



An tÚdarás Sláinte agus Sábháilteachta
Health and Safety Authority

Electricity At Work: Forestry

Irish Forestry Safety Guide
(IFSG)
804



Introduction

1 This leaflet covers the safe working practices to be followed by those working on forest operations near Overhead Electricity Lines (OELs) and underground electricity cables, who are not working for the Network Owner/Operator.

2 To ensure that the right tasks are carried out by the right people, this guidance groups these health and safety tasks into management roles as defined in the HSA approved Code of Practice for Managing Health and Safety in Forestry Operations:

- Landowner
- Forestry Work Manager (FWM)
- Contractor

3 Detailed guidance on avoiding danger from working close to OELs and underground electricity cables is provided in the HSA approved *Code of Practice for Avoiding Danger from Overhead Electricity Lines* and *Code of Practice for Avoiding Danger from Underground Services* respectively.

Hazards involved

4 Work in proximity to OELs may cause fatal or severe electric shock and burn injuries. This can either be by direct or indirect contact, for example through a fallen tree, vehicle, rope or fence wire. Striking underground cables may lead to burn injuries from the resulting 'explosion' or possible fatal electric shock.

5 Everyone must assume that all OELs and underground cables are energised unless it has been confirmed by the Network Owner/Operator that it has been de-energised, switched out and earthed. The switch-out will be arranged by the Network Owner/Operator who will issue a Declaration of Disconnection Form for completion to the FWM. Where it is not practicable to de-energise the OEL, follow the precautions in this Guide.

Competance

- 6** All those involved in controlling, supervising and carrying out work near live electrical equipment should be competent and should have received adequate instruction as well as training in the correct procedures and precautions they must take. The level of supervision should also reflect the risks involved.

- 7** All operators must have had appropriate training, and any relevant refresher training, in how to operate any equipment or machinery and how to carry out the tasks required.

- 8** All workers must be made aware, through safety briefings on this document, of the onsite dangers and the appropriate precautions and actions to take.

Planning

- 9** Landowners should consult the Network Owner/ Operator well in advance to discuss their forthcoming forest harvesting plans, usually at least two months, where operations are to be carried out within 2 tree lengths plus hazard zone of the OELs or underground cables.

- 10** In consultation with the Landowner, the FWM must identify the routes of all OEL and underground cables that cross or are near the worksite and access routes and confirm this by onsite inspection. These must be clearly marked on the site and the site maps.

- 11** Organise operations within the worksite to minimise the need for forest machinery to pass below or close to OELs or over underground cables.

- 12** Prepare site-specific risk assessments, and ensure these incorporate any advice received from the Network Owner/Operator. Where a Method Statement has been developed it should reflect the risks involved and the advice received.

13 Assess the effect of the site characteristics, such as slope and the weather conditions, that could affect how the work may be done.

14 Goalposts must be erected where machinery / vehicles pass under an OEL on or near a worksite. Goalposts must never exceed the maximum safe working height:

- 4.2 metres – where machinery pass under an OEL, except existing forest road
- 4.9 metres – forest roads only, provided the height of the OEL is measured accurately by a competent person in consultation with the Network Owner/Operator, and that the measured height is at least 6.0 metres above the road level

If the height of the OEL above the road is less than 6.0 metres, the FWM must consult with the Network Owner/Operator.

Machinery must pass under the OEL without stopping in the hazard zone (between goalposts).

15 Operators or drivers must check the heights of fully laden vehicles or forest machinery on low loaders to ensure that they do not exceed the maximum safe height.

16 Where the clearance between the ground and the OELs has been altered in any way e.g. creating deep brush mats or resurfacing roadways, check the clearance to ensure that machines cannot come into proximity with the OELs. If in doubt contact the Network Owner/Operator.

17 Plan and designate safe loading areas for timber stacks that ensure OEL hazard zone (*COP for Avoiding danger from Overhead Electric Lines*) can never be breached and clearly mark these on the site harvesting plan.

- 18** At the pre-commencement meeting identify:
- the location of OELs and underground cables on maps and on site;
 - the name of the Network Owner/Operator contact for when more information is required: and
 - the Network Operators Emergency number **(for example: ESB Networks is 1850 372 999)**.

Access routes to the worksite

- 19** The Landowner must establish the safe access routes with the FWM who will brief operators, including contractors and hauliers on those routes.

- 20** Where OELs cross the access road to a worksite, warning signs must be prominently displayed at each side of the OELs and clearly marked on the site maps.

- 21** When travelling to and from a worksite, the operator or driver must ensure forest machinery attachments and loads do not exceed the maximum safe height (i.e. 4.2 m unless otherwise agreed with Network Owner/Operator). Where an existing forest roads passes under OELs on or around a worksite a competent person, in consultation with the Network Owner/Operator, must assess the height of the OEL above the road. Where this OEL height above the road is at least 6.0 metres, the maximum safe working height for passage of machinery (including trucks) is 4.9 m.

Access routes within the worksite

- 22** Within the worksite, the FWM will clearly identify the safe clearance for driving alongside / parallel to OELs and underground cables (6 metres or 10 metres depending on the voltage levels of the OEL). The Network Owner/Operator may advise distances greater than 10m depending on the voltage of the OEL and the nature of the terrain. (See Figure 1).

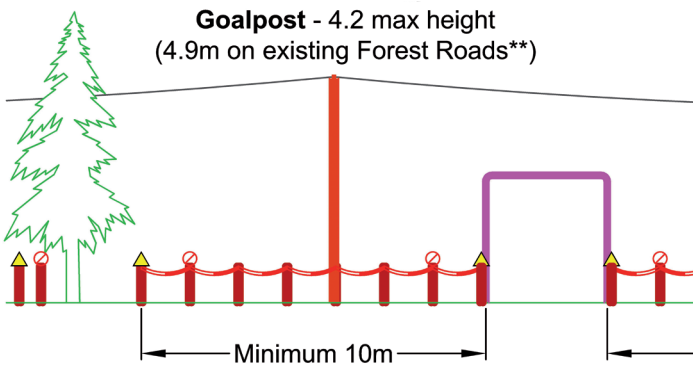
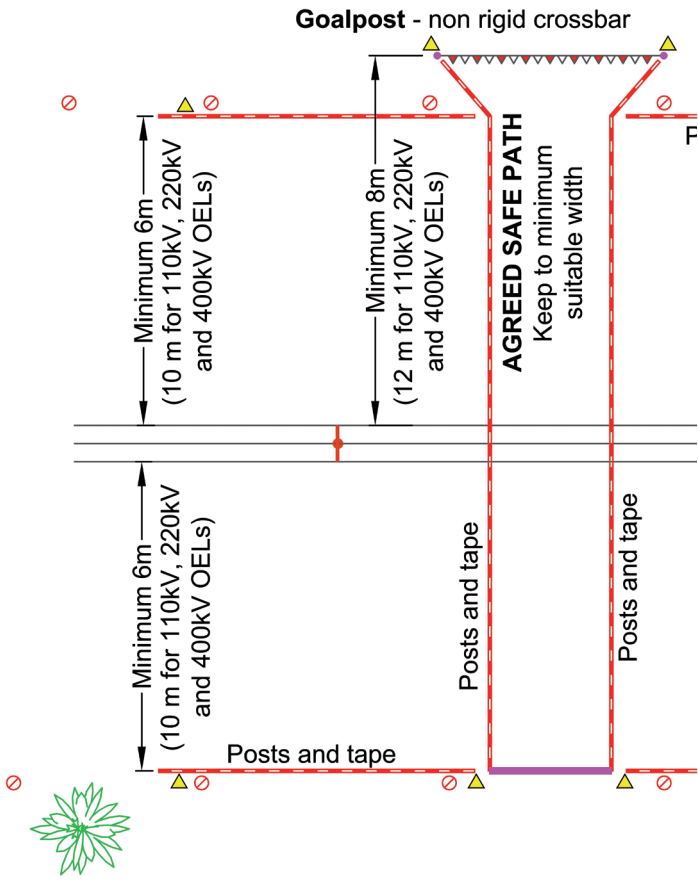
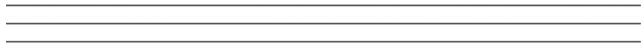
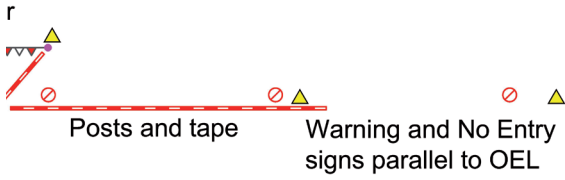


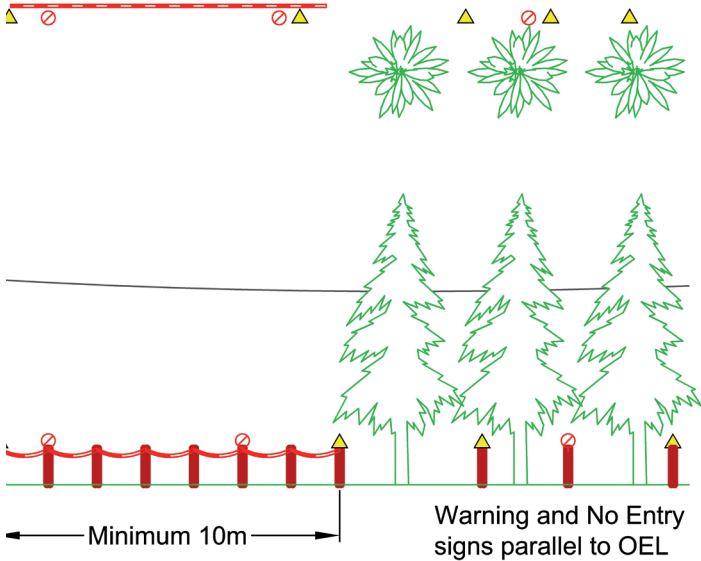
Figure 1 - Site Layout

** FWM must confirm OEL is at least 6.0m above existing forest roads



Posts and tape

Warning and No Entry signs parallel to OEL



23 Erect goalposts at all points within a worksite where it is necessary to cross under OELs. Ensure that there are barriers to prevent any crossing other than at the designated crossing points. If in doubt consult the Network Owner/Operator on the required height of the posts' cross members to establish appropriate clearances from the conductors.

24 Goalposts also need to be erected where OELs cross any route that is used to move between nearby worksites.

25 Goalposts should be constructed from rigid, non-conducting material, such as timber or plastic pipe and be highly visible by their colour or distinctive marking, for example red and white stripes.

26 If the agreed safe path is too wide to be spanned by goalposts with a rigid non-conducting crossbar, you may have to use tensioned plastic ropes with bunting attached.

27 Where it is necessary to travel over or near underground cables consult with the Network Owner/Operator to determine their depth and protection measures required. See Underground Cables Section.

28 When working close to OELs, move ladders, scaffold poles, other poles or any long objects horizontally and keep them as low as possible.

Underground cables

29 Underground cables may not be very far below the surface. Before you start any operation that might damage underground cables, for example digging, ditch maintenance, crossing with heavy machinery or timber stacking, ensure, so far as is reasonably practicable, if there are any underground electricity cables where you are working. Check with the Network Owner/Operator and with the Forestry Work Manager (FWM), on site maps, and look for

location markers on the ground. If a cable runs down an OEL support, this shows that there are underground cables.

30 Where there are underground cables present the edges and approximate depth of the cable run must be identified by a competent person using a cable locating device, and mark these on the site and the constraints map.

31 Where access is required, and machines have to travel over underground cables, the FWM should, where necessary, consult the Network Owner/ Operator of the cable to discuss working methods and protection.

32 Markers must be erected to indicate access point to the worksite. All agreed crossing points within the worksite must also be marked.

33 Where digging work must be carried out near underground cables, consult the HSA's "Code of Practice For Avoiding Danger From Underground Services".

Tree-felling operations – OEL

34 For tree felling operations, tree heights should be assessed for their falling distance in relation to the OEL. They should be categorised as being in either a Red, Amber or Green Zone.'

These zones are illustrated in Figures 2, 3 and 4 and defined as:

Red Zone: (Hazard zone plus tallest tree height) The area next to the OEL containing all trees within falling distance of the Hazard Zone of any conductor and all trees which could cause damage to any support structure.

In normal circumstances the extent of the Red Zone is measured on the ground from directly underneath the outermost conductor to the centre of the tree. This should be done by a competent person nominated by the FWM in consultation, if necessary, with the Network Owner/ Operator.

The extent of the Red Zone could vary greatly along the length of the OEL when taking full account of variations, steep slopes, valleys and variations in tree heights. All of these should be addressed in the risk assessment, and agreed by the FWM and the contractor.

Amber Zone: (one tree length (tallest) beyond Red Zone) The area from the Red Zone up to a distance of one further tree length. This zone acts as a buffer to protect the Red Zone and within it trees may be felled either away from or parallel to the OEL, following conditions set out in Section 37.

Green Zone: (two tree lengths (tallest) beyond the red zone) The area beyond the Amber Zone (normal forest operations).

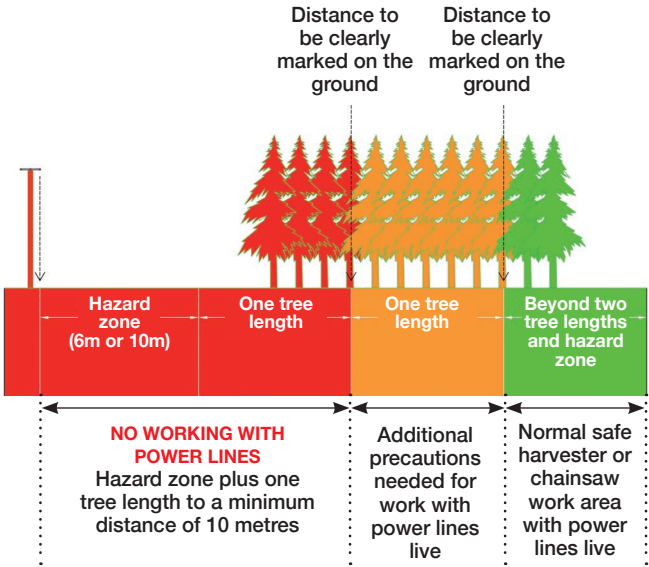


Figure 2
Red/Amber Zone (Uniform height crop)

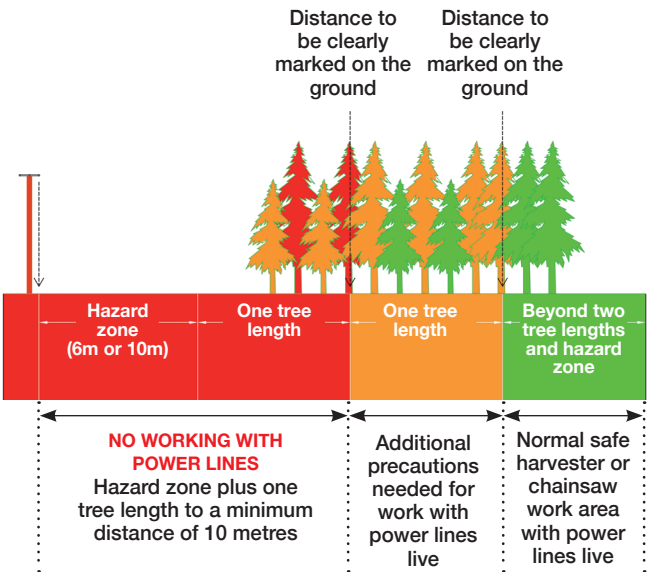


Figure 3
Red/Amber Zones (Uneven height crop)

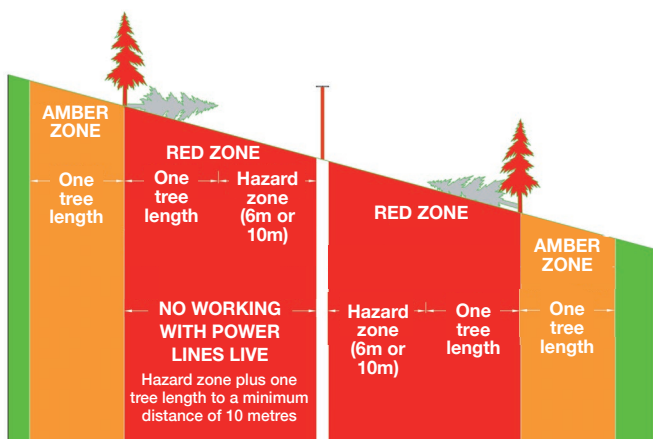


Figure 4
Red/Amber zones on a side slope

- 36** The Hazard Zones (Table 1) is the area near an OEL from which work activities must be excluded. This zone must never be breached.

Table 1 Hazard zone distances

Nominal Voltage of OEL	Hazard Zone (metres)
LV, 10kV, 20kV and 38kV	6 m
110kV, 220kV, 400 kV	10 m

- 37** Where there are trees to be felled in the Red Zone, there must be consultation between the FWM and the Network Owner/Operator to arrange to turn the power off. A Declaration of Disconnection / Permit to Work must be issued by the Network Owner/Operator. Felling can only be done with the OEL de-energised (isolated and earthed).

- 38** Where a OEL cannot be de-energised, then Red Zone trees will not be felled and felling within the Amber Zone will only be allowed provided the following conditions are met.

- The Red and Amber Zones must be clearly marked on site by the FWM or his/her appointee. Use paint or high-visibility tape on the trees or any other suitable marking method.

- There must be a written Method Statement covering the marking of Red and Amber Zones and the felling and extraction arrangements of trees in the Amber Zone.. This will make clear that no Red Zone trees will be felled with the OEL energised.
- Operators must be made aware of the dangers from electricity, how to avoid the danger and what to do in an emergency.
- Ensure you use only trained and competent operators with the relevant Chainsaw or Forestry Machine Operator Certificate of Competence.
- Felling should be arranged so that trees are felled away from, or parallel to the conductors, taking account of terrain, aspect, species and tree height.
- Traffic/vehicle movement on site should be properly controlled. Ensure that no part of any machine, load, or tree being processed can come within the hazard zone of any OEL when working alongside it.
- Assess and take account of the ground conditions.
- Assess the weather conditions and make sure the wind direction does not affect control of the felling direction. If it is likely to have an adverse effect, stop operations until the wind speed drops to an acceptable level.

39 **If tree-felling work is required within the Red Zone with the OEL energised, then this will only be carried out in consultation with the Network Owner/Operator. These works will only take place in accordance with the Code of Practice for Avoiding Danger from Overhead Lines.**

40 Where the OEL can be de-energised the following is required.

- A system to ensure the OEL has been de-energised and made safe before work begins – this will involve the Network Owner/Operator issuing a Declaration of Disconnection / Permit to Work stating that the OEL has been isolated,

earthed and will remain so until the safety document is signed-off on completion of the work.

- The Declaration of Disconnection / Permit to Work should only be issued to a competent person capable of understanding the electrical hazards and controls, and overseeing the forestry operations.
- All those on site must be made aware that they must treat the OEL as energised until the Declaration of Disconnection / Permit to Work is in place and the OEL de-energised.
- Timber must be placed outside the OEL hazard zone to enable safe extraction when the OEL is re-energised. Extraction machinery must never encroach the OEL hazard zone (see figure 5.)
- On completion of felling work and removal of machinery and personnel from the OEL hazard zone, a Proof of Readiness document must be provided to the Network Owner/Operator so that the OEL can be safely re-energised.
- As soon the Proof of Readiness has been completed, the OEL must be treated as energised.
- All work parties must be told when the OEL is being re-energised.

Timber extraction operations

- 41** Do not operate a forwarder or skidder if any part of the machine or its load (product being lifted) is likely to come within Hazard Zone of energised OELs. Where necessary, clearly mark the limit of work in relation to the energised OELs (see Figure 5). Use high-visibility tape or other markings.
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- 42** The forwarder or skidder must be operated from the opposite side of the timber from the OEL.
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- 43** Where loaded skidders are being driven under OELs, there must be goalposts and the tree butt should be secured directly against the butt plate.

Where this is not practical due to stability, then an agreed safe working method must be implemented.

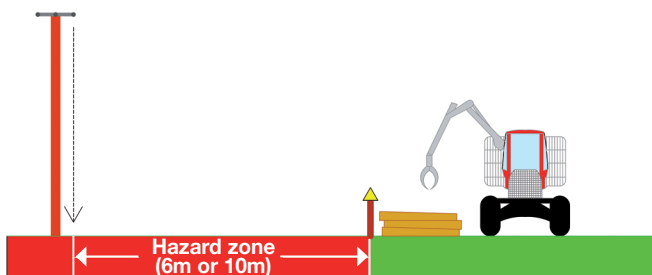


Figure 5
OEL hazard zone for Extraction Machinery

44 When using brush mats for timber extraction, within hazard zone of an OEL with the OEL energised, then this will only be carried out in consultation with the Network Owner/ Operator. These works will only take place in accordance with the Code of Practice for Avoiding Danger from Overhead Lines.

45 Do not stack timber in any place where it would be possible for the machine or timber being handled to come within the OEL Hazard Zone.

Cable crane system

46 If you are using a cable crane system:

- **Do not transport or reposition a cable crane winch with the mast raised if it is within OEL Hazard Zone.**
- Ensure that Red Zone distances, OEL Hazard Zone + one tree length is sufficient for the type of cable crane system and the OEL.
- Never cross the route of OELs with any type of cable extraction system.
- Normally no part of the aerial setup (i.e. tower/ mast, skyline, haul lines, guy, spar or supports) should be located within the Red Zone of an OEL (see Figure 6). In exceptional circumstances it

may, on occasion, be necessary to have guys or anchors **but NOT running ropes** located within this zone. This must incorporate fail-to-safe restraint systems and be agreed with the Network Owner/Operator – and the guys and anchors made of non-conductive material – no wire ropes or chains.

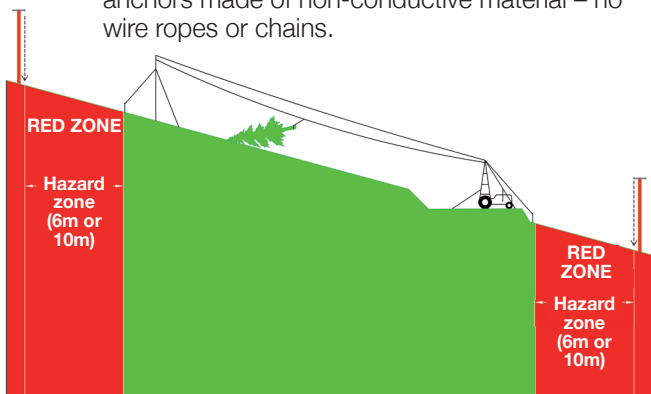


Figure 6
Cable crane set up

Fencing

47 Fencing presents some risks, particularly from the fence wire coming in to contact with;

- the OEL;
- striking underground cables by digging and driving fence posts; and
- from induced voltages that may be present in fences running parallel to OELs – induced voltages will increase with the OEL voltage and the length of parallel fence and will reduce the further away the fence is from the OEL.

48 The following precautions should be taken:

Planning

- Plan the route of a new fence to avoid hazards.
- Check the site map for the routes of OELs and underground cables.
- Ensure that any underground cables have been identified on the ground and that you have appropriate control measures to avoid contact when driving posts.

- If a wire fence has to be erected close to an OEL, then plan a route at right angles to the OEL to avoid induced voltages. Where possible fences should not cross directly under the OEL to avoid the possibility of fence wire contacting conductors during erection and dismantling. This is a particular problem if fence wire has to be stretched across a valley beneath an OEL.
- Where winches are used to lay out fence wire near an OEL, there must be systems to prevent a broken wire contacting the OEL.
- Do not attach fencing to an OEL pole.

Consultation

- Consult the Network owner/Operator when running fences within 50 m parallel to OELs.

Controls

- To reduce the risk of induced voltages, you may need to earth the wires on these fences, use at least one steel post every 50 to 60 m to earth the fence.
- Never erect or dismantle a fence on your own when near an OEL, and be aware of the potential dangers of fencing in valleys or when there is lightning.
- Always keep the fencing wire under control – this is particularly important in steep valleys, where clearance may be reduced.
- When assessing hazards (see worksite planning section), be aware of the working height of machines and tools.

Other ground-based operations

- 49** Consider the risks and the identified control measures, and seek advice, if in doubt, from the Network Owner/Operator for ground-based operations that could come within the Hazard Zone of an OEL, such as ground prep, track construction, road maintenance, use of sprayers, flails or mulcher, tipping trailers or mobile elevated work platforms.

- 50** Smoke and hot gases from a fire can create a conductive path for electricity. If the method of work involves having a fire on site when clearing rhododendron, scrub or brash, then consult the Network Owner/Operator to establish where the fire may be located, limits on the size of the fire, and if there are any other considerations for example terrain or weather.

Aerial works

- 51** Make sure you know if OELs are near the worksite.

- 52** When the FWM engages specialist aerial contractors, for example for fertilising, they must provide maps that clearly identify the position of OELs to the contractor.

Emergency procedures

- 53** The Network Owner/Operator Emergency number (e.g. ESB Networks is 1850 372 999) should be recorded in the emergency procedures in case of accidental contact or damage to the electrical equipment. The emergency procedure should include the location of work site, or name or number of the OEL or underground cable if known (provided by the Network Operator)
- Assume all OELs are energised, even if they are not sparking – remember that, even if they are ‘de-energised’, the wires can become ‘re-energised’ again with no notice – this may happen automatically after a few seconds, or they may be re-energised remotely up to several hours later if the Network Owner/Operator is not aware that the OEL has been damaged.
 - Do not go near or touch any person, machine, other plant or tree that is touching or very near an OEL or underground cable, until you are advised by the Network Owner/Operator that it is safe to do so. Warn others to keep away.

54 Accidents and near-misses involving OELs should be reported immediately to the FWM and the Network Owner/Operator emergency number as soon as possible, for example:

- Contact with conductors, stays, poles or insulators.

55 If a machine, or the load it is carrying comes in contact with an OEL or underground cable, the operator should:

- a) If the machine is operable;
 - release the load, lower any raised parts that are controlled from the driving position, and, or, drive the machine clear of the OEL, as long as neither of these actions risks breaking the OEL or dragging it to ground level; and
 - contact the Network Owner/Operator immediately by mobile phone, or as soon as possible by any other method.
- b) If the machine is not operable (or cannot be driven free) and it or its load is in contact with or within 5m of a damaged OEL;
 - stay in the cab;
 - contact the Network Owner/Operator immediately by mobile phone, or as soon as possible by any other method;
 - instruct everyone outside the vehicle not to approach it – touching it or even getting too close could kill them; and
 - do not leave the cab until you have confirmation that the OEL or underground cable is de-energised.
- c) If the machine is not operable or cannot be driven free of the OEL and there is a risk of fire that you can't safely extinguish or other immediate life-threatening hazard;
 - **avoid simultaneous contact with any part of the machine and the ground;**
 - jump as far away as you can from the machine landing on your feet;

- move away as quickly as possible taking short steps;
 - warn other people not to approach the vehicle – touching it or even getting too close could kill them;
 - contact the Network Owner/Operator immediately by mobile phone, or as soon as possible by any other method; and
 - do not return to the machine until you have confirmation that the OEL or underground cable is de-energised.
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After any vehicle has been removed from danger and made safe, it must be checked by a competent person to ensure it is working properly before returning to normal use.

Notes



Further Information and Guidance:

Visit our website at **www.hsa.ie**, telephone our contact centre on **0818 289 389** or email **contactus@hsa.ie**



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Use BeSMART, our free online risk assessment tool at **www.besmart.ie**
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Further reading

Available at www.hsa.ie/eng/Publications_and_Forms/Publications/Agriculture_and_Forestry/

- Code of Practice for Managing Safety and Health in Forestry Operations
- Information on Health and Safety Responsibilities of Forest Landowners who intend to fell their trees
- Guide to Safe Working with Timber and Chainsaws
- Chainsaw Safety Training Advice Information Sheet

IFSG Leaflets:

- 301 - Using Petrol Driven Chainsaws
- 302 - Basic Chainsaw Felling and Manual Takedown
- 303 - Chainsaw Snedding
- 304 - Chainsaw Cross Cutting and Manual Stacking
- 306 - Chainsaw Clearance of Windblow
- 307 - Chainsaw Felling of Large Trees
- 503 - Extraction by Forwarder
- 603 - Mechanical Harvesting
- 804 - Electricity at Work: Forestry

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This guide sets out evidence of good practice for a specific forestry task. Deviation from the guide should only be considered after a full risk assessment has been undertaken by competent persons. Health and safety obligations **MUST** be met at all times.

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