Fire Management Guidelines for Small Forests

National Rural Fire Authority 2010

Contents

List of annexes available at the National Rural Fire Authority website, www.nrfa.org.nz

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Introduction

This guide is for owners of small forests – and by small, anything from a few trees to over 100 hectares, is considered a small forest. Whether you own or manage an exotic or indigenous forest, protecting it from fire is critical to realising the full value of your trees or site values.

This guide has been developed by the National Rural Fire Authority to help reduce the chances of a wild fire, and how to prepare for one should it occur. If you use the guidelines, and the web references, you will be better placed to prevent and deal with such fires quickly.

Preventing forest fires

Fires are more likely to occur on:

- **north facing sites** - the sun warms such sites and dries both ground and vegetation much faster than southern faces
- **sites with higher temperatures** - these sites dry out faster than cooler wetter sites, making more fuel available to feed the fire
- **sites experiencing lower relative humidity** - fire burns more vigorously in low relative humidity, so sites are at risk in dry weather, even cold sites, such as high altitude hill country
- **windy sites** - if fire starts on such sites, it will spread faster, cause more damage and be harder to put out than at calmer sites. Don't burn on windy days
- **sites well hidden from public view with good road access** - these sites are favoured for burning out stolen motor vehicles or working on illegal activities such as growing cannabis.

Select less burnable species

Nearly all woody tree species will burn. Even trees that are reluctant burners may catch if the understory is full of plants that burn well. To reduce the risk, consider controlling the understory weeds.

As the chart below indicates, many of New Zealand's exotic species burn more readily than many native tree species.

Does not burn well **Average burn** **Burns well**

0 1 2 3 4 5 6 7 8 9 10

	Douglas fir.	*Pinus Radiata.*		*Eucalyptus sp.*
	Tasmanian blackwood.		*Cypress sp.*	
Kotukutuku (Fuchsia)	Kamahi	Tawa	Totara	Kanuka.
Broadleaf (Griselinea)	Ngaio	Rimu	Tree ferns.	Manuka.
				Hakea. Gorse.

Lower fire risk **High fire risk**

Reduce your risk by:

- planting a buffer of less easily burned native species around your trees. Make the buffer 10 to 20 metres wide against road edges or vulnerable boundaries
- clear any gorse near or under your trees, and keep it cleared
- when planting your forest, choose species that have a lower burning risk.

Tend your forest in a way that reduces risk

The way that you tend to your forest and the season can increase or reduce the risk of a fire. For example, if you thin in autumn, you reduce the risk; thin in summer and you increase it. Broadcasting fertiliser in a very young forest will cause weeds and grass to grow vigorously, increasing the amount of fuel available; applying fertiliser to each tree will promote tree growth rather than weed growth.

Reduce your risk by:

- Considering the amount of available fuel resulting from any tending operation, and planning the timing or method to reduce or remove it
- Pruning trees close to road edges so that fires can't use weeds on verges to travel through a forest
- Stopping mechanical operations when fire danger is extreme or very high. To check fire danger status, see 'Fire Weather/Season' on www.nrfa.org.nz
- Keeping Vegitation away from power wires

Keep 'fire starters' out of your forest

Humans start most fires. Try to stop escapes from controlled burns and illegal activities, and carefully manage machinery operation, recreational use and other potentially harmful activities in your forest.

Discourage illegal activities

Make it difficult to park a stolen vehicle and burn it out, to use your forest for drug cultivation, or to deliberately set a fire.

- Improve property security. Limit trespassers and perhaps encourage approved access. Locked gates or barriers such as drains, concrete blocks or large trees across entry points will limit vehicles and reduce fire opportunities for vandals, as will encouraging sensible folk to visit your land. (Use the Trespass Act 1980 if necessary. The Act is available from Government Bookshops, phone 04 499 3433).
- Have sound gates, fences or barriers; minimise gorse; and have friendly, responsible and cooperative neighbours. Consider being part of a Neighbourhood Watch.

Avoid escaped controlled burns

About 20 percent of wildfires are managed fires that have escaped. If you or your neighbours are burning off, ensure that the burn is under complete control at all times.

Before starting a controlled burn:

- establish fire breaks
- seek advice from your local Fire Authority
- check the long-range weather forecasts and fire season status

- if the fire season status is restricted, get a fire permit from your Fire Authority. Ensure you comply with any special conditions on the fire permit
- tell all the neighbours what you are planning, and when
- select a suitable time of day when conditions are less severe.

Ensure machinery is operated safely

When machinery is being used in your forest, ensure that:

- bulldozers, excavators or trucks are well maintained and have suitable fire extinguishers on board
- machines are clean and have no oil or fuel leaks; turbo-charged or fitted with a spark arrester; radiator clear of grass and fine twigs and so on. (Turbo-charged engines do not emit as many large cinders as other engines)
- bulldozer belly pans are clean. Clear any sump oil, fine twigs and branches
- exhausts on all plant engines are not ported towards fine dry fuels nearby. (Make sure that contracts specify that exhausts

port in accordance with Forest and Rural Fires Regulation 2005, regulation 55, as a minimum.)

- machines have self-activating fire extinguishers, if possible
- chainsaws are fitted with spark arresters that trap or pulverise exhaust carbon particles. Work the saw at cooler times of the day in early morning and late afternoon. Halt operations if exhaust gasses cause fine fuels to smoulder. Clear all flammable material away from each saw cut and check for smouldering embers before moving to the next cut. Cool the saw before refuelling and refuel in a place free of combustable fine fuels. Clean spilt fuel from the engine before starting.
- persons using disc grinders or welding have suitable water supplies readily available at short notice, and a written authority from the forest owner. Work should be done in open areas and not too close to dry fuels such as browned off grass, Eucalypts or *Dracophyllum*. Please note that a fire permit may be required.

Ensure that recreational users behave safely

- Discourage recreational use during extreme fire danger.
- Instruct all children living in or visiting the forest area about fire safety.
- Gas-powered cooking stoves should be used rather than thermettes.
- Discourage irresponsible behaviour, such as:
  - four-wheel drive and motorcycle rallies in the forest without proper exhaust systems on vehicles
  - theft of signs describing the RAPID address or water points and the like
  - using an open flame anywhere near trees. This includes matches, fireworks, bonfires, blowtorches and so on. It is particularly important where there is long dry grass and steep slopes on northerly aspects
  - firearms using tracer ammunition or with coarse-grained gunpowder (Black powder).

Do your housekeeping

Manage the site by planting or clearing fire breaks, avoiding fuel continuity, and keeping the understory clear of flammable materials.

- Create firebreaks by planting forest edges with species that don't burn well, discing soil or creating an access road. Firebreaks are best constructed on ridgelines or property boundaries.
- Clear pruning/thinning slash from roadsides and prune lower branches to ensure that fire has no fuel to climb into the trees. Keep weeds down on the forest margins – grazing can help (you may need to ensure that your trees are not browse vulnerable).
- Less combustable plants, such as *Lotus major* or clover, often found on the sides of the road, also make effective fuel breaks.
- Avoid spilt oil and fuel. Don't dump fuel or grease containers. Remove or bury rubbish, including derelict cars, and old plastic, paper or wooden containers.

A forest property that looks untidy is a more likely target for arsonists than a well-kept and well-managed one.

IMAGE: Close-cropped roadside grass below these pruned stems makes for better fire protection than the site further down the road.

Avoid possible ignition points

- Keep vegetation clear of power wires. Fires can start if branches contact wires or wires contact one another to shed molten aluminium into dry vegetation (check with your local electricity authority if in doubt or refer to the Electricity (Hazards from trees) Regulations, 2003). See also the 'Electricity, Forests and Vegetation' section at the rear of this booklet.
- If you are having any tracks formed on your forest, ensure that the operator knows of any gas pipelines and contacts the pipeline owner.
- Avoid planting on sites where there may be pockets of natural gas. These can seep to the earth's surface and ignite. Several such sites are known in the eastern North Island.
- Avoid spontaneous combustion at sites where plenty of volatile fuels or finer fuels are present or buried (such as hay barns, wood processor sites at skids or landings). For example, reduce the amount of foliage and light branches about skid sites by putting it back into the forest. Make sure that steel ropes are not buried near fine fuels.
- Don't use explosives in elevated fire danger periods. Check conditions with your Fire Authority.
- Don't use tin lids or other reflective surfaces that might act as magnifying glasses and start fires. Phosphorus bait can be laid on an overturned earth sod instead of a tin lid (and later buried under the replaced sod), or alternative poisons can be used. Keep the site clean of bottles and other reflective items.

Lightning strikes

Lightning strikes can happen in warm dry weather with the passage of cold fronts. While there is nothing to stop lightning from starting a fire, some of the ideas above will help to reduce the amount of fuel, and therefore limit the seriousness of the fire.

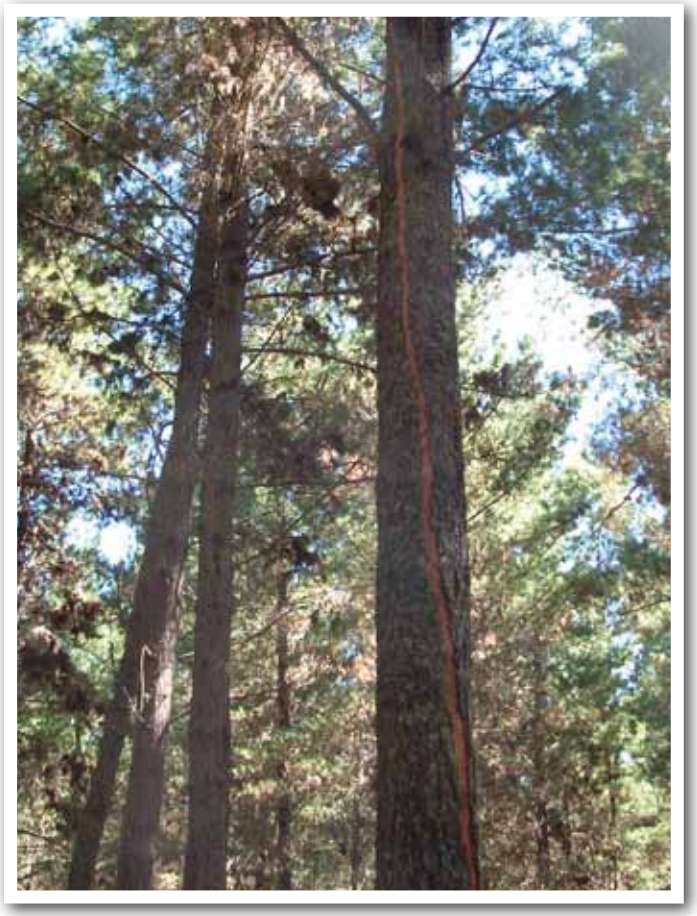


IMAGE: This lightning strike on the above mature tree resulted in a small fire because of dead plant material on the forest floor.

Preparing for fire

If a fire starts, it must be put out as soon as possible, before it spreads. You can help this to happen by preparing well in advance. Ensure easy site access, install good signage and have adequate water accessible.

Easy access

Make sure that firefighting equipment can get onto your site. Road surfaces must not be undermined and not have deep ruts cut by water. Long dry grass over steeper roads reduces traction and makes access dangerous. Compacted gravel road surfaces provide better grip than recently dozed moist surfaces or grass.

You'll need at least light truck access (4x4). This requires a road width of 4 metres with vegetation cut back to this width; road grades no greater than 1 in 4; and bridges capable of taking 2.5 tonnes laden weight. Turning areas of up to 5 metres must be available for a multi-point turn.

If you lack access to water or have a serious fire risk, you'll need large truck access (4x6 or 4x4). This requires a road width of 4 metres with vegetation cut back to this width and to a height of 3.4 metres; road grades no greater than 1 in 5; and bridges capable of taking 44 tonnes laden weight. This is what a transporter carrying a larger bulldozer could weigh. Turning areas of 12 metres for a multi-point turn are required – as you wouldn't want a stuck tanker up your drive!

Note: *some private rural roads and bridges are not constructed to the same standards as public ones. If in doubt, check before a vehicle gets stuck.*

Good signage

Firefighters need to know where to go. Have signs at entrance points and property boundaries. These are helpful and distinguish one property from another. RAPID numbers also need to be prominent to identify the property when a fire is reported. Have signs for:

- bridge weight limits
- water point access
- places where there are hazards that may not be known to strangers entering the property such as agrichemicals, fuel and electricity.

Suggestion: many of the signs you require can be purchased from industrial safety shops.

RFS14

RFS12

Adequate water

Water points should be easily accessible and clearly marked. They could include: streams, rivers, ponds, dams or tanks. Mark the major supplies of 'all year round' water. Ensure that:

- vehicles can access the water
- safe aircraft landing points are no more than 50 metres away from the supply point
- water points are well situated around a forest. Ideally, helicopter water sources should be within two minutes flying time of any part of the forest.
- the available water volume is sufficient to supply pumpable water at 30 litres per second to fill numerous tankers, many large monsoon buckets and hoses. A young forest may have adequate water now, but not in ten years if the trees have drawn it all up for growth
- the available water volume is greater in areas that are drier more often or have severe droughts, for example eastern vs. western New Zealand .

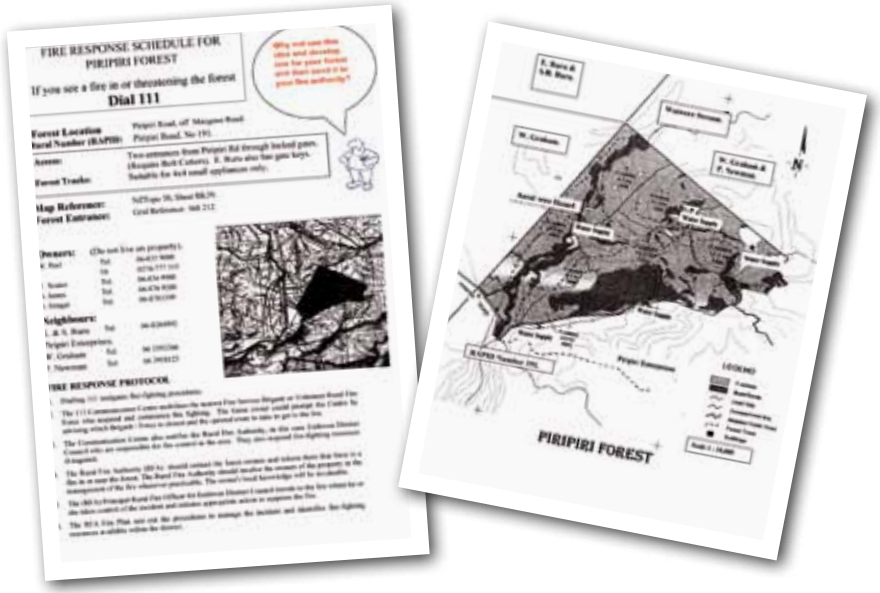
Larger capacity water points can ideally be located outside the forest area. Rubber lined dams are useful for providing water at high points. Fence these off, as stock will drink from them and cloven hooves destroy the liners.

If a dam is made, the regional council may need to be consulted prior to construction, depending on water volume held or catchment area.

IMAGE: Fire preparation - This forest access has a RAPID number clearly visible, a name on the letter box (other side), good road width and grade, no overhanging vegetation and easy access to the plantation for fire vehicles.

Fire Response Schedule

You can also prepare for fire by having a 'Fire Response Schedule' like the one below for your forest and distributing it to your rural fire authority and helpful neighbour.



Equipment for fighting smaller fires

If you intend to deal with a smaller fire yourself, you'll need suitable clothing and hardware. **Safety is extremely important in fire fighting.** Synthetic clothing (overalls, trousers, shirts, jackets and underwear) melt if exposed to radiant or direct heat. This can happen even under a layer of cotton or wool. Natural fibres are better for fire fighting. Leather gloves and sturdy footwear are a 'must'. **People with bare feet or jandals should not be allowed onto the fireground. Send them out of danger.** Hard hats or woollen balaclava, eye protection, first-aid kit and clean drinking water are also necessities for fire fighting. If a forest owner has any doubts about fighting the fire, leave it to the Rural Fire Authority.

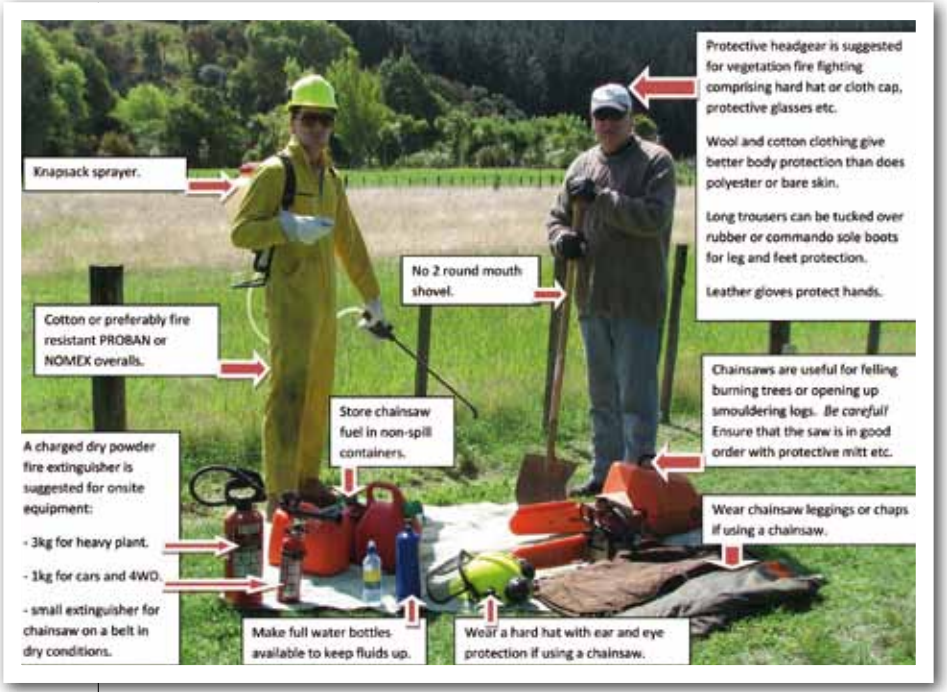


IMAGE: Basic Fire Equipment - Forest owners will have some basic equipment at hand for every-day work.

Knapsack water sprayers are cost effective on smaller fires. Larger or more extensive forest fires require specialised equipment and numerous people. Your Fire Authority has access to these resources. In an emergency, call them on 111 and find out their everyday telephone number beforehand.

Improve your chances of putting the fire out by:

- ensuring easy access, good signage and plenty of water
- having suitable clothing available before a fire
- having suitable fire-fighting equipment to effectively deal with a small fire
- calling your Fire Authority (dial 111) for help before any fire gets too large.

Managing the risks

A forest owner can minimise the risks and consequences of fire by effective use of neighbours, contractors and insurance.

Neighbours

A local community working in your favour is a great asset. Supportive neighbours are especially important when the forest owner is an absentee owner. Notifications of fire problems are more likely from good neighbours than official agencies. Forest owners should encourage:

- a strong, watchful and helpful local community. The forest owner needs to be a part of the community and support it if she / he expects support in return. The local community is likely to be a first responder to any wildfire on the property
- responsible site visitors.

Contractors

- Contractors work in many small forests doing a wide range of work. Their contracts should specify conditions for the safety of others, themselves and the forest. This is especially so with operators of heavy machinery and chainsaws. A sample schedule is available on the National Rural Fire Authority website as Appendix 3 to this guideline under 'Publications'.

Suggestion: Before the contractor is allowed onto the property to begin work, ask to see evidence of sufficient and appropriate insurance cover as well as a current paid-up premium.

Insurance

Insurance gives forest owners some security so that a fire doesn't mean needing to sell other assets (such as your home) to pay for fire suppression costs or other losses caused by a fire starting on your property.

The property found to be the 'point of origin' for the fire is a likely target for lawsuits from people suffering losses. For example, a fire originating in your exotic commercial forest and spreading to a larger commercial forest will have the other owner attempting to put out the fire. You could have accounts rendered for the fire suppression costs as well as your neighbour's forest losses.

See Appendix 4 for things to think about when selecting insurance.

IMAGE: You are more likely to require larger insurance in warm dry localities with strong summer winds and many people close by or using the forest illegally.

Think about your forests' risks before you insure. Higher fire risk situations for a forest include:

- Remote dry roadsides with no telephones nearby, no cell phone coverage, plenty of gorse, strong winds and irresponsible neighbours.
- Locations close to an urban settlement in an area of low rainfall and summer drought.
- Easily accessible tracks, out of view, off public roads that are suitable for burning out cars.

Against these situations, must be weighed the likelihood and consequences of fire. In many cases the risk of fire is very low. Here are some examples of lower risk forest fire situations:

- A forest in high rainfall areas and otherwise damp environments.
- Forests surrounded by rivers, sea or high standing native vegetation.
- Mature forests with bare earth in the understory and close to significant permanently available fire suppression resources.
- Remote forests with low history of fire occurrence.

Note, also, that if your forest is next to a larger forest, you need to consider a higher level of fire suppression insurance and public liability insurance.

Some contractors will assure a forest owner that they have insurance cover but they do not, or it has lapsed through premium non-payment. The consequence of a contractor not having sufficient and appropriate insurance is that the forest owner could have to make up any differences owing to fire authorities for fire suppression or to other affected parties if they suffer a loss. (See section 46 of the Forest and Rural Fires Act 1977 in the first instance.)

Fire suppression cover of $100,000 + GST would have met all fire expenses in 80 % of fires in 2009. $2,000,000 + GST will meet almost all fire suppression costs for almost all rural fires. Values of forest loss have ranged up to $2.5 M in recent years with additional costs to clean up the site of unmerchantable timber that was not worth harvesting and too difficult to replant through.

You will probably need:

- Forest crop loss cover. (Optional but often good business practice).
- Public liability insurance. This will pay for damage to other people's property caused by a fire on your place.
- Fire suppression cover. This pays for the cost of putting a fire out caused by you or originating in your forest.

We suggest that you get several quotes on fire insurance from different companies, or through a broker, as prices will vary.

Forest owners may also join together through a Farm Forestry Association Branch, or informal grouping, and approach insurers to collectively insure several members' forests.

If a fire starts

Phone 111 immediately. Large fires were once small fires. To comply with the law:

Any person not engaged in essential services who becomes aware of an unattended fire burning in the open air, in a forest area, or during a restricted or prohibited fire season, shall cease work and do everything within his / her power to extinguish the fire. If the person finds that they are unable to extinguish the fire, they shall notify the nearest available fire officer of the outbreak (see also F&RF Act, 1977, Section 35 [1]).

For practical purposes, this means that if you can't put the fire out, phone 111 and notify your Fire Authority.

You must tell them:

- your name, RAPID number, telephone contact number and where the fire is located. You may have to spell some place names. A prearranged New Zealand map Topo 50 series grid reference for your forest could help. (For example, sheet BD40 497 027.)
- what is burning and which Fire Authority (if known) has to deal with it
- extent of the fire in hectares and the type of terrain in which the fire is burning
- the closest brigade or volunteer rural fire force that is available to deal with the fire
- the quickest route and the quickest roads for firefighters to take to get to the fire

Once you have provided this information, you may wish to:

- advise your neighbours if they are likely to be affected
- mark access routes for incoming fire vehicles, if this is necessary, through whichever gate is closest and safest. (Use bright coloured spray paint writing the word 'fire' with an arrow pointing in the direction of the access gate)

- mark suitable water supplies and access to these in the same method as above
- if using helicopters, identify any aerial hazards, and mark or eliminate these. Fell trees on the entrance / exit flight path – if on your property. Identify wires strung across gullies etc. Establish helicopter water points upwind of the fire, and certainly away from dense smoke or ember fall outs
- move livestock that may be affected by fire or smoke.

A sample 'Fire Response Schedule' appears in the section 'Preparing for Fire'. We strongly advise forest owners to use this Fire Response Schedule to make a similar template for their forest to be sent to their local Fire Authority, neighbours and first response fire crews.

IMAGE: A gram of prevention is worth a kilogram of cure as far as forest fires are concerned.

Electricity, Forests and Vegetation.

Controlling vegetation around power wires will reduce electrical fires from this source. Vegetation falling across, or growing into a live wire can result in fire. Wires may also sag into vegetation under heavy electrical load and may also clash together producing molten aluminium resulting in fire. Tables 1 and 2, specify distances that vegetation should be removed from power wires for various voltages. These tables are taken from the Electricity (Hazards from Trees) Regulations, 2003.

Key Points.

1. The maintenance of transmission and distribution lines is the responsibility of the line owner. Landowners cannot refuse line owners access to these lines for maintenance purposes. However, where no other contractual agreement exists, the maintenance of access tracks and land under transmission lines is the responsibility of the line owner. The arrangements for maintaining the corridor through which electricity lines pass can be complicated and not all lines companies, and land-owners, have the same arrangements.
2. Vegetation, including treetops and branches must be cut back from live wires to at least the distances specified in the tables below.
3. Beware of any trees outside these "Growth Limit Zones" being able to fall on the live wires during stronger winds.
4. Beware of lighting a fire beneath power wires as the electricity can "arc" to earth through flame and carbon particles. This is extremely dangerous if you are standing nearby due to electrocution. The higher the electrical voltage, the greater the danger.

Common law duties relating to nuisance and negligence require that one person's property does not have an injurious effect on another's property. For example, trees that physically touch transmission lines can be seen as landowner's property interfering with line owner's property - and vice versa when the wires sag under heavy electrical loads.

Table 1. Growth Limit Zones.

(From Electricity (Hazards from Trees) Regulations 2003, Table 1.)

Distances for Spans Less than and Equal to 150 metres in Length.

Key: kV = kilovolts. V = volts.

Voltage of conductors other than aerial bundled conductors or conductors insulated by other means.	Distance in any direction from any point on Conductor. (metres.)
66 kV or greater. 50 kV to 66 kV. 33 kV. 11 kV. 400 / 230 v.	4 3 2.5 1.6 0.5
Voltage of aerial bundled conductors or conductors insulated by other means. *Any voltage where the conductor is an aerial bundled conductor or is otherwise insulated.*	Distance in any direction from any point on conductor (metres.) 0.5

Greater tree setback distances may be wise

Table 2. Distances for Spans More than 150 metres in Length.

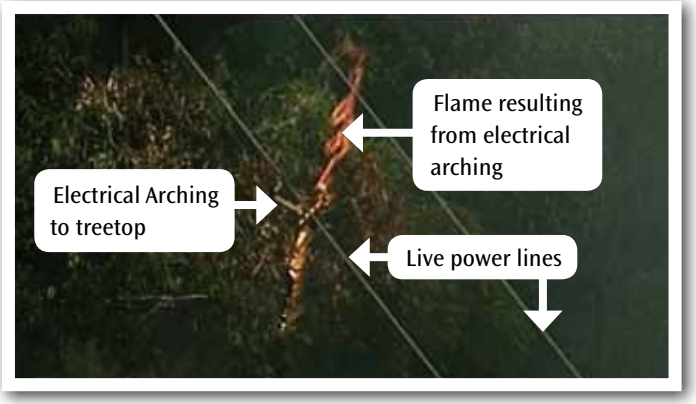
Length of Span (metres.)	Vertical distance from a horizontal plane drawn from any point on conductor. (metres.)	Horizontal distance from a vertical plane drawn from any point on conductor. (metres.)
150 to 300	4	D1 = 4 D2 = 8
301 to 500	4	D1 = 7.5 D2 = 15
501 to 700	4	D1 = 15 D2 = 30
Greater than or equal to 701	4	D1 = 25 D2 = 50

Key: *D1 = Distance for the 15 % of each span at either end of span.*
D2 = Distance for the centre of each span.

Suggestions :

1. Ensuring that vegetation is well back from power wires, in accordance with the Regulations, will minimise fire risks.
2. Preferably, engage the line owner to clear the line of vegetation.
3. Be very careful working around electricity. If in doubt, get a suitably qualified person to do so.
4. Do not light a fire directly under live power lines.
5. Consult the line owner about vegetation removal.
6. Know which power lines you own and which the lines company owns. Keep yours in good condition.

7. Keep birds and vermin from nesting in meter boxes.
8. If you own power wires with very long spans (supplying a pump house, woolshed etc) ensure that the wires cannot “clash” together by having closer power poles or have an electrician fit insulating material between the wires.
9. Remember that power wires can sag more when under a heavy electrical load.
10. If you are not sure if you have a problem or cannot find a solution yourself, ask a suitably qualified electrical specialist.



SOURCE IS: TV3 News 6.58pm 16 January 2009. Flames at treetops resulting from electrical arcing of live power lines.

Notes:

NATIONAL RURAL FIRE AUTHORITY

Te mana ahi manaaki o te motu

New Zealand Government