?
- Is the scarred tree >80 yrs old?
- Are there signs of tool marks on the scarred area?
- Is the scarred area significantly weathered?

Consider the local environment the scarred tree is located in and the species of the scarred tree. Only native trees will exhibit scars made by Aboriginal people.

**IF YOU ARE UNSURE OF THE CAUSE OF A
SCARRED TREE AND SUSPECT IT TO BE MADE
BY ABORIGINAL PEOPLE – ASSUME THAT IT IS
AND ACT ACCORDINGLY**



Actions to take in managing scarred trees

- Report the location (grid ref) to your fire ground supervisor (who will then inform the Incident Controller) and nearby crews.
- Establish a 50m 'no machine work' buffer either side of the tree using forestry flagging tape (pink tape).
- Protect the tree from fire, if safe to do so.
- If the scarred tree is also a Killer Tree, establish an exclusion zone.



Actions to avoid

- Spraying any mark onto a scarred tree.
- Use of plant to remove trees within 2 tree lengths from the scarred tree.
- The use of plant to clear around the base of a scarred tree

FIREFIGHTER SAFETY IS PARAMOUNT

Every effort will be made to retain scarred trees, however they may need to be removed if firefighter safety cannot be assured

Source: Scarred Trees – An Identification and Recording Manual, 2003.

FALLER RANGE DESCRIPTOR

The faller range statements are included for reference. Fireline supervisors shall consider the abilities of both intermediate and advanced fallers when allocating tasks on the fireline.

INTERMEDIATE

Trees typical to the scope of this unit may include the following characteristics:

- lean and weight distribution, which can be assessed and readily adapted to falling direction with the use of wedges and/or control with hinge-wood
- various dimensions relative to local forest size distribution
- limited visible damage or defect
- species prone to free splitting and adverse reactions during felling
- single or multi-stems
- diameter of tree greater than chainsaw bar length
- grown on terrain and slope that can add complexity to the operation

FALLER RANGE DESCRIPTOR

The faller range statements are included for reference. Fireline supervisors shall consider the abilities of both intermediate and advanced fallers when allocating tasks on the fireline.

ADVANCED

Trees typical to the scope of this unit may include the following characteristics:

- lean and weight distribution that adds significant complexity yet can be assessed and adapted to site requirements
- larger dimensions relative to local forest size distribution
- substantial lean
- damage or defect that requires complex felling techniques
- multi-legged, hollow butts, culls and stags
- species prone to free splitting and adverse reactions during felling
- single or complex multi-stems
- diameter of tree greater than chainsaw bar length
- grown on terrain and slope that can add significant complexity to the operation



Actively burning trees (eg: trees that have fire burning internally within the trunk, roots or limbs) are very high risk of sudden collapse. Refer to Work Instruction 4.5.3.15 for guidance on treatment by removal

Reference: FWPFGM3213 Fall trees manually (advanced).

Refer to WI: 4.5.3.15 – Hand Falling actively burning clear and present danger trees.

INITIAL RESPONSE IN VERY HIGH TREE HAZARD AREAS

The below is to prompt thinking and decision making. Considerations are ordered in increasing importance. Weighting should be given to most reliable information to determine if the tree hazard is very high.

Is the hazard tree risk level very high?

- ☐ Does the modelled tree risk data available on eMap predict a very high risk level?
- ☐ Does local knowledge indicate that the fire ground is dominated by hazardous trees overhead?
- ☐ Does aerial observation of the fire ground indicate that the majority of trees appear hazardous, dead, or dead topped?
- ☐ Do ground observations report the area is dominated by hazardous trees with most sites having hazardous trees?
- ☐ Do fire crew report tree hazard of a size or distribution that the ground crews cannot readily avoid working in the exclusion zones around any CPD trees which are burning or weakened by the fire?

IF ANY OF THESE ARE ANSWERED AS 'YES' THEN THE TREE HAZARD IS VERY HIGH

There are 3 pre-determined strategies for managing bushfire in VHTH areas. Below are the considerations for the Plant Only strategy.

Source: [Considerations for Initial Response in Very High Tree Hazard, 20-CHK-4.4.1.4, Bushfire Management Manual –4 Response.](#)

Considerations for Pre-determined Strategy (Plant Only)

1	Situation	Is the fire well established but still currently small and accessible?
2	Heavy Plant Capability	Do you have access to suitable plant in sufficient numbers to facilitate off-siding of each other?
3	Operator Experience	Are plant operators competent and safe-to-work without direct on-ground support and supervision?
4	Staging Areas	Has the clearing of VHTH around staging areas (and their access) been planned? (Required for plant refuelling / maintenance in proximity to fire)
5	Communications	Do plant have GPS and VHF radios for comms with IC, fireground and aircraft?
6	Safety Zones	Has the clearing of VHTH around safety zones (and their access) been identified and planned? Do you have triggers when to use safety zones?
7	Medivac	Has a feasible, effective and safe medivac plan been established which will not expose medical staff to the risks of tree fall?
8	Aircraft	Are aircraft and air observers available and tasked to support the plant? (fire intel, directions to operators, strengthening safety zones or slowing fire fronts with air attack) Is a plan in place to withdraw plant (to safety zones etc) should aircraft become unavailable?
9	Logistics	Are plant operators self-sufficient for meals / hydration for duration of shift?

TREATMENT OPTIONS

ELIMINATION

1. **Hazard trees should be machine felled where ever possible.**

Removal of the hazard by downing trees is the preferred method of treating the hazard.

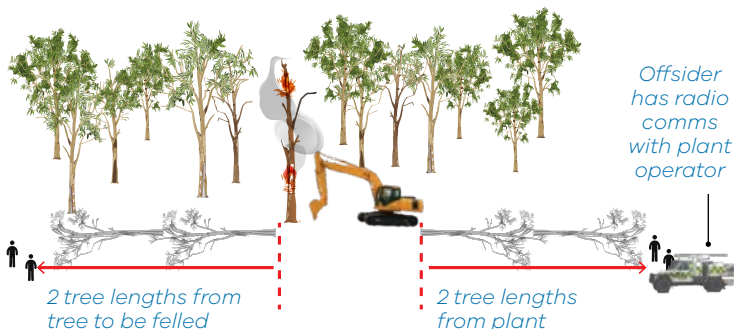
Hand falling of hazard trees should be avoided unless it is both essential and safe to do so in accordance with the dynamic risk assessment process.

Only intermediate and advanced fallers may hand fall hazard trees within the range limits of their competency.

The use of mechanical harvesters to fall actively burning trees should be avoided due to exposed hydraulics and the risk of the feller head catching fire

2. **Extinguish** in-situ if safe to do so.

If a tree has been successfully extinguished, it should be re-assessed to determine if it has become a Killer tree.



TREATMENT OPTIONS

SUBSTITUTE

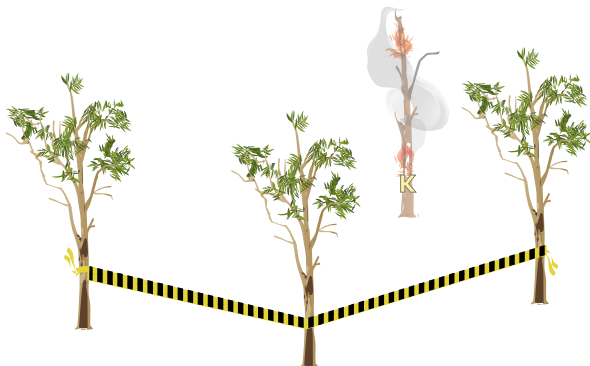
Move or **abandon** the control line if CPD trees cannot be eliminated. Construct or select an alternative location for a control line.

ISOLATE

Isolate CPD trees by locally re-aligning the control line (to provide at least a 2 tree length separation) or by establishing an exclusion zone. Generally, an **exclusion zone** shall be a distance of at least 2 tree lengths around a tree hazard or less if the tree will fall away from the work area

The actual distance in each instance is determined by site factors such as slope and may be larger (or in some rare instances smaller) than 2 tree lengths.

The perimeter of an exclusion zone is marked using yellow and black hazard tape on sufficient individual trees to indicate its extent.



TREE HAZARD MANAGEMENT

- IMT

Personnel involved in operational command on the fire-ground or IMT, are to consider the following:

STRATEGIES:

- Has tree hazard been considered in the options analysis?
- Consider tree hazard for crews access to fireground
- Is the fire located in or near a Very High Tree Hazard area?
- Do fire line resources have a safety zone free from tree hazard to stage from?



TREE HAZARD MANAGEMENT

- IMT

INFORMATION FLOW:

- Is the forecast weather going to be different than what is in the IAP? Could this impact hazardous tree management on the fire ground?
- Has this info been communicated to the fire ground?
Consider Field Information Update or Red Flag Warning.
- Has the IMT been advised on tree hazard on the fireline?
- Has the IMT been updated on progression of hazardous tree assessment and treatment?
- Has tree hazard been reported in Situation Reports from the IMT?
- Are key IMT functions sharing information on tree hazard management at the incident? (Operations / Plant Operations / Planning / Logistics / Safety Officer)

RESOURCING:

- Are operations adequately resourced to manage the scale of hazardous trees across the fire ground?
- Is the IMT adequately resourced to manage the amount of hazardous tree work being conducted?

MAINTAIN SITUATIONAL AWARENESS

RESPONDER SAFETY IS PARAMOUNT

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Printed by (insert printing company name, suburb).

ISBN 978-1-76047-588-8 (print)

ISBN 978-1-76047-589-5 (pdf/online)

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Version 1 - 2017