Technical Guide 1:
Tree Climbing and Aerial Rescue

We Need Your Feedback
Please submit all responses by Friday 7 August 2020

This is the '**draft for consultation**' for the first of five new technical guides based upon the principles set out in the revised '*Industry Code of Practice for Arboriculture – Tree Work at Height*' (2nd edition 2020).

This draft for industry consultation is presented to show the content, style and design for the ***Technical Guide 1: Tree Climbing and Aerial Rescue***.

The text is in its proposed final form. Some images and illustrations are still being produced and the layout shows a box with the words 'Image to come' over it where images are to be added.

Some images shown may be replaced by improved versions.

If you have comments which your are unable to submit within the survey, please e-mail **simon@trees.org.uk**

Please use the link below to review the draft for consultation.
You can provide feedback via Survey Monkey.

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Background to the Arboricultural Association

Founded in 1964, the Arboricultural Association is the largest and longest-established UK body and authority for the amenity tree care profession. It has a base of circa 3,000 members in central and local government, commercial and educational employment, at craft, technical, supervisory, managerial, tutor and consultancy level.

The Arboricultural Association is regarded by central government departments, the Royal Horticultural Society and local government as the focal point for good practice in arboriculture, for certification and regulation of the industry, for information, education and research. It is unique in the profession in that its body of knowledge extends across the full spectrum of arboricultural issues and it can represent and advise a wide range of members from small operators to large corporate bodies, local and central government.

The Association publishes a range of technical leaflets, guidance notes and other publications concerning arboriculture, the quarterly *ARB Magazine* and the quarterly *Arboricultural Journal*. In its function as voluntary regulator for the arboricultural industry, the Association produces an online directory of Registered Consultants and Approved Contractors, all of whom have reached standards of excellence in arboriculture. The Association offers training through a varied programme of topical workshops, seminars, an annual trade show (The ARB Show) and an annual Amenity Conference. Various grades of membership exist for professional arboriculturists, those in related disciplines and enthusiasts.

This Technical Guide is part of a series of guidance documents published by the Arboricultural Association with support from STIHL, City & Guilds/NPTC and the Scottish Forestry Trust.

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Foreword

This Technical Guide has been developed as part of a comprehensive review of industry guidance relating to arboricultural tree work at height. It represents the culmination of several years of work involving hundreds of days of study, research, practical workshop exercises, demonstrations, drafting and industry consultation.

The document sits within a national framework of guidance for planning, managing and delivering safe and effective arboricultural operations.

The overall principles for planning and management are set out in the *Industry Code of Practice for Arboriculture – Tree Work at Height* (ICoP), which provides an organisation's Responsible Person with the information to implement appropriate structures, systems and controls.

This Technical Guide is the first in a series of five guides which provide practical guidance to operators carrying out tree work.

Technical Guide 1: *Tree Climbing and Aerial Rescue*
Technical Guide 2: *Use of Tools in the Tree*
Technical Guide 3: *Rigging and Dismantling*
Technical Guide 4: *Use of Mobile Cranes in Tree Work*
Technical Guide 5: *Use of Mobile Elevating Work Platforms in Tree Work*

They are designed to be read sequentially, thus avoiding excessive duplication between guides.

In each Technical Guide, picture captions begin with the number of the paragraph to which the image relates.

Acknowledgements

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Thank you all.

1

Introduction

1.0 Introduction

1.1 This document, Technical Guide 1, provides technical guidance for anyone who is required to carry out tree climbing operations.

1.2 This Technical Guide is not a substitute for adequate training but sets out current industry good practice relating to tree climbing and aerial rescue.

1.3 Everyone involved in tree climbing operations can use this document:

a. to help make tree climbing safer;
b. to help ensure the correct use of components in a tree climbing system;
c. to identify suitable techniques for tree climbing operations;
d. as the basis of a safe system of work to avoid or reduce risk; *and*
e. as guidance, to ensure health and safety legislation is complied with.

1.4 In accordance with the Industry Code of Practice for Arboriculture, the key principles of tree work at height must be adopted when using this Technical Guide.

It is essential that:

a. all work at height is properly planned, organised, supervised and managed;
b. tree climbing should only be undertaken when it is not reasonably practicable to do the work from ground level or from a platform;
c. everyone engaged in a tree climbing operation has the appropriate training and experience to be proficient in the tasks they are required to undertake;
d. lifting (and lowering) systems are properly designed, including the compatibility and correct configuration of components within each system; *and*
e. any equipment used is suitable for the task and subject to periodic inspection, examination and maintenance to confirm it remains safe for use.

1.5 **Warning:** Tree work and related operations at height can be inherently dangerous. It is the responsibility of any proficient operator to learn, understand and practise the proper techniques for working in such environments. While it is not possible for this technical guide to cover all methods used to carry out tree work at height, it aims to set out the principal considerations, some of the more common techniques used and their correct application.

2

Planning and Management

Checklist:

- Has a suitable and sufficient recorded risk assessment been carried out?
- Do operators understand the risk assessment?
- Is there an opportunity for everyone on site to contribute to the site-specific risk assessment on the day of works?
- Are climbers fully aware of the hazards and risks they are exposed to during the specific tree work at height task?
- Do climbers know the control measures they must implement to ensure safe working and in turn create the safe system of work for carrying out the tree work?
- Have the control measures specified been carried out?
- Does the risk assessment process include dealing with emergencies?
- Are enough personnel present, including provision for rescue?
- Is the weather suitable for tasks to be completed?
- Has enough time been allocated to allow the work to be carried out safely and without applying undue pressure on the operational team?

Have you checked?

2.0 Planning and Management

2.1 Risk Control Systems and Emergency Planning

This section includes information to enable tree work operatives and others involved in supervising arboricultural climbing operations to understand the purpose of the risk assessment and the emergency planning process, and their role within them.

2.2 Risk Assessment

2.2.1 For every operation, a suitable and sufficient recorded risk assessment that covers the site, the work to be carried out and machinery must be in place. That risk assessment must clearly identify the controls that need to be put in place to reduce the levels of risk operators are exposed to. It is the controls of the risk assessment that dictate the safe system of work.

2.2.2 Through a sequence of events that may include:

a. new starter induction;
b. direct briefings/toolbox talks; *and*
c. training,

climbers are responsible for ensuring they are aware of all the significant hazards and risks associated with undertaking tree work at height. They must also check that they are aware of the control measures they must implement to ensure safe working is fully carried out.

2.2.3 A competent person must draft a site-specific risk assessment that accounts for a range of factors that may affect the works. These factors may include but are not limited to:

a. railways, roads, footpaths and waterways;
b. immediate infrastructure, e.g. buildings, fences, property targets, utilities; *and*
c. third-party constraints like access arrangements or restrictions on the timing of work.

2.2.4 In a process led by a nominated individual responsible for supervising those on site, the site-specific risk assessment drafted by a competent person must be reviewed by all operators on site to ensure it is an accurate reflection of what will take place on site.

2.2.5 A minimum of two people must be present during all tree work at height operations. At least one team member must be available, proficient and equipped to perform aerial rescue without delay.

2.2.6 For every operation, Emergency Action Plans (EAP) must be drawn up at the pre-work planning stage and revised if necessary at the point-of-work stages. An effective rescue plan must be put in place.

2.2.7 All site personnel must take part in job planning, raise any points of concern and recognise that they must stop work if something is unclear or a safety issue arises.

2.3 Emergency Action Plans

2.3.1 Every work site must have an effective, recorded Emergency Action Plan which includes what actions operators will take in the event of: Aerial Rescue, First Aid Emergency, Fire or Contact with Service Utilities (underground and overhead).

2.3.2 Emergency contact and access information normally recorded as part of the site-specific risk assessment may include the following. However, it should not be limited to this list. If other information is relevant, include it:

a. site/location address, providing the nearest address and postcode (where applicable);
b. six-figure grid reference/location finder applications to allow services such as an air ambulance to locate your position;
c. work site directions (especially if the address and postcode are inadequate);
d. designated emergency services meeting place (especially if communication methods are restricted or the address is inadequate);
e. nearest emergency services access point and type of access;
f. location and contact details of the nearest urgent care facility;
g. work manager's contact details; *and*
h. site (landline number if possible) and site staff contact details.

2.4 Weather

2.4.1 If the weather creates a significant hazard and the safety of anyone involved in, or affected by, the operation could be compromised – for example, if the wind strength could cause the climber to lose stability in the canopy – a risk assessment process in conjunction with the competent person should carefully examine the hazard highlighted and any further controls that are required to ensure safe working.

2.4.2 If a climber is concerned that the weather is impacting directly on their safety when working at height, work must stop.

2.5 Time

2.5.1 As part of planning the work, the competent and/or the responsible person must allocate enough time for climbers to complete the designated tasks. Before beginning work, climbers must make sure they are fully aware of any time restrictions on the task. Climbers must plan work accordingly with the competent and/or the responsible person to ensure operations can be carried out safely and efficiently.

2.5.2 Where operators feel insufficient time has been allocated to a task, or where the safety of operations is jeopardised because of a shortage of time, they have a responsibility to stop work and contact the competent person/health and safety representative to raise their concerns.

3

Roles and Responsibilities

Checklist:

- Do all operators understand their roles and responsibilities?
- Are operators proficient to carry out their assigned duties?
- Is there appropriate supervision in place to manage the tree work at height operation?
- Does everyone on site understand the communication method between climbers and ground staff? Is it clear, unambiguous and agreed by all?

Have you checked?

3.0 Roles and Responsibilities

3.1 General

3.1.1 Clear and correctly defined roles and responsibilities must be established from the outset to ensure a consistent approach to the planning, management and completion of tree work at height.

3.1.2 The following designations are used in this Technical Guide:

a. **Responsible person**: an individual who is ultimately legally responsible for all activities under their control, e.g. the employer.

b. **Competent person**: individual(s) responsible for ensuring operations are managed and undertaken safely and that the work environment is controlled, e.g. contracts manager, supervisor, foreman, chargehand, team leader.

c. **Proficient operator**: a skilled, knowledgeable and experienced operator able to perform specific tasks.

3.1.3 As part of planning tree work at height, each person on site must understand what their role is. Documenting this information as part of a site-specific risk assessment may help avoid confusion as work progresses, assist in the event of an emergency and provide accountability to measure what an individual is supposed to be doing against what they may actually be doing.

3.2 Proficient Operators

3.2.1 Regardless of their employment status or position within an organisation, it is the proficient operator's duty to understand their role and the responsibilities that they have, which must include the following:

a. understand the limits of their own skill and experience of work practices. Not take on tasks or use machinery without being adequately trained or if they do not feel comfortable or confident to do so;

b. carry out their responsibilities as defined by good practice and as determined by an employer or an individual charged with coordinating the work site (e.g. foreman, team leader, chargehand);

c. select the correct equipment for a task, ensuring they always use the equipment in accordance with manufacturer's guidance and within its safe operating parameters, e.g. safe working load;

d. be responsible for inspecting their own equipment to confirm it is undamaged and entirely suitable for the intended use;
e. maintain equipment in accordance with manufacturer's guidance and correctly store the equipment they use;
f. work safely on their own initiative, ensuring what they do (or don't do) does not jeopardise the safety of others on site or anyone else affected by the work; *and*
g. tell those responsible for coordinating work-site activities if there are safety-critical or other developments that could have a bearing on any of the above.

3.2.2 Tree work is usually a team task, and therefore each person on site needs to remain aware of other operators' roles. Working together, ground staff should expect that any individual working at height will:

a. plan the job with the ground staff, including agreeing on a sequence of works;
b. agree and maintain an effective method of communication with ground staff;
c. work in accordance with good practice so that no unnecessary risk is introduced to the task;
d. consult with ground staff where methods of working or the sequence of works deviates from the original plan;
e. provide instructions and receive verbal confirmation from ground staff to ensure drop zones are clear when required; *and*
f. work at a speed which is consistent with the ability of ground staff to maintain a clear work site.

3.2.3 Ground staff play a vital role in tree climbing operations. An effective ground person will make the climber's job easier and safer and can improve the efficiency of the task by doing the following:

a. planning the job with the climber;
b. maintaining effective communication with the climber;
c. maintaining concentration, anticipating the climber's needs, passing up tools and other equipment;
d. ensuring climbing and work ropes on the ground are free of knots, kinks, tangles, debris and branch wood, and clear of machinery (e.g. brushwood chippers), passing traffic and other potential sources of damage;
e. keeping the work site tidy;
f. being aware of the surroundings and not entering designated drop zones unless the go-ahead has been given by those working at height, except if there is an emergency;
g. ensuring the precautions taken to keep the public and traffic out of the work area are maintained while work is in progress;
h. controlling working ropes and, when applicable, lowering systems;
i. discussing with the climber any poor work practices they notice or any work technique that may endanger the climber or others – reporting near misses and correcting unsafe acts;
j. being aware of their ability/responsibility to call a halt to proceedings or raise concerns at any point during the operation; *and*
k. helping in emergencies and aiding or, if adequately trained, carrying out rescue.

3.3 Supervision

3.3.1 Those in supervisory roles (competent person) – such as chargehand, crew leader, foreman or team leader – must be familiar with the content of the Industry Code of Practice and how best to meet its requirements.

3.3.2 Anyone in the competent person role must ensure they are fully aware of their responsibilities and must understand the expectations others have of them. A competent person is expected to:

a. lead by example in work practices and equipment use;
b. treat those involved in or affected by the work respectfully, maintaining effective communication between the workforce and with managers;
c. control the work environment, ensuring that climbers and ground staff with specific responsibilities carry them out effectively;
d. monitor task progression, actively encouraging efficiency within the workforce;

e. provide feedback to individuals on their performance and observed work practices;
f. encourage operators to develop their knowledge and understanding of tree work at height by engaging in proactive continuing professional development (CPD);
g. ensure that individuals allocated specific tasks are capable of carrying them out; *and*
h. directly supervise operators who lack experience or need to consolidate their skills.

3.4 Communication

3.4.1 Clear and effective communication during an operation is key to safety and efficiency. Any system to be used must be agreed between climbers and ground staff before work begins and must remain effective throughout. To ensure clarity, the agreed system can be recorded in the site-specific risk assessment.

3.4.2 The effectiveness of the agreed system must be measured by the competent person, and if found to be ineffective it must be revised accordingly.

a. Has the communication system been agreed and understood by all operators?
b. Can all operators communicate with each other clearly, without confusion and ambiguity?
c. Does the method employed allow any operator to stop work at any time if concerns are raised regarding safe work practices?

3.4.3 The communication system chosen can be verbal or non-verbal. It must be appropriate to the site and situation, based on:

a. weather conditions;
b. background noise – construction traffic, highways, public spaces;
c. complexity of the task – where misinterpretation of information could have serious consequences;
d. reliability of the communication system, e.g. risk of radio-signal-based communications suffering interference or losing a connection; *and*
e. whether visual contact can be maintained between climber and ground staff.

3.4.4 Any form of instruction given by a climber or a ground person and the reply should be:

a. brief;
b. always given; and
c. easy to understand.

A misunderstanding between climber and ground staff could result in an accident.

3.4.5 If there is more than one person on the ground, a 'Lead' or 'Head' ground person should be nominated to avoid the potential for multiple – possibly conflicting – replies to a climber's call.

3.4.6 Where the site has multiple operational areas, a single person can be allocated for each task, to reduce the chance of miscommunication which could lead to an accident. For example, where there are two climbers in two separate trees with a ground person supporting each one, a climber must only act on instructions given by their ground-based 'contact' and not by the individual supporting the climber in the other tree.

3.4.7 Whilst a number of communication methods are available for climbers and ground staff, helmet radio comms can provide a practical solution to ensure clear and regular communication is maintained between all parties.

4

On-site Preparation

Checklist:

- Have hazards and risks identified by the site-specific risk assessment process been adequately addressed?
- Has a tree condition assessment been carried out?
- Have clearly defined drop and working zones been established?
- Do all operators understand the limits of each zone?
- Are there established procedures in place (1) for when someone wants to enter a drop zone; (2) for materials to be dropped into a drop zone; and (3) when handling equipment above the drop zone?
- Is the extent of the work zone clear with adequate demarcation in place to prevent unauthorised access?
- Is PPE correctly worn and used by every operator in either zone?

Have you checked?

4.0 On-site Preparation

4.1 General

4.1.1 Before a work at height operation begins, it is the competent person's responsibility to ensure that any control measures identified during the site-specific risk assessment process are carried out.

4.2 Tree Condition Assessment

4.2.1 Prior to any tree work at height operation, it is the climber's responsibility to carry out a pre-climb condition assessment of the tree. Such an assessment is vital to:

a. ensure that any work at height methodology, agreed as part of planning the tree work, is still a safe and viable option;
b. identify any signs and symptoms within the tree which could indicate that tree climbing is not a safe, viable option;
c. help choose the most appropriate method of access;
d. identify hazardous areas within the tree to avoid; *and*
e. identify suitable anchor points.

4.2.1 It is known that most types of defect can be detected through visual inspection from the ground. However, climbers must exercise all due care to examine parts of the tree that may be obscured from sight, e.g. ivy-clad stems or the top side of branches.

4.2.3 The risks that there could be hidden hazards in the tree may be mitigated by:

a. climbers using binoculars to focus their assessment on areas that may not be clearly visible from the ground;
b. not installing access lines that anchor beyond where a clear condition assessment can be carried out;
c. carrying out a continuing tree condition assessment process as ascent is made;
d. validating the outcome of a climber's assessment with another proficient (aerial tree work) operator on site; *and*
e. proof loading anchors.

4.2.4 An inspection of the rooting area should always be carried out where it is practicable to do so and should look for signs that might lead to instability in the tree, including:

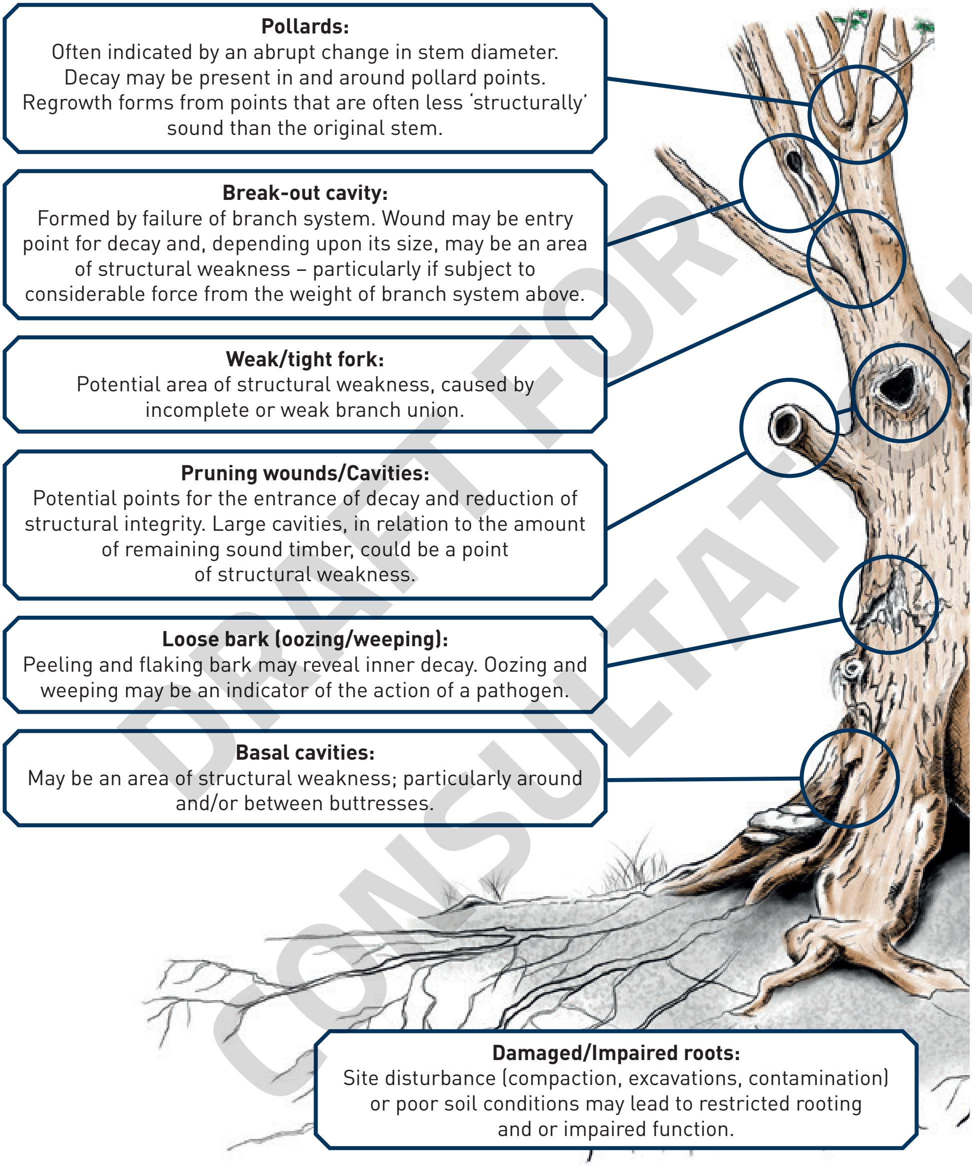
a. evidence of fungal activity associated with stem and/or root decay;
b. evidence of movement or heave of the root plate, e.g. soil cracking or lifting;
c. evidence of root pruning/severance, e.g. recent trenching or excavation work in the proximity of the main stem; *and*
d. any other visible defects.

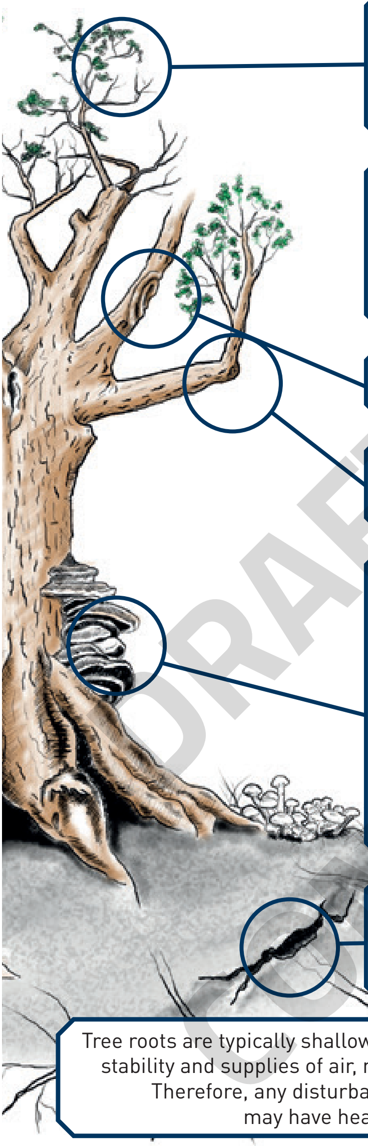
4.2.5 Pre-climb inspection of the stem and crown should assess it for signs of decay or weakness, for example *(see illustration overleaf)*:

a. fungal fruiting bodies, cavities, cankers and poor health;
b. major deadwood and hanging branches;
c. asymmetry of the lower main stem;
d. open wounds;
e. potential structural weaknesses that may be indicated by included bark in forks, weak branch union, abrupt bends and epicormic growth;
f. damaged stems and/or branches with cracks or splits;
g. evidence of previous work, e.g. 'topping' and 'lopping', or branch regrowth from a stub which may have a weak branch union because of decay; *and*
h. any other visible defects.

4.2.6 It is important that any climber involved in tree climbing operations has a basic ability to identify tree species and to understand timber characteristics and seasonal variations as these may affect the structural integrity of the tree, which in turn may have a bearing on the work specification and the access technique used.

4.2.5 Pre-climb inspection.





Crown dieback:
Foliage small, sparse or pale. Late flushing or premature leaf fall. General lack of vigour.
These are symptoms of ill health and often indicate root damage and/or biological dysfunction.

Other crown hazards may include:
Dead, broken, split/cracked, rubbing and hung up branches.

Crown formation/architecture:
Unbalanced crown; excessively weighty branches; long, lone, isolated branches; past poor pruning works causing hazards e.g. 'lion's tailing'.

Cankers:
May be a point of weakness in branch or stem.

Abrupt bends:
Most likely the result of past pruning. Decay may enter wound, weakening branch union.

Fungal fruit bodies:
Could be found around root plate, collar, trunk, stems, branches and the site of old wounds. Generally, fungi use enzymes to break down woody material as a source of food. This process can cause decay and ill health.

NB: There are numerous types and species of fungus and the likely implications for a tree's health and safety can range from minimal to very severe. It is therefore important to be able to positively identify the particular fungus and understand its function, before determining any health and safety implications.

Soil cracks/Ground heave:
Cracking and ground heave are potential indicators of instability.

NB: The whole root plate area should be inspected.

Tree roots are typically shallow. They have a dual role providing anchorage/stability and supplies of air, moisture and nutrients to maintain growth. Therefore, any disturbance to the roots and surrounding soil may have health and safety implications.

4.3 Site Zoning

4.3.1 During any work at height task, operators – particularly those working on the ground – can be injured by falling tools, equipment or debris. When the layout of a work site is planned, the risk associated with falling objects must be considered and appropriate drop and working zones must be set up. Such zones must be established, communicated and maintained by everyone involved in the work as part of the risk control system for the site.

4.3.2 The size of each zone should be assessed and determined individually. Changes to the dimensions of any zone must only be made following a reassessment of the factors that determined the original zone size and only after carefully considering why a change is to be made.

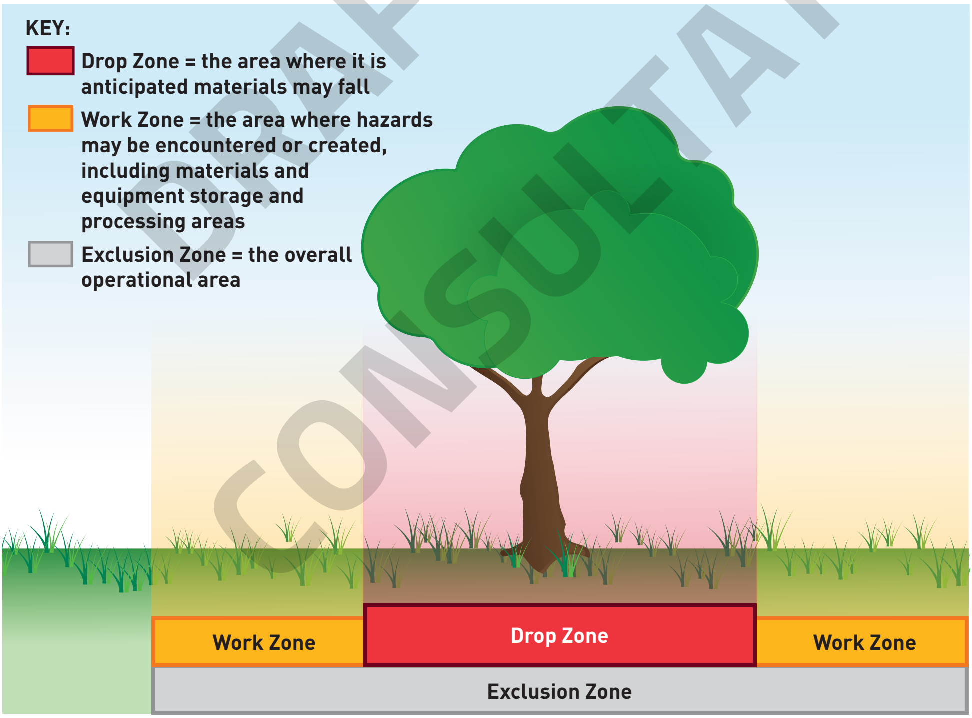
4.3.3 If a zone size or location is to be changed, the details of the alteration must be made clear to everyone involved in the operation.

4.3.4 Any operator entering a drop or work zone must wear PPE in accordance with current good practice. This requirement must be strictly enforced by the competent person on site, e.g. the foreman.

4.3.5 **Drop Zone:** this is the area where it is anticipated materials may fall and therefore people or property would be at significant risk from falling objects *(see illustrations below)*.

4.3.6 The factors that will influence the dimensions of a drop zone include but are not limited to:

a. wind conditions and direction;
b. size, weight, shape and type of material;
c. accuracy (experience) of the person dropping the material;
d. contact with other objects, e.g. lower branches;
e. height of fall; *and*
f. the surface onto which the material falls and its topography.



4.3.5 Clearly identified and communicated drop zones must form part of planning the work site layout.

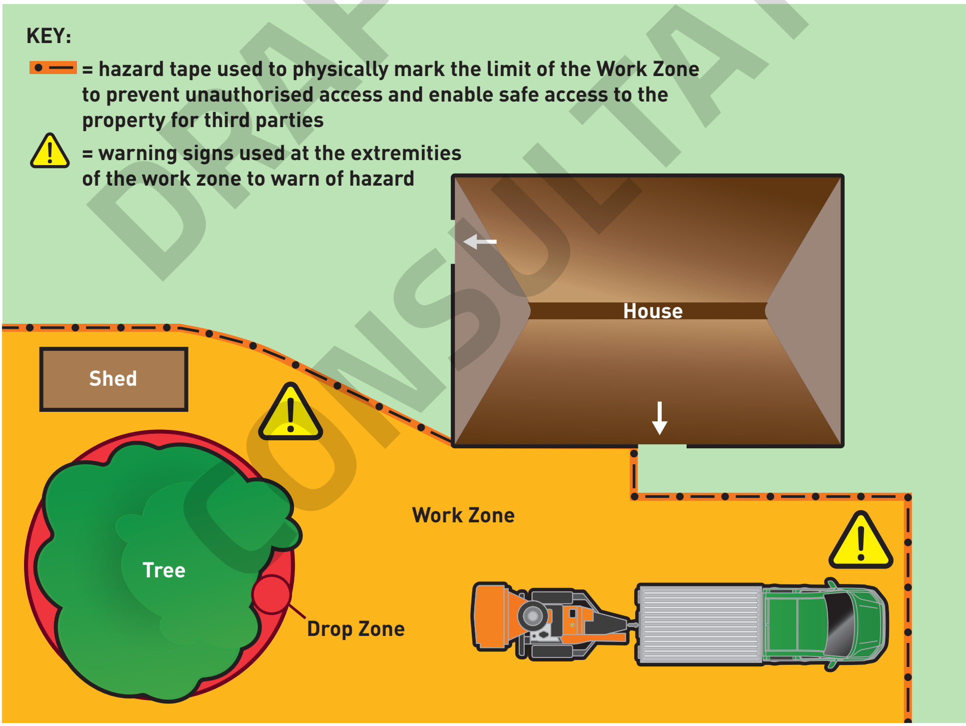
4.3.7 Specific controls must be in place to manage entry to the drop zone. As a minimum these should be verbal confirmation from the climber to ground staff and vice versa that it is safe to proceed, and demarcation, e.g. physical barriers, signs, floor indicators, physical features (canopy dripline, for example).

NB: A drop zone need not necessarily be physically marked, such as with barriers. However, the limits of any drop zone must be agreed and all those engaged in the task (climbers and ground staff) must know the extent of those limits.

4.3.8 **Work Zone:** an area where hazards could be encountered or created. The risk that items from the drop zone could enter the work zone must be considered, and therefore control measures may need to be introduced such as extended drop zones and particular work practices, e.g. branch lowering techniques, to minimise the chance of falling objects entering the work zone.

4.3.9 Anyone who is not authorised to enter the work zone must stay outside it. Signs and guards must be established and maintained at the perimeter of this zone.

4.3.10 The climber must also make it clear when equipment is being handled in the tree, such as during the installation of friction savers, in case objects are dropped. The climber must ensure the areas below are clear and must give a verbal warning before installing the equipment. The climber must receive a positive reply to the warning before proceeding.



4.3.8 Identification of both drop and work zones as part of laying out the work site.

5

Occupational Health

Checklist:

- Can everyone on site maintain 'situational awareness'? Are they fit and well, physically and mentally?
- Is everyone on site aware of any individual operator's limitations?
- Does anyone on site require reduced exposure duration to, or increased protection from, a particular hazard which may affect their health? If so, has this been implemented?

Have you checked?

5.0 Occupational Health

5.1 All climbers involved in arboriculture have a responsibility to promote good occupational health in the workplace. Self-awareness among climbers and ground staff about their own health and how to reduce the chances of long-term sickness and ill-health will help develop a positive culture in the workplace.

5.2 Anyone taking practical measures to improve their health – such as stopping smoking, improving diet and increasing water consumption – is taking positive steps and should be encouraged by other members of staff.

5.3 The development of a positive culture in the workplace, where each individual feels valued and has the opportunity to discuss health-related issues, should be encouraged. Climbers or ground staff who report any signs of ill-health – their own or a colleague's – to the competent and/or the responsible person as soon as possible will help improve that culture. Ill-health can impair judgement and physical capability and can therefore affect the safety and wellbeing of both the individual concerned and the team.

5.4 The following specific occupational health factors should be considered as part of tree care operations because they can have a day-to-day effect on staff. They include:

a. Exposure to the sun, potentially resulting in poor hydration levels, sun stroke and heat exhaustion. Avoid exposure and seek shade. Try to sequence your work to allow climbers to stay in the shade of the tree for as long as possible. Long-sleeved tops, trousers, sunglasses and sunscreen are relevant controls to protect against the UV in sunlight.

b. Warming up and stretching. All climbers should make sure that they are warmed up before climbing to reduce the risk of muscular strain. Climbers should be able to use a range of techniques to improve their efficiency and reduce the risk of injury.

c. Workplace-related immunisations. The decision to have immunisations must be based on a risk assessment of the working environment and the operators who are doing the work. Particular environmental factors can present significant hazards, e.g. watercourses, animals, needles. Some individuals are at greater risk, e.g. people with low immunity because of ongoing medical conditions or treatment and new or expectant mothers.

Other health factors:

d. Mental wellbeing. Be aware of and engaged with those around you. Mental wellbeing does not mean the absence of times of stress and sadness; it is more about an individual's general outlook and ability to cope with such times.

e. Substance abuse. This is the harmful or hazardous use of psychoactive substances, including caffeine, alcohol and illegal or prescription drugs. These substances affect the way that the brain and nervous system work and can therefore directly impact on an operator's ability to function.

6

Personal Fall Protection Systems in Tree Work

Checklist:

- **Has the climber elected to use a system that allows them to ascend, move around the tree and descend appropriately?**
- **Does the system correctly comprise a primary system and backup, and does the backup provide protection against failure of the primary system, including mainline, components and anchor?**
- **Have all the working considerations for using a personal fall protection system been taken into account by the climber?**

Have you checked?

6.0 Personal Fall Protection Systems in Tree Work

6.1 Introduction

6.1.1 A personal fall protection system used in tree work allows the user to ascend, move around the tree and descend using the branch structure for support and anchorage.

6.1.2 Personal fall protection systems used by climbers are a collection of components which, when used correctly, work together to prevent a fall, limit the potential of a fall or minimise the distance and consequences of a fall.

6.1 The use of personal fall protection systems in tree work.

Moving rope techniques – ascent.

Image to come

SRT – ascent.

Rope advance.

Branch walking

Descent.

Image to come

Spiking.

6.2 Moving rope technique.

6.2 Moving Rope Technique (MRT)

6.2.1 A technique where the rope passes over or through an anchor and is formed into a large adjustable loop when both parts are brought together. The climber connects to both parts of the rope; one part remains static relative to the climber (often the termination of the rope) and the other is connected via a midline friction hitch or device. As the climber (attached to the system) is ascending, moving around the tree and descending, the rope travels through or over the anchor as a result of the climber's actions, i.e. the taking in or letting out of rope from the friction hitch or device.

6.3 Stationary Rope Technique (SRT)

6.3.1 A technique where the rope is secured to an anchor or multiple anchors so that the rope remains stationary. The climber connects to the rope using one or more friction-based elements and can ascend, move around the tree and descend whilst the rope remains stationary at the anchor.

Image to come

6.3 Stationary rope technique.

6.4 Components of the Personal Fall Protection System

6.4.1 When a proficient operator is using personal fall protection systems for tree climbing, it is expected that there will be a backup system to prevent them falling a distance that is likely to cause injury if the primary system (including the main line, components or anchor) were to fail. The backup should be attached to an independent anchor where possible. If there is no suitable independent anchor, it should be installed over a shared anchor.

Personal Fall Protection system

Moving Rope Technique | **Stationary Rope Technique**

Primary System and Backup

Use of anchors which are independent of each other; if there is no suitable second anchor, systems are installed over a shared anchor

Image to come

Image to come

6.5 The Backup

6.5.1 A backup, in addition to the climber's primary system, may provide additional stability and reduce risk associated with pendulum swings. A device, safety line or system that is used for such a purpose and to provide protection and/ or support in the event of main line, components or anchor failure may include:

a. A second independent primary system, i.e. two climbing systems; this may be referred to as dual-line working.
b. A second primary system formed from the other end of the climber's rope, i.e. the climber is using both ends.
c. Use of an adjustable lanyard.
d. Use of a trailed type backup device that will move with the user but lock when a sudden load is applied.

Image to come

6.5.1a A second independent climbing system used as a backup.

6.5.1b A second primary system formed from the other end of the climber's rope.

6.5.1c Using a lanyard as a backup in conjunction with the climber's primary SRT system.

Image to come

6.5.1d A backup device that will follow the user.

6.6 Working Considerations

6.6.1 A climber who is correctly using and applying their chosen system:

a. should ensure that the fall protection system does not allow a potential fall distance to exceed 500mm;

b. must only connect the fall protection system via approved points on their harness. The same point on the harness may be used to connect the primary and backup systems;

c. for self-rescue*, should ensure the primary system is positioned throughout the duration of the task to allow the climber an uninterrupted descent to the ground without the need to re-anchor;

d. must take steps to ensure they cannot descend inadvertently off the end of either the primary or backup systems; *and*

e. will only omit the backup in cases where it is not practical to maintain it for the specific, short-duration task of rope advance/changeover; in these circumstances the climber will remain stationary during the procedure.

*During self-rescue, the climber's backup would be disconnected for descent.

Image to come

6.6.1b The climber's primary and backup system connected through a single pelvic attachment point.

7

A Strategy for Access

Checklist:

- **Do the methods selected take into account: the tree condition assessment, climbers' abilities, training, surrounding features and tree structure?**
- **Have all aspects of the chosen access method and ascent technique been discussed and agreed as a safe method of working by the team?**
- **Does the selected access technique lower the risks of muscular skeletal disorders and fatigue? Has equipment been tailored to the operator's ergonomics?**
- **Is the work team familiar with the techniques to be used to allow an effective rescue to take place?**

Have you checked?

7.0 A Strategy for Access

7.1 General

7.1.1 In order to carry out tree work at height safely, the climber will need to undertake an assessment to (1) determine the most appropriate method for access and (2) select an appropriate ascent technique.

7.1.2 The outcomes of these decisions must meet the requirements of the site-specific risk assessment and the tree condition assessment.

7.1.3 The flow chart opposite is intended to help the climber determine the appropriate access methods and ascent technique.

7.2 Rope Installation

7.2.1 The chosen method of installing the rope will depend upon:

a. the ascent technique to be used;
b. the desired position of the rope within the canopy of the tree;
c. proximity to overhead utilities/infrastructure; and
d. the physical capabilities of the climber.

7.2.2 For example, if body thrusting is the chosen method, a rope positioned in the lower part of the canopy against the stem would be adequate. However, this will not be the preferred option if the climber is using a stationary rope technique, where rope(s) positioned hanging freely from the main stem would be most advantageous.

7.1.3 *Determining access methods and ascent technique.*

Tree condition assessment carried out[1]

Site-specific risk assessment carried out and controls implemented[2]

Structure identified as safe to climb via rope and harness[2]

Select access method according to:[1]

a. availability of unquestionably reliable anchor points;
b. avoiding hazards within the tree;
c. equipment availability;
d. proficiency of the climber;
e. access to the base of the tree;
f. extraneous vegetation present, e.g. ivy; *and*
g. tree form.

- **Rope throwing**
- **Throwline**
- **Extendable poles**
- **Ladders and steps**

Identify ascent technique to be used based upon:[1]

a. anchor points selected;
b. efficiency of ascent;
c. fatigue reduction;
d. minimising key risk points, e.g. changeovers;
e. position of rope within the structure; *and*
f. access routes.

- **Moving Rope Technique: body thrusting**
- **Stationary Rope Techniques**
- **Spiking**

Select appropriate equipment ensuring compatibility and correct configuration[1]

Work team and climber must confirm sufficient planning, equipment, personnel and operator proficiency are in place for aerial rescue

Communicate the work plan and methods to be used to the team[2]

Work team agrees it is safe to proceed

NO | **YES**

[1] A process led by the climber.

[2] A process led by the competent person on site in consultation with the climber.

7.3.2 A coil allowing the rope to unravel once thrown .

7.3.2 A rope coil which will remain in the rope as thrown, as well as adding weight.

7.3 Rope Throwing

7.3.1 Rope throwing may be chosen as the method to install a rope when significant height and/or distance are either not necessary or not desired.

7.3.2 The climber should select their throwing technique based on whether the rope should remain coiled or uncoil as it is thrown. The climber should select a throwing style that they are comfortable with and proficient in using – side-arm, underarm, overarm or overhead. Where a misdirected throw may pose a risk to others, e.g. a rope could enter a highway, consider alternative rope installation techniques such as the use of poles.

7.3.3 Additional weight in the form of hardware should not be added to the rope being thrown as this may damage the equipment or the tree or strike the climber. Where additional weight is required to assist with direction or for a rope to drop, a throw-bag weight or ball may be used.

7.3.3 A throwball weight added to the end of the climber's line.

7.3.4 An climber may 'walk' a rope along a limb to ensure the anchor is positioned as close to the main stem as possible, reducing any lever arm effect on the main branch union.

7.3.5 When the desired rope position is within a fork or close to the main stem, the climber must ensure that this position has been achieved and that the rope is not caught on epicormic growth or similar which may unpredictably break.

7.4 Throwlines and Associated Equipment

7.4.1 A throwline can be a very effective method of installing a climbing line high in a tree.

7.4.2 Tree form and surrounding hazards may limit the use of throwlines. For example, the bag can get stuck in a tree covered in ivy or epicormic growth.

7.4.3 Additional risks may arise from misdirected throws, overhead lines or the recoil of a snapped line when it is stretched.

7.4.4 An initial throw may send the line over several branches. By using a bag on either end of the throwline, a climber can manipulate it so that the line is installed over a single isolated branch.

7.4.5 Using two throwlines, two independent anchor points may be established from a single throw.

7.4.6 In certain circumstances, the line can be installed through the canopy and routed over multiple branches, e.g. when the climber is employing a stationary rope technique. This type of rope installation can work well where it is difficult to isolate a single branch because of a complex canopy or physical limitations.

NB: *Be cautious when installing a rope over multiple branches as it can exert eccentric forces on the canopy of the tree and cause branch failure.*

7.4.7 Once the throwline is installed, it can be attached to the climbing rope using a karabiner or tied on, e.g. using a clove hitch and a series of half hitches.

7.4.8 Specific equipment, such as a catapult, can be used to send a throwline a long distance.

7.4.5 ***Establishing independent anchor points using throwlines.***

7.4.8 ***Using a catapult to achieve a greater throwline distance.***

7.5.1 Using an extendable pole to assist with rope installation.

Image to come

7.6.2d Using a pre-installed overhead anchor to protect the climber during ascent.

7.5 Use of Extendable Poles

7.5.1 Extendable poles can provide a climber with a means to install part of their rope system. Poles can be used either from the ground to position an initial anchor in the canopy or from within the canopy. Poles with fitted hooks will significantly reduce the risk of damage to textile components or people and are preferable. If a saw head is to be used, a cover/scabbard should be in place.

7.5.2 Whenever extendable poles could be used, consider the following:

a. site-specific hazards, e.g. overhead lines: ensure appropriate safe working distances are maintained and exercise caution where poles may extend outside of the tree canopy;
b. the climber is responsible for ensuring the drop zone is clear when poles are in use; and
c. ensure a method is employed so poles can be securely fastened within the tree when not in use, not relying upon propping or balancing.

7.6 Ladders and Steps

7.6.1 Ladders or steps must only be used for low-risk, short-duration tasks, such as accessing the lower canopy to begin a staged ascent.

7.6.2 The following points should be observed to help reduce the risks associated with their use:

a. Ladders must be of a type rated for industrial or heavy-duty use, be subject to recorded periodic checks by a competent person and be inspected by the operator prior to use.
b. Operators must be able to demonstrate adequate training in their safe use via methods such as:
   i. in-house internal training, led by a competent person/proficient operator;
   ii. nationally recognised and accredited training; *or*
   iii. tree access training that incorporates safe ladder use.
c. The set-up (safe operational angles, footing, correct overlap, use of stabilisation devices etc.) and transport of ladders must be in accordance

7.6.3 Climber secured to the tree with both primary and backup system as she leaves the top of the ladder.

with manufacturer's instructions, which the competent person must ensure operators have access to.

d. A rope can be installed (by throwline, for example) to safeguard the climber's ascent of the ladder. Ground staff can tend a climber's system during ascent so that the climber can keep both hands in contact with the ladder.

e. The climber must be secured to the tree before leaving the ladder or when installing a higher anchor point from the top of a ladder.

f. Ladders are normally only used as a means of accessing the crown of the tree. Once the climber is secured to the tree, the ladder should always be removed and stored safely to prevent damage to it, rope entanglement or the ladder being inadvertently knocked over.

g. The climber should avoid working from the ladder where higher, easily accessible anchor points are available. The ladder can then be removed before work starts.

7.6.3 Where a ladder is used as a means of providing a temporary platform for work, the climber must be secured to the tree and the ladder secured to stop it moving.

7.6.4 When a risk assessment has determined that uninstalling a ladder poses significant risks to climbers or surrounding structures, a ladder-lowering system is the preferred option. It will also help prevent damage to equipment. A lowerable system could be required because of the height and weight of the ladder when it is extended, the number of people available to carry out the operation or the specific conditions, e.g. wet and slippery.

7.6.5 A lowering system should contain an element of friction management, e.g. a Munter hitch, not be an operator simply holding a free-running rope.

7.6.6 Where the climber is working with ground staff to control the lowering system from within the tree, the ground staff must ensure they are not positioned directly beneath the climber or the ladder.

8

Selecting an Ascent Technique

Checklist:

- Does the climber have the appropriate knowledge to safely ascend and descend on their chosen ascent system?
- When an ascent technique is used, are the distance and consequences of a fall minimised?
- Does the climber use correct rope advance procedures during changeovers?
- Is the climber correctly anchored to the tree at all times?
- Are newly established anchors subject to a full body weight test where practical?
- If spikes are used, is it possible to descend without solely having to spike back down the stem?

Have you checked?

8.0 Selecting an Ascent Technique

8.1 Moving Rope Techniques (MRT)

8.1.1 Body thrusting

This technique can be used where ascent distances are short and a number of changeovers are needed to get to the final anchor point.

a. Climber installs primary and backup system to suitable anchors and 'body thrusts' to ascend, i.e. pulling the moveable part of the climbing rope and sliding the friction hitch/mechanical device to take up the slack.

b. The climber's route and rope installation should be planned so that where possible they can stand or sit whilst changing anchor points.

c. The climber can roll over to sit on an anchor branch, ensuring that no potential fall distance is greater than 500mm, or they can hang beneath an anchor. In both scenarios the climber must ensure equipment is correctly used and remains appropriately configured.

The climber maintains their primary and backup system whilst climbing higher throughout the structure.

d. The system may be reduced to one primary attachment during rope advance/changeovers and while anchors are re-positioned provided the climber remains stationary during the procedure.

e. Alternatively, a third, supplementary system such as an adjustable lanyard may be used to maintain two systems throughout the changeover procedure.

f. Additional equipment may be incorporated into the climber's system such as foot ascenders or micro-pulleys to help manage slack and make ascent more efficient.

8.1.1a Using the body thrust technique to ascend the tree.

8.1.1b A comfortable, stable position adopted by the climber using the tree structure.

Image to come

8.1.1d Rope advance techniques to allow for ascent.

8.1.1e Primary and backup systems in place with the addition of a lanyard to allow two permanent connections to be maintained.

8.1.1f Incorporating a foot ascender helps facilitate an ascent.

8.1.2 Changeovers (or Rope Advance)

Changeovers happen either during the ascent in order to pass branches and establish higher anchor points or to improve the climber's position. The following protocol should be adopted by climbers to help reduce the risks associated with changing anchors.

At the point of changeover primary and backup systems should be put in place around suitable anchors

The climber's weight must be fully transferred into any newly established system and anchor point before any existing system is released.

Note: Where practical this should be a full-body-weight test, whereby the climber correctly hangs in their harness off the anchor.

Image to come

When changing anchor points, check physically and visually that any newly established systems are correctly connected to the harness, to approved anchor points designed for either support/restraint or suspension

8.2 Stationary Rope Techniques/Systems (SRT/SRS)

8.2.1 Such techniques may be employed to provide an efficient (quicker, less effort) access technique into a tree.

Climber installs primary and backup systems often using a throwline, securing them to suitable anchors, either as basal or canopy tie-offs or a combination of both

↓

When installing systems, it may be advantageous to set them hanging away from the stem, depending upon the technique to be used

↓

Once installed, the components can be assembled to form the climber's ascent system

Image to come

↓

The climber should not ascend a line without first having the equipment and knowledge to safely descend on that line if required

8.2.2 Where a base anchor is used as part of the ascent system, the climber must ensure they are securely attached to the tree before they instruct ground staff to untie/release an anchor.

8.2.3 In order to advance a canopy anchor whilst a system remains connected to a basal anchor, the climber can use a temporary anchor such as a sling to create a new anchor higher in the tree. In such circumstances the sling must be entirely fit for purpose and the connector used between the sling and rope must have a spring-loaded self-locking gate that requires at least three distinct movements to open it.

Image to come

Image to come

8.2.3 Using a sling to advance an SRT canopy anchor.

8.3 Spiking

8.3.1 This technique can be used for access, movement and positioning where the climber needs to maintain a secure, mobile connection with the stem. This can be most advantageous when working on featureless vertical or near-vertical stems.

8.3.2 The use of spikes is invasive and can significantly damage the tree. For this reason, their use should be considered carefully and they should be employed only where tree health is of negligible consequence, e.g. when the tree or tree section being climbed is being removed, or during aerial rescue where the safety of a casualty takes priority.

8.3.3 Spiking is not a stand-alone technique and must be used with a personal fall protection system. A system may be configured for ascent or descent that incorporates elements of moving or stationary rope techniques.

8.3.3 Spiking with an SRT personal fall protection system.

8.3.4 When spiking, the climber must be secured to the tree with a primary and a backup system, but may be reduced to one system during changeovers.

Image to come

8.3.4 A lanyard and MRT system acting as a primary with backup.

Image to come

8.3.4 SRT and lanyard use.

Image to come

8.3.5 Double wrapping.

Image to come

8.3.5 Crossing.

Image to come

8.3.5 Choking.

8.3.5 Where reasonably practicable, any fall protection system configured for spiking must ensure the potential distance and consequences of any fall, whether during ascent, descent or changeover, are minimised. Techniques such as double wrapping, crossing or choking lanyard systems may help achieve this.

8.3.6 Where techniques used to reduce the distance of a potential fall are not practicable, such as during access on larger diameter stems, alternative work methods could include:

a. installation of an overhead anchor, either in the tree which is to be worked on or in another tree; *and*

b. both the primary and backup system working together around the stem combined with the friction that the bark or stem structure may provide to prevent the climber's system from slipping.

8.3 Spiking ascent.

A reinforced adjustable flip-line will often be used as part of a personal fall protection system when spiking up a tree because it can be easier to 'flip' up the back of the stem. The reinforced core can also reduce the risk of cutting through the flip-line when working close to the anchor point

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Where a reinforced flip-line has a mechanical adjuster, it must be used in conjunction with a textile connector so that there is a point at which the system can be severed during an aerial rescue

↓

Where components are connected to the harness D-rings (side or lower), climbers must take care to manage any torsion of connectors and avoid gates coming into contact with objects and 'rolling' open

↓

On very thin stems, when a system attached to D-rings is being used, safety and stability can be increased by crossing the system in front of the stem or double wrapping it around the stem. Friction on the stem may be increased and in turn help the system grip in the event of a slip

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The climber ascends the tree on spikes supported by a primary system and backup around the stem, e.g
a. lanyard/rope system; *or*
b. dual climbing systems

8.3.7 The climber's system must be configured so that it is possible to descend without solely having to spike back down the stem. The climber's primary system running through a temporary anchor such as a friction saver, or choked to the stem, will help maintain an MRT or SRT system for descent.

8.3.7 The climber's primary system running through a temporary anchor for descent.

Image to come

8.3.7 The use of SRT during descent.

9

Managing Slack and Improving Climber Positioning

Checklist:

- Is the climber always secured to at least one anchor point throughout the duration of work at height?
- Does the climber ensure that there is no more than 500mm of slack in the system being used?
- Are two high anchors used wherever practical?
- Has the climber included an adjustable lanyard as part of their system?
- Does the climber use their fall protection system appropriately to reduce the risk of pendulum swing?
- Are the correct connection points to the harness being used, appropriate to the operation?

Have you checked?

9.0 Managing Slack and Improving Climber Positioning

9.1 General

9.1.1 A climber will use the tree structure and their fall protection system to move around the tree and must always remain anchored to the structure.

9.1.2 When the climber is branch walking and adopting working positions, the fall protection system should be kept as taut as possible, not introducing more than 500mm of slack into either system, to prevent the risk of a free fall and the potential associated arrest forces.

9.1.3 When moving around the tree structure, the climber should lean away from their anchor points, using the rope systems for support. Keeping low to the branch during branch walking will help maintain balance.

9.1.4 The climber should avoid the potential for a pendulum swing by installing appropriate redirects, using positioning anchors and repositioning and/or sharing anchor points.

9.1.3 Climber leaning away from his anchor points, using the rope systems for support.

9.1.4 Using multiple anchors to aid the climber's positioning.

9.2 Managing Slack

9.2.1 Climbers should configure their system to minimise and control any slack that may be generated within the fall protection system and should use tree climbing techniques that will help with this. Measures can include:

a. The use of a pulley beneath the friction hitch. This can act as a 'slack tender' allowing the pulley to be advanced with one hand when the climber is returning from branch extremities.

9.2.1a Using a slack-tending pulley beneath the friction hitch.

b. Adopting rope management techniques whereby slack is not generated in the system; this relies on the climber holding their own weight whilst drawing the rope through the system.

c. Floating prusik: the climber's system is configured to allow the friction control element to be positioned further from them, thus keeping the system taught during both ascent and movement throughout the canopy.

Image to come

9.2.1c Floating prusik configuration.

d. Incorporating mechanical advantage within the climbing system to assist in ascent in the vertical plane, e.g. the climber can set a 2:1 system as part of their climbing system.

Image to come

9.2.1d Incorporating mechanical advantage during ascent.

Image to come

9.2.1e Self-hauling technique to improve rope management.

Image to come

9.4.2b An M rig to help triangulate the climber's position.

e. The use of 2:1 self-hauling techniques, in particular with SRT systems, the principle being to create a fixed point on the stationary rope between the climber and canopy anchor which will function to redirect the rope.

9.3 Working at Crown Extremities

9.3.1 When working in the extremities of the crown it is sometimes necessary to carry out work above the main anchor points. In some situations, it may be possible to use extendable tools to reach higher into the crown.

9.3.2 Another method is for the climber to establish positioning anchors above and in addition to their personal fall protection anchor points. The purpose of these higher positioning anchors is to give short duration, temporary support for work in a small area of the crown.

9.4 Double-anchor Configurations

9.4.1 Using two high anchors set a reasonable distance apart can offer improved positioning by triangulation from both anchors, helping climber stability and reducing possible lateral stress on each anchor.

9.4.2 Double-anchor techniques include:

a. double crotching:
   - i. using the backup if appropriate (dual system working); *or*
   - ii. using the other end of the primary system

b. V or M rig, helping to potentially spread load between anchor points and triangulate position.

9.5.1 Using a lanyard use to provide stability at the climber's work position.

9.5 Adjustable Lanyards

9.5.1 Climbers should carry an adjustable lanyard while climbing to aid their positioning in and around the canopy.

9.5.2 Lanyards must be adjustable to provide sufficient support and to remove slack. Adjustment could be by a friction hitch or a mechanical adjuster.

9.5.3 Adjustable lanyards can be used in the following applications:

- **a. To prevent or reduce the consequences of a pendulum swing**
- **b. To improve positioning: particularly relevant in the upper and outer crown**
- **c. To provide a backup in the event of the primary system and/or anchor failing**
- **d. To provide a direct link between casualty and rescuer**
- **e. When changing anchor points**

Image to come

9.5.3b Lanyard used to improve positioning.

9.5.3c Lanyard used to provide backup.

Image to come

9.5.4a ***Lanyard use in single-leg mode.***

Image to come

9.5.4b ***Two-handed lanyard adjustment.***

Image to come

9.5.4b ***Additional friction added to maintain hitch or device function.***

9.5.4 When using an adjustable lanyard, climbers must note and act on the following points:

a. If it is used in a single-line configuration, check that the adjustment mechanism grabs reliably and such use is in accordance with the manufacturer's recommendations for use.

b. When a lanyard is used in a single-line/single-leg configuration and therefore the majority of the climber's weight may be on it, the adjustment element (friction hitch or mechanical device) may not function in the same way as when the lanyard is used in a 'side to side' or 'double mode' configuration. Use two hands when making adjustment (one on the friction element and another on the tail end).

   When the lanyard is to be exposed to full body loading, additional friction – in the form of a Munter hitch or anchor ring – may be incorporated to provide normal friction hitch/device function.

c. When a climber is using harness attachments designed for support and not suspension, i.e. side D to side D, their weight must be borne in their feet.

Image to come

9.5.4c ***Side D to side D use for support.***

Image to come

9.5.4c ***Lower D to lower D for support.***

Image to come

9.5.4c ***Lower D to lower D for suspension.***

Image to come

9.5.4c ***Bridge attachment for support or suspension use.***

d. The system should not be attached to one side of the harness alone, in particular when it is acting in a backup function.
e. A stopper knot or another suitable measure must be employed in the end of the lanyard to prevent accidental release when it is fully extended.

10

Descent

Checklist:

- Does the climber's primary system allow for an uninterrupted descent to the ground?
- Does the climber check the length of rope before descent?
- Is the climber's system appropriately terminated?
- Is descent carried out in a controlled manner that minimises risk to the climber and potential equipment damage?
- Are anchor devices lowered in a controlled manner?

Have you checked?

10.0 Descent

10.1 It is the climber's responsibility to ensure the primary system is positioned throughout the duration of the task to allow an uninterrupted descent to the ground, i.e. without the need to re-anchor.

10.2 Before descending, the climber must ensure:

a. The primary system rope is long enough to complete the planned descent. The climber can check rope length using the other end of the primary system rope (loop must reach the ground).

b. Systems are terminated so that any friction hitch or mechanical device cannot run off the end of the rope, e.g. by using a stopper knot or having a long enough rope.

c. The planned route for descent takes into account the positions of tools and equipment and how equipment will be retrieved once climbers are on the ground.

10.2a A rope length check performed by the climber using the other end of the primary system, with a stopper knot.

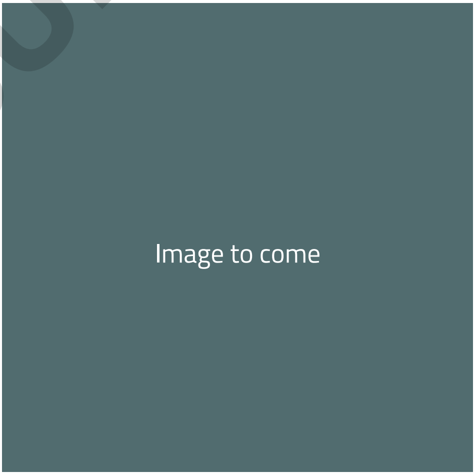
d. The area directly beneath and the landing zone are clear.
e. The descent is carried out in a controlled manner to avoid the excessive build-up of heat that could damage PPE components. Friction management components or techniques can be incorporated to help minimise heat build-up during descent.

These can include:
   i. components positioned beneath a friction hitch such as an anchor ring; and
   ii. applying techniques such as using a Munter hitch in conjunction with a friction hitch.

f. Anchor devices are lowered in a controlled manner to avoid damaging the equipment, infrastructure or anyone affected by the work.

10.2e Adding an anchor ring.

10.2e Adding a bight of rope into the system.



10.2e Incorporating additional components to manage friction.

11

Anchors and Anchor Point Selection

Checklist:

- **Have operators been trained in anchor point selection?**
- **Can the selected anchor support any foreseeable loading, including in the event of a rescue?**
- **Have anchors been fully load-tested prior to ascent?**
- **Have load-bearing anchors within the tree been subject to full body weight tests?**
- **Are climbers using equipment to create anchors in accordance with the manufacturer's guidance and is it suitable for its intended application?**

Have you checked?

11.0 Anchors and Anchor Point Selection

11.1 General Considerations

Whatever method of personal fall protection is used, anchor points must be carefully selected, inspected for suitability and load-tested where applicable before use. It is essential to select appropriate anchor points to ensure the structural integrity of the climbing system; poorly selected anchor points could fail, resulting in a fall from height. When selecting anchor points for use during an aerial rescue, take into account the fact that they may bear additional loads during the rescue.

11.1.1 Damage to the tree's bark at the climber's main anchor point should be avoided, in particular when using moving rope systems. Friction/cambium saver type devices should be installed where trees are to be retained.

Image to come

Image to come

Image to come

Image to come

11.1.1 Ring to ring friction savers.

11.1.1 Pulley type friction savers.

11.2 Anchor Point Selection

11.2.1 Anchor points can be broadly classified into two categories:

- **Personal fall protection anchors:** an anchor point which supports the full potential load of the climber along with any equipment being carried and is suitable in the event of an aerial rescue. The climber must be confident that such anchors, which can accommodate the climber's primary and backup systems, are unquestionably reliable. These are often referred to as load-bearing anchors.
- **Positioning anchors:** anchors which are used primarily to aid positioning and prevent inadvertent movement such as pendulum swings. Often referred to as supplementary anchors, positioning anchors may fulfil the same criteria as fall protection anchors but do not necessarily have to (i.e. they may not be fully load bearing).

11.2.2 Anyone selecting anchor points must be able to demonstrate an understanding of:

a. the timber characteristics of the tree species involved;
b. tree health and the potential effects of any decay, damage or defect present on the tree;
c. branch form: diameter, length and the relevance of angle attachment to the stem; *and*
d. the potential forces that may be placed upon the anchor.

11.2.3 Climbers installing any anchor should consider the following points:

a. the equipment to be used, its suitability and how it will be attached to the anchor;
b. when installed, the anchor and its components must not allow the rope to slip down the stem;
c. any spread in the rope as it passes over an anchor, and the effect this may have on the climber's access technique and equipment;
d. the position of the anchor in relation to the work to be done and the features present in, on, around or beneath the tree; *and*
e. the weather (in particular the wind) expected during the work and how this may increase loading on an anchor.

11.2.3b Use of a temporary anchor that chokes or cinches to the stem prevents it slipping.

11.2.4 Whilst the climber must have the knowledge and experience necessary to select anchor points correctly, a system must be in place where others, regardless of their knowledge and experience, can question the selection of a particular anchor point selected. If a process is implemented whereby co-workers validate anchor points chosen by climbers (in particular initial and main anchors), the risk of poor anchor point selection is reduced.

11.3 Loads on Anchors

11.3.1 The strength of an anchor may be limited by structural weaknesses or defects in the tree. Thorough tree condition assessment and proof loading of anchors prior to committing to their use are essential to ensure sufficient load-bearing capacity is available.

11.3.2 Proof loading anchors from ground level.

Image to come

11.3.4 Full body weight testing of an anchor.

11.3.2 From ground level, the proof loading (testing) of anchors to support the climber's fall protection system must be carried out by applying the weight of at least two people to the anchor. Testing should be carried out by applying full body weight steadily and gradually, not by bouncing or dynamically loading an anchor.

11.3.3 When pre-loading a remotely set anchor to establish its suitability, climbers should listen for cracking, creaking or any other sound that could indicate branch or stem failure in or around the selected anchor.

11.3.4 Whilst establishing new anchors during changeovers/rope advance, climbers must, where possible, apply a full-body-weight load to the anchor and must only commit to a new anchor when they have fully established its integrity.

11.3.5 In systems where a basal anchor is used, the rope should be secured to the basal anchor system before the system is proof loaded.

11.3.6 The multiplication of load on an anchor can vary depending upon:

a. how the system is anchored;
b. the angles at which rope will run into and out from the anchor;
c. friction within the system;
d. type of ascent system used;
e. any slack generated; *and*
f. the length of rope in the system.

System of anchoring	Multiplication of load on anchor point (x)
Moving rope technique	×1
Canopy tie-off	×1
Basal tie-off	×2

11.4 Directional Load on Anchors

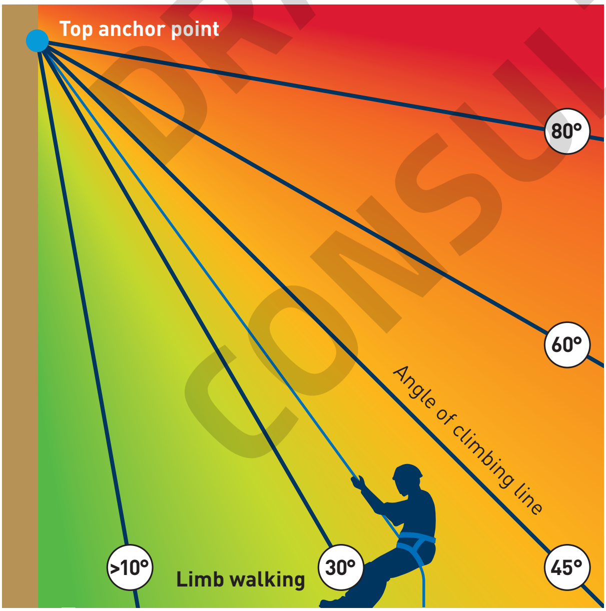
11.4.1 The climber must fully consider the effect their position in the canopy could have on their anchor points.

11.4.2 Anchor points loaded laterally to the direction of the branch/stem growth will be more prone to failure. A load direction of 0°–45° is optimal. As the loading direction moves closer to 90° the force exerted on the anchor will significantly increase. Where the stem is vertical the increase in angle will also increase the risk of pendulum swing.

11.4.3 If possible, the climber should always place anchor points on or around the main stem. Anchor points installed away from the main stem will increase the load on the branch union and could lead to anchor point failure.

Image to come

11.3.6 Anchoring systems and potential multiplication of load



11.4.2 Anchor point loading.

11.4.4 When using multi-anchor and/or equalising systems, the climber must take the following into account:

a. the additional forces exerted on the canopy when connecting to multiple anchors;
b. the additional friction within the system and its effect on movement, including ascent and descent around the canopy; *and*
c. how the system could affect a potential rescue.

11.4.5 **NB:** If anchor points are to be installed high up on slender featureless stems, the climber should consider the lateral loading on the entire stem. In such circumstances, significant lever forces can be placed on the stem which may lead to stem failure.

11.5 Positioning Anchors

11.5.1 The climber should use positioning anchors when appropriate in order to:

a. support their position or stance whilst working in the canopy;
b. prevent or reduce a pendulum swing; and
c. aid horizontal movement within the canopy.

11.5.2 It may be necessary or preferable to have more than one positioning anchor. In these circumstances the climber should evaluate the available anchor points carefully and consider how they will move around the canopy or descend swiftly in the event of an emergency.

11.6.1 Basal anchor incorporating an industrial belay device.

11.6.4 Basal tie-off.

11.6 Basal Anchors/Tie-Off

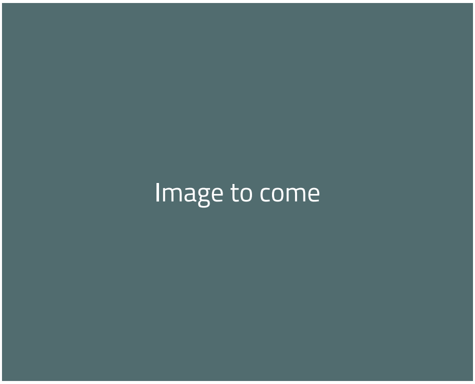
11.6.1 Basal anchors provide climbers with a feature to which a climbing system or belay set-up, such as that used during aerial rescue, may be secured.

11.6.2 When a basal anchor is used, the following criteria must be met:

a. the anchor around which equipment is attached must be suitable and confirmed as such by the climber after they have carried out a thorough tree condition assessment;
b. the position of the anchor must be appropriate: where ground-based chainsaw operations might pose a risk of compromising the anchor, either an exclusion zone should be established which no operator may enter, or the anchor should be placed higher up the stem; *and*
c. the configuration of equipment must ensure anchors cannot slip or ride up the stem. Chokered systems will normally provide adequate grip but stem features such as basal flare may require further consideration.

11.6.3 Climbers may decide to tie climbing systems (base tie) directly to the stem to reduce the number of components required. Any knots used must include appropriate stopper knots.

11.6.4 Any base tie-off that is directly tied to the stem should include the facility to attach a secondary rescue system by which the climber could be lowered.



11.6.4 Basal tie-off incorporating provision for rescue.

11.7.1 A running bowline used to form a canopy anchor.

11.6.5 During tree climbing operations the climber's system may become unweighted. This may result in base anchor equipment sagging or becoming misaligned. Incorporating a turn of rope around the lower section of the stem may help reduce this risk. This technique will also help facilitate drawing slack into the system if emergency lowering procedures are required.

11.6.6 To reduce the risks associated with increased load at anchor points, misalignment of components, third-party interference with anchor systems and the potential physical effects on the tree (rubbing bark), it is recommended that, for most tree work operations, basal anchor systems are used for ascent only.

11.7 Canopy Anchors

11.7.1 Canopy anchors may be formed by the climber's system passing through installed equipment (e.g. a cambium saver), passing through a fork or being tied directly to the anchor. These techniques are all commonly associated with moving or stationary rope techniques.

11.7.2 The use of shared anchors, particularly during moving rope techniques, may cause a conflict due to rope-on-rope contact. To avoid this, the climber may choose to:

a. install moving rope systems so they are set apart to reduce possible rope-on-rope conflict;
b. use equipment such as cambium savers to install the moving rope through; *and*

11.7.3 An alpine butterfly incorporating an autolocking component used as a knot blocker.

c. consider alterative personal fall protection systems such as MRT and SRT systems combined.

11.7.3 Canopy anchors that incorporate the use of knot blocking techniques must include autolocking connectors as a means of protecting the anchor.

Image to come

11.7.7a Reducing spread in the rope.

11.8.3 Installed blocking knot on the main access line.

11.7.4 When installed anchor equipment is remote from the climber, it should be formed of closed components and configured to avoid hardware contacting the tree or neighbouring components.

11.7.5 When establishing a canopy anchor, a climber must not misconfigure equipment, e.g. side loading karabiners.

11.7.6 Where the climber's rope may need to be retrieved through a number of redirects, friction-reducing properties incorporated into the anchor will help reduce rope drag and textile damage.

11.7.7 Where the rope passes over an anchor and the climber wants to ascend a doubled rope, e.g. secured footlock, measures must be taken to reduce the spread in the rope as it approaches the anchor. If this is not addressed, there is the potential for the friction hitch/device to lose grip as it nears the anchor.

It should therefore be ensured that:

a. The climber introduces measures to reduce spread in the rope, e.g. installation of cambium/friction saver, alpine butterfly knot or similar.
b. Where point a) is not adopted, a safe distance from the anchor must be maintained.

   This safe distance can be calculated using a 5:1 principle. For example, for every 2cm of the branch's diameter, a distance of 10cm is observed: if it is secured to a 20cm branch, the friction hitch/device must not come within 100cm of the branch.
c. Where point a) is adopted, a 150mm safe distance should be maintained from the anchor regardless of the friction hitch/device used.

11.8 Mid-line Anchors

11.8.1 Mid-line anchors may form part of a climber's system during both tree climbing operations and aerial rescue.

11.8.2 Climbers must not use frame-loaded toothed ascenders or a cam-loaded non-toothed ascender as a connection point for an anchoring system.

11.8.3 If the climber chooses to use an anchoring system on their climbing/access line, this must include a stopper 'blocking' knot beneath.

11.8.4 The diameter of rope/cord used for mid-line anchors must be adequate and appropriate to the task, regardless of whether the weight of one or two climbers will load the system.

11.9.1 Redirects set to create a rope deviation, providing stability to the climber's position.

11.9.3c A tape sling used to extend the length of the climber's lanyard.

11.9 Redirects

11.9.1 Redirects are used to create a deviation in the direction of the climbing rope. Redirects can be set up using the natural features of the tree or by installing components. If they are made by installing components, redirects can be fixed, adjustable, static or retrievable or a combination of these.

11.9.2 Any deviation in the direction of the climbing line may create directional forces on both the main anchor and the anchor to which the redirect is attached, which must be taken into account.

11.9.3 The type of redirect chosen will depend on the technique being used, the equipment available and the purpose for which the redirect is being installed.

The climber must consider the following:

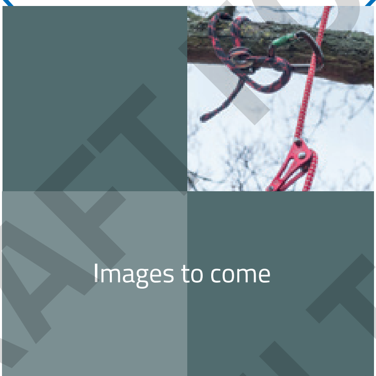
a. The friction the redirect will add to the system: in a moving rope system, this may affect the performance of a hitch and/or the climber's ability to ascend and descend. For example, if a natural fork is used as a redirect, the rope in the system will gain extra friction as it comes into contact with the branch but also as the legs of the rope contact one another whilst travelling in opposite directions.

b. The bend placed on rope: when the rope is redirected through a component, the tighter the bend exerted on the rope (coupled with the load being applied), the greater the strength loss in the rope.

c. The use of components such as pulleys or connectors incorporating some sort of roller will help to reduce friction at redirects in addition to potentially making a bend less tight, which will in turn help to reduce potential strength losses.

11.9.4 When installing, using or retrieving redirects, climbers must follow the guidance set out in the diagram below:

Redirects: key points



Ensure that whilst installing or retrieving the redirect the climber is secured to the structure, minimising the distance and consequences of any potential fall or pendulum swing

Any components installed must provide a secure attachment to the branch or stem which will remain secure when loaded in any potential direction

Retrievable redirects should be configured to prevent inadvertent release of the climbing system and/or disconnection from the stem

Understand the implication of the directional forces placed upon the tree structure, e.g. a redirect that causes the rope to be pulled between 60° and 90° from the main anchor point will place significant lateral loading on the main anchor and redirect attachment

12

Equipment: General

Checklist:

- **Is the equipment provided suited to the task?**
- **Does everyone on site have the correct PPE and is it in good condition?**

Have you checked?

12.0 Equipment: General

12.1 All those engaged in tree climbing operations must wear PPE appropriate to the site, the task and the equipment they are using. It is the climber's responsibility to carry out pre-use checks on their PPE. Only use PPE that is in a suitable condition and not age-expired. Report defective or damaged equipment in accordance with organisation/ company procedures.

12.2 Climbers must receive training that ensures they can select the correct PPE for the circumstances and know how to use, maintain, transport and store it.

12.3 Operators must make sure that PPE is worn in accordance with manufacturer's guidance. Where applicable, PPE must apply to relevant conformity assessments.

12.4 As a minimum, those engaged in tree climbing operations must wear the following:

a. helmet – to relevant standards applicable for aerial work;
b. footwear – providing grip and ankle support; *and*
c. non-snag outer clothing, ensuring harness attachment points are not obscured.

The following may also be needed:

d. eye protection, subject to the requirements set out in the task-specific risk assessment;
e. gloves, suitable for the intended task and subject to the requirements set out in the task-specific risk assessment; *and*
f. further PPE may be required for the tasks to be carried out, e.g using a chainsaw. See *Technical Guide 2: Use of Tools in the Tree*.

12.7 A personal first aid kit must be carried by all climbers. It must include at least one haemostatic dressing. It should include a self-applied tourniquet but only where the climber has received training in its use.

12.8 Climbers must be able to readily access any first aid provision mounted on their harness from a range of work positions.

12.9 Climbers should carry with them the means to safely cut rope, e.g. in a rescue situation. A knife with a retractable blade is recommended, to avoid increased risk to the casualty, rescuer or any part of the fall protection system. Bear in mind that the rope to be cut may be pinned by the casualty or in an awkward position to access.

13

Equipment Components: Building a System

Checklist:

- Does the selected climbing equipment meet the relevant conformity standard?
- Are all parts of the climber's system correctly configured, in accordance with manufacturer's guidance?
- Are neighbouring components of the system compatible with each other?
- Are the standard(s) against which the equipment has been tested identifiable?

Have you checked?

13.0 Components: Building a System

13.1 General

13.1.1 Climbers will often self-build their personal fall protection system, which should always be made up of certificated components. It is the individual climber's responsibility to ensure they are familiar with the components of any personal fall protection system they use.

Image to come

13.1.1 Certified components used to build the climber's system.

13.1.2 Climbing equipment must only be used for its recommended purpose, in accordance with manufacturer's instructions. If a climber wishes to use equipment for a purpose other than that recommended by the manufacturer, written consent must be obtained initially from the manufacturer, and the climber – in consultation with a competent person – must ensure the equipment is entirely suitable for its intended application.

13.1.3 All tree climbing equipment used as PPE should be compliant with applicable test standards that lead to independently verified certification.

13.1.4 All new climbing equipment purchased should be accompanied by evidence of conformity and carry a CE mark to identify that the product has been through a process of independent verification by a notified body.

Image to come

13.1.4 CE marking on PPE.

13.1.5 No equipment should be modified or altered in any way without the consent of the manufacturer and the equipment owner.

13.2 Configuration

13.2.1 Personal fall protection systems should be put together by the climber in consultation with a competent person, to ensure that the system and each component in it are appropriate for the task and correctly configured.

13.3 Compatibility

13.3.1 Each component must be compatible with neighbouring ones so that when used they perform as intended.

13.3.2 Climbers and competent persons should seek manufacturer's guidance to determine whether changing an element in a system presents any form of incompatibility issue, such as hardware items on a harness bridge, or rope type running through a mechanical device.

13.4 Loading Parameters

13.4.1 When equipment is selected and/or configured in a system, the climber must ensure that all reasonably foreseeable loading scenarios have been accounted for and that the system and any component within it can withstand the loads exerted upon them.

13.4.2 It should be ensured through appropriate system design, correct configuration and component compatibility that all elements of the system will return to original form following loading.

13.5 Manufacturer's/Supplier's Information

13.5.1 All climbing equipment must be maintained in accordance with the manufacturer's instructions

13.5.2 The climber should understand and comply with any information or instructions supplied with the equipment. This could be the user instructions or guidance information supplied by the manufacturer.

Image to come

13.5.2 User instructions relevant to equipment in use.

13.5.3 All equipment must be accompanied by:

a. information that identifies the manufacturer;

b. information that relates to its correct use; *and*

c. any relevant test standards.

13.5.3 Basal anchor incorporating an industrial belay device. a = manufacturer. b =symbol for instruction manual. c = EN12841 reference

13.6 Climber's Knowledge

13.6.1 Anyone using any equipment must know how to do so appropriately and safely. Climbers are responsible for deciding whether they have the requisite knowledge before they proceed. This knowledge could come from reading the user instructions or a climber might need to undertake training.

13.6.2 Climbers must also understand the data on a product, its relevance and its meaning in relation to the other items in their system.

13.7 Organisation of Equipment

13.7.1 Suitable and sufficient equipment storage should be provided on the climber's harness, e.g. tool clips, gear loops etc.

13.7.2 Equipment on the harness should be stored in a logical order so the climber can retrieve it and the risk of dropping items is minimised. It should be stowed so that components will not be damaged by contact with each other.

13.7.2 Equipment storage, racked on the harness at the climber's discretion.

13.7.3 All of the following should be considered and acted upon:

a. Textile components should be positioned to prevent material catching on cutting components, e.g. lanyard stowed on the opposite side of the harness to handsaws.

b. Personal first aid provision must be readily accessible.

c. Where a climber can adjust the position of gear loops, these should be set at accessible locations to reduce the need for twisting the upper body.

d. Equipment should be stowed higher on the harness to prevent loops forming which may become a snag or entanglement hazard, e.g. daisy-chaining of rope, storage bags or recoil reels.

14

Equipment for Tree Access and Rescue

Checklist:

- **Are the components of the fall protection system being used correctly in accordance with manufacturer's guidance?**
- **Do the components selected meet technical guidance requirements?**

Have you checked?

14.0 Tree Access and Rescue Equipment

14.1 Friction Hitch and Mechanical Device

14.1.1 A friction hitch or mechanical device is generally used by climbers to progress along a rope or lanyard. It must provide regulated control of ascent and descent during normal mode of use and rescue, and it must be reliably self-locking.

14.1.2 Friction hitch cords must be constructed of materials which have good abrasion- and heat-resistance qualities.

14.1.3 Any friction hitch cord used in a personal fall protection system must meet the following criteria:

a. clearly identifiable, carrying sufficient information to allow traceability back to manufacturer, product name and construction properties;
b. manufactured against validated performance criteria;
c. subject to independent verification by a notified body; *and*
d. suitable for its intended use, based on its diameter and its construction from materials suitably resistant to the abrasion and temperatures experienced during all climbing scenarios, e.g. climbing and rescue.

14.1.3 Friction cord selected against criteria a–d.

14.2 Mechanical Adjusters

14.2.1 Any mechanical adjuster within a system must grab and lock reliably on the diameter of the approved rope in use.

14.2.2 Adjusters can enable easy one-handed take-up of slack when used as part of a lanyard system. However, different lanyard configurations may affect their performance, including their control and reliability. Climbers should carefully consider these factors when selecting and using adjusters for work at height.

14.2.3 Adding friction behind a device in certain scenarios may significantly improve the function and predictability of the device.

14.2.4 If a reinforced lanyard (flip-line) is used, some form of 'cut away' must be incorporated to make it possible to cut the system free.

14.2.4 ***Cut away or soft link included as part of the lanyard system.***

14.3 Connectors

14.3.1 Connectors can be broadly divided into 'open' and 'closed' types. It is important that the most appropriate type is used for each application.

Open Connectors e.g. karabiners

- Multiple profiles available that can be used for specific applications
- Suited to climbing systems where it might be necessary to attach and detach systems frequently
- Allow for quick connections to be made without the need to create terminations

Image to come

Closed Connectors e.g. anchor ring

- Potential wear pattern evenly spread across entire surface area
- Suited to remote anchor locations
- Provide greater protection from inadvertent opening
- Can be loaded in multiple directions
- Can be dual interface, allowing connection of textile and/or hardware components

Image to come

Image to come

14.3.3b Incorrect karabiner configuration.

Image to come

14.3.3c Inappropriate karabiner use.

14.3.2 Karabiners can be used as part of the climber's fall protection system in the following scenarios:

a. primary and backup system to harness connections;
b. lanyard components; *and*
c. establishing a harness-to-harness link during rescue.

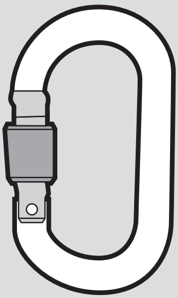
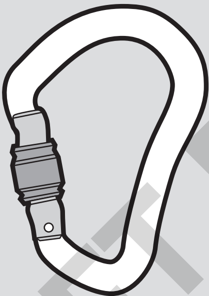
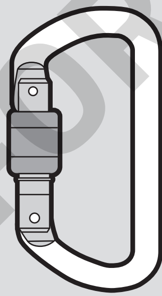
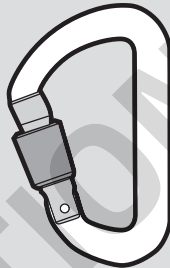
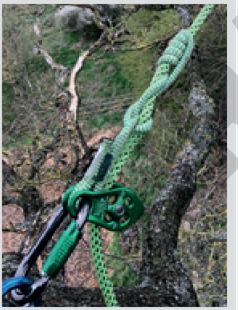
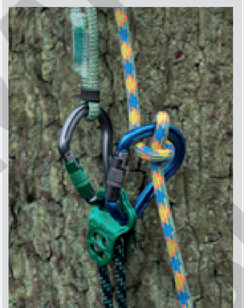
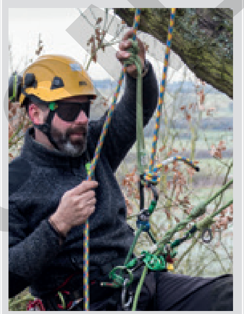
They must have a spring-loaded self-locking gate that requires at least three distinct movements to open it.

14.3.3 There are a number of generic karabiner styles and many different designs, each engineered to be loaded along the major axis. When configuring a fall protection system, the climber must ensure:

a. there is no external pressure against the gate;
b. karabiners are not subject to torsional loading – the kind of loading caused when they are chain-linked; *and*
c. karabiners are not cross-loaded against the frame, i.e. not choked.

14.3.4 Different karabiner styles or profiles can be used for various applications within the climber's system. One profile will not necessarily suit all applications. Therefore, climbers should carefully consider how the karabiner will be used, basing their selection on that analysis.

14.3.4 Karabiner profile styles and their uses.

Oval	HMS	D-shape	Offset D-shape
Used to facilitate centrally aligned systems where the load on the karabiner is shared equally between the major axis and the gated side.	Used where a larger internal volume and wider gate clearance are required.	Used to transfer much of their load close to and parallel with the spine, orientating the load along the strongest axis.	A greater asymmetry than the D-shape, allowing for a wider gate opening whilst still conducting much of the load through the spine.
			
		Image to come	Image to come
		Image to come	Image to come

14.3.5 A karabiner's ability to carry a load is reduced as the width of loading is increased, i.e. as the loading axis is moved away from the major axis. Therefore, as part of an appropriately configured system, a climber should load a karabiner as close to the major axis as possible.

Image to come

14.3.5 Width of loading increase.

Image to come

14.3.5 Appropriately configured loading.

14.3.6 The climber must ensure that any connector is loaded correctly. It is essential that connectors are kept in correct alignment during use to minimise both cross-loading and conflict with locking gate mechanisms. The correct configuration and alignment of connectors can be improved by:

a. using clips, bands or rubber fixings that hold the karabiner or components captive;
b. using a small captive eye in the end of the rope; *or*
c. using a knot designed to constrict around the object it is tied to.

Image to come

Image to come

Image to come

14.3.6a

14.3.7 Any time a connector is opened during climbing, the climber must check it fully closes and locks properly again. This should be both a visual and a tactile check on the locking mechanism.

14.3.8 Where a specific connector may require manual locking, such as Maillon Rapides, the climber must ensure it is fully closed and, where applicable, tightened to the manufacturer's specification.

Image to come

Image to come

Image to come

Image to come

Image to come

14.3.6b

Image to come

14.3.6c

14.4 Rope

14.4.1 When selecting a rope, the climber must carefully consider the compatibility of any friction hitches or mechanical devices used, including but not limited to:

a. diameter;

b. handling characteristics; *and*

c. fibre properties.

14.4.2 It is recommended that climbers use low-stretch, braided ropes designed for tree climbing operations. When new, ropes should have a breaking strength of at least 18kN without terminations and 12kN with terminations.

14.4.3 Climbers must ensure their primary system rope is of an appropriate length, taking into consideration:

a. the size of the tree;

b. any lateral movement which will happen during the task;

c. the type of technique used; *and*

d. the requirement for the primary system to be long enough to reach the ground, allowing the climber an uninterrupted descent to the ground for the purposes of self-rescue.

NB: If a system with a basal anchor is being used and it is set so the climber can be lowered then the rope will need to be more than three times longer than the distance from the ground to the top anchor. If the climber is not being lowered directly parallel to the lead of the line then an even longer rope will be required. Such systems should also include an appropriate stopper knot in the tail of the rope to prevent it passing through the lowering system.

14.4.4 If two ropes are joined to create the length needed, the climber must make sure that appropriate knots and/or closed connections are used; knots must be tied, dressed and set correctly. The climber must consider the loads applied, the relative diameters of the ropes, and whether the rope will need to pass over obstacles or through devices. Specific manufacturer's guidance should be sought to determine if particular knots and/or tail lengths can be used during such an application.

14.5 Friction/Cambium Savers

14.5.1 Anchor devices such as friction savers, pulley savers or false anchors can be used to protect the bark, cambium and climbing rope from friction. This reduces damage to the equipment and to the tree. The reduced friction in the system may also make climbing easier.

14.5.2 Friction savers may also be used to reduce the spread in a rope as it approaches an anchor.

14.5.3 Friction savers may in some circumstances be installed and retrieved from the ground. To aid efficient removal, prevent damage to equipment and avoid snagging in the tree, it is strongly recommended that a throwline is used for retrieval.

14.5.4 It may be possible for an item to be double wrapped or cinched around the stem where no suitable branch fork exists. In such circumstances ensure correct installation and configuration to prevent it slipping down the stem.

Image to come

14.5.4 Double wrapping of friction savers.

14.5.4 Cinching systems to the stem.

14.5.5 Anchor devices that have greater adjustment in their length and can be cinched against a stem may provide a climber with more options and flexibility in a range of situations.

14.6 Harnesses

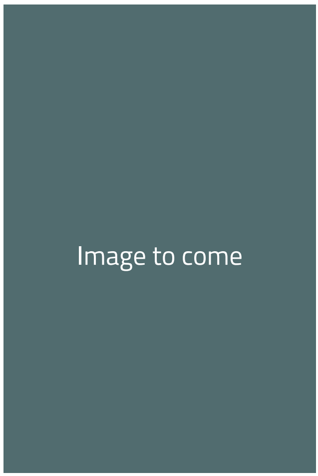
14.6.1 Harnesses for tree climbing comprise a waist belt and sit harness with leg loops. Some models are also fitted with, or can be modified to include, shoulder straps or a seat.

14.6.2 Any harness must only be used in accordance with the manufacturer's intended design and field of use.

14.6.3 If possible, select a harness that has dual or multiple front attachments as these can provide more options for dealing with different techniques or situations. Fixed or sliding pelvic attachments may also provide a climber with a broader range of movement.

14.6.4 If possible, incorporate components at the bridge that can help improve the alignment and orientation of equipment, and can improve the climber's positioning. Such components may play a significant role in avoiding torsion or twisting of components and, in turn, the harness attachment points they are connected to.

14.6.5 The climber must use harness attachment points correctly and in accordance with the manufacturer's instructions.



14.6.4 Using components to reduce torsion and improve alignment.

14.7 Chest Harness/Upper Assembly

14.7.1 A chest harness/upper assembly or neck tether may be used by a climber to help draw the friction system up the rope. A climber should not put improvised elasticated-type neck tethers around their neck because this poses a risk of strangulation.

14.8 Pulleys

14.8.1 A pulley offers several benefits as part of the climber's system, when it is aligned correctly:

a. It can be used to lift a friction hitch, making it self-tending.
b. It can act as a fair lead to keep the running end of the climbing rope in line with the friction hitch.
c. It can act as a slack tender, allowing the pulley to be advanced with one hand.
d. It can be incorporated in a system to help create a V or M rig.
e. When used in conjunction with a friction hitch, it can provide an efficient means of hauling equipment into the tree. The climber can lower a loop to the ground, so ground staff can clip the equipment in and pull on the tail end of the rope to send the equipment up to the climber.
f. A pulley at the climber's anchor point or strategically set within the tree allows for mechanical advantage returns.
g. A pulley may be used to help control a casualty's friction hitch during aerial rescue, or to help establish a system to assist with hauling a casualty during rescue. (**NB:** Mechanical devices may not allow for this mode of operation; ensure the component being used and the method of use are compatible with the manufacturer's guidance.)

14.8.2 For a micro-pulley to act efficiently in different scenarios, the main anchor point should have low friction; for example, it could incorporate a friction/cambium saver.

Image to come

14.8.1e Equipment hauling.

Image to come

14.8.1g Friction hitch control.

14.9 Slings

14.9.1 Stitched tape slings are widely used as an aid in a number of situations. They are available in different lengths and fibre types.

14.9.2 Depending on its construction and fibre properties, the residual strength of a sling may change in different configurations. The climber is responsible for ensuring they are aware of an item's limitations when it is used in different circumstances, and must avoid applying generic principles across all sling types.

14.9.3 Sling applications may include:

a. By using a lark's foot to attach it round a stem or branch, it can create a foothold where none exists.

Image to come

14.9.3a

b. It can be used as part of a redirect.

c. It can be used to extend the length of a lanyard.

Image to come

14.9.3c

d. It can be used as a direct attachment from rescuer to casualty during rescue.

e. It can create a soft link when using items such as reinforced lanyards and mechanical adjusters.

Image to come

14.9.3e

f. It can be used as an improvised 'chest' harness to maintain an unconscious casualty in an upright position.

Image to come

14.9.3f

14.9.4 Slings must be used in accordance with manufacturer's guidance and should not involve:

a. placing knots within the sling to reduce its working length;
b. girth hitching slings together to increase working length;
c. use where energy absorption is required; *or*
d. direct running textile-on-textile contact, e.g. rope running through a sling.

14.9.5 The competent person must ensure that slings are uniquely identifiable. There must be a clear distinction between equipment that may be used for PPE and equipment used for rigging applications.

14.10 Knots and Splices

14.10.1 A loop may be created in the end of a rope by a spliced eye, a stitched eye or a knot.

14.10.2 Where knots are used, the climber must ensure that they are tied, dressed and set correctly. Knots that will tighten up against components and help keep them in correct alignment should always be chosen in preference to knots that form large open loops where components could become misaligned or poorly orientated. Where it may not be practical to use a knot that cinches against a connector, e.g. when using a mechanical device, the climber must take measures to ensure the knots used still remain captive by using items such as construction bands or grommets.

14.10.3 Splices must only be made by someone competent to splice and with the consent of the manufacturer or their chosen representative. Competence should be demonstrable for each type of rope construction.

14.10.4 All open knots or hitches (e.g. split tail to form a Blake's hitch) used within a system must include an appropriate stopper knot.

15

Equipment: Inspection, Care, Storage and Maintenance

Checklist:

- **Have operators received training in climbing equipment inspection, maintenance and record-keeping?**
- **Do all users of equipment understand manufacturer's recommendations for product lifespan, maintenance, storage and use?**
- **Are adequate records maintained of equipment issue, inspection, withdrawal and disposal?**
- **Are visual and tactile pre-use inspections carried out to a proficient standard?**

Have you checked?

15.0 Equipment: Inspection, Care, Storage and Maintenance

15.1 General Procedures

15.1.1 Climbers carrying out tree work at height must be adequately trained and able to carry out pre-use equipment checks. A climber must have practical experience of using the equipment they plan to check, and they must understand the standard to which the equipment should be inspected, as defined by the arboricultural industry and the manufacturer's recommendations. Arboricultural lifting equipment must undergo thorough examination at recommended intervals to ensure the equipment continues to be safe to use. Any individual carrying out thorough examinations must be sufficiently independent and impartial to allow objective decisions to be made.

15.1.2 All in-service climbing equipment must be subject to a pre-use check by the user of that equipment. The competent person must ensure it is demonstrably clear that any individual undertaking pre-use checks has the proficiency to do so, which should include:

a. end-users having access to manufacturers' product data and user instructions;
b. end-users being trained in how to carry out pre-use checks of equipment; *and*
c. periodic auditing to ensure the standard of pre-use checks remains satisfactory.

15.1.3 Equipment must be given a close visual and tactile (touch) inspection to look for:

a. cuts;
b. frays;
c. glazing;
d. condition of rope terminations;
e. functionality of moving parts;
f. contamination;
g. condition of attachment points;
h. burrs;
i. cracks;
j. deformity;
k. corrosion; *and*
l. any other defects

15.1.4 Other key elements that must be inspected include:

a. harnesses for damaged stitching, incorrect buckle function, cuts or fraying, and the condition of the PPE and tool attachment points;

b. the condition of and stitching on friction savers and tape slings;

c. the condition of friction hitch cord, particularly the splices or knots and areas that are subject to high levels of wear; *and*

d. connector condition and function.

Image to come | Image to come | Image to come

15.1.4a

Image to come | Image to come | Image to come

15.1.4b

Image to come | Image to come | Image to come

15.1.4c

Image to come | Image to come | Image to come

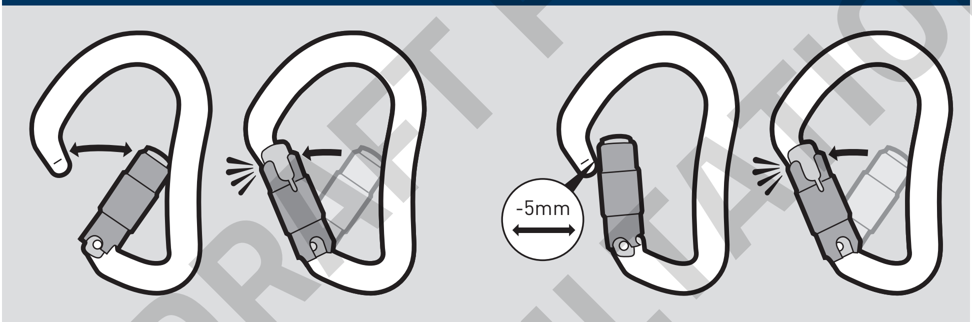
15.1.4d

15.1.5 The inspection of karabiners must include the gate mechanism, looking for signs of abrasion, cuts, deformity and sharp edges.

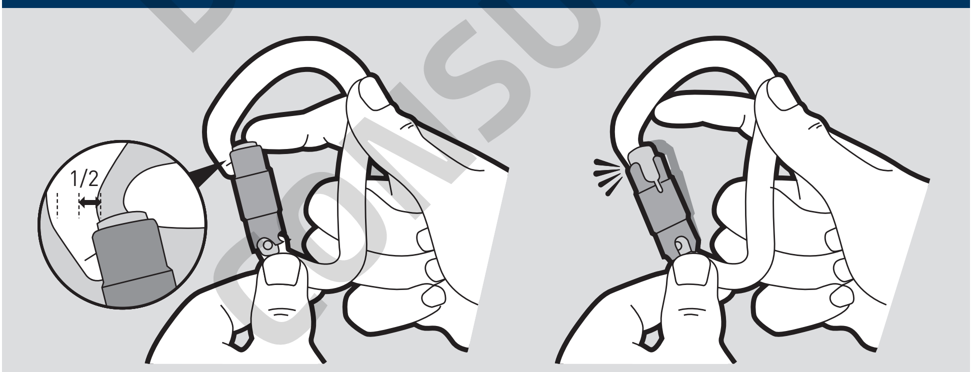
15.1.6 The nose of the karabiner and hinge rivet must also be inspected for condition and correct alignment.

15.1.7 Gate action tests must be carried out without applying bias or influence to any of the actions and as a minimum must include those illustrated below. The gate action must close positively and reliably in order to be safe for use. Cleaning and lubrication must be done in accordance with specific manufacturer's guidance.

a. a fully open gate test **b. a test that is carried out close to the nose**



c. and a test carried out over the nose



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15.1.8 Textile items must be subject to visual and tactile checks. As part of these checks, the climber should run the item through their hands and make a rope loop to ensure a constant curve along its entire length, looking for damaged fibres, inconsistent diameter etc.

15.1.9 Hardware items must be checked for proper operational function on the correct rope type and diameter.

Image to come

15.1.9 An operator pull test to ensure correct function.

15.1.10 Any protective parts that cover splices or stitching should, where practical and possible, be pushed back/slid away to ensure the integrity of the item.

15.1.11 If the climber is not sure about the serviceability of a component at any point, it should be removed from service immediately and thoroughly examined.

15.2 Equipment Lifespan

15.2.1 The lifespan of an item is almost impossible to quantify because of the many factors involved. However, some information is included here for guidance only.

15.2.2 Metal lifespan

a. Most metal items age naturally, even under perfect storage conditions. For metal items, ageing results in slight, if any, strength loss. This is insignificant compared with the wear incurred during normal use.

b. In general, metal items can be used until they exceed acceptable levels of wear or are otherwise damaged. Refer to individual manufacturer's guidance relating to maximum lifespan since date of manufacture.

15.2.3 Textile lifespan

a. Textiles deteriorate with age. The fibres degrade naturally even under perfect storage conditions. This gives textile items a finite lifespan.

b. All textile equipment is subject to wear and tear with use. Ropes and rope tools are particularly subject to high levels of wear and tear.

c. Individual manufacturer's guidance should be followed to help determine the point of retirement, paying particular attention to guidance about lifespan from date of manufacture or from date into service.

15.3 Maintenance

15.3.1 Repairs, alterations or modifications should normally only be carried out by the manufacturer. However, some products have components that can be replaced by the climber such as the bridge on sliding D harnesses and the cam on some rope adjusters. The manufacturer's instructions must be followed in respect of maintenance and replacement parts.

15.3.2 Climbers are encouraged to have resources available on site to allow mechanisms such as karabiner gates to be cleaned and lubricated.

Image to come

15.3.2 Equipment available for field maintenance to be carried out.

15.4 Storage and Transport

15.4.1 Equipment should be maintained and stored by climbers in accordance with the manufacturer's instructions.

15.4.2 Climbers are encouraged to store their equipment in a way that means it will not become confused with other climbers' fall protection equipment.

15.4.3 Consideration should be given to the total weight of a climber's kit bag and how ergonomically it can be manoeuvred. Kit bags with carrying straps may be preferable.

15.4.4 Wet equipment should be thoroughly dried in a well-ventilated environment away from any direct heat source before it is stored.

15.4.5 Storage bags or buckets that allow air circulation will help equipment dry out more efficiently.

15.5 Marking and Traceability

15.5.1 For traceability, individual products must carry a unique identifier. Marking must ensure any item can be traced back to its records. Marking must therefore remain legible and form part of the climber's pre-use checking process for equipment.

15.5.1 Unique identifiers for equipment.

15.5.2 For all product groups, it may be necessary to contact the manufacturer to ensure that items are marked correctly, or where re-marking of an item is required manufacturers may stipulate certain criteria to prevent compromising the structural integrity of the equipment. Always follow manufacturer's recommendations regarding modification or alteration of a product, which may include ID marking it.

15.6 Records

15.6.1 Equipment must be used and maintained within a controlled system. The system should start with a purchase record, enabling traceability ultimately to the manufacturer and a production batch.

15.6.2 Additional records for any item of equipment should also be maintained, including:

a. manufacturer's instructions; *and*
b. any evidence of conformity (which should be filed and retained for as long as the equipment is in use).

15.6.3 In addition to pre-use checks, recorded interim inspections are required on items subject to high wear and tear.

15.6.4 Climbing equipment should be thoroughly examined by a competent person at least every six months. It is essential that interim inspections are taken seriously and carried out by someone who has the necessary experience and authority.

15.7 Equipment Withdrawal

15.7.1 All equipment must be regularly inspected, and any defective equipment must be withdrawn from use and the details recorded.

15.7.2 Climbers should know the quarantine processes in place. Such processes may include the removal from service, repair and/or maintenance of the equipment, then its return to service or destruction.

16

Aerial Rescue

Checklist:

- Have you planned for aerial rescue?
- Do you have suitable and sufficient resources to make an effective rescue and are they immediately available?
- Has the nominated rescuer(s) received training in rescue techniques and the equipment to be used?
- Does everyone understand their role and responsibility in the event of an aerial rescue?
- Have the nominated rescuer and the operatives involved practised rescue techniques at regular intervals to maintain skills?
- Can the casualty be removed from the tree safely without risk of injury to the rescuer?
- Are the tree and the available anchors still safe to climb on?

Have you checked?

16.0 Aerial Rescue

16.1 General

16.1.1 Poorly planned and poorly managed tree climbing operations can have potentially life-threatening consequences. It is essential that climbers receive thorough training in climbing techniques and aerial tree rescue methods.

16.1.2 Climbers may be in danger of serious injury from several risks such as:

a. falls;
b. becoming unconscious;
c. becoming stuck/frightened, e.g. inexperienced climbers;
d. cutting themselves; *and*
e. electrocution.

16.1.3 During aerial tree rescue, members of the rescue team must not be put at risk. Therefore, before recovering the casualty, the rescue team must undertake a risk assessment to select a procedure which avoids endangering themselves. All climbers should be trained in first aid and all team members should be able to promptly call for assistance from appropriate specialists.

16.1.4 Under no circumstances should anyone attempt to perform an aerial rescue of a climber who is in contact with or located within the proximity zone of live electrical apparatus. The electrical apparatus must be proven to be de-energised before a rescue is attempted.

16.1.5 Climbers should always consider the potential for self-rescue and maintain good positioning so that ropes are routed appropriately to allow for safe, effective and efficient descent if the need arises.

16.1.6 Aerial rescue must be practised (both scheduled and impromptu) at least once every 6 months, so that all members of the team, including ground-based operators, are familiar with the techniques.

16.1.7 Aerial rescue practice scenarios should always seek to simulate authentic situations to make any practice relevant.

16.1.8 Aerial rescue practice should include but not be limited to:

a. the position of the casualty in the tree – a rescue from the end of a limb or working on spikes may be more difficult to undertake and is therefore worth practising;
b. increased loads being exerted on the tree, anchors and systems;
c. any tools in use – where is the chainsaw and what will happen to it during the rescue?
d. the need to administer first aid – where are the first aid kits and can a personal first aid kit on a harness be deployed easily whilst hanging in the harness?
e. role-playing the handover to the emergency services – the nature and level of information that will be required.

16.1.9 Climbers who are nominated in the role of aerial rescuer should ensure they understand the function, application and limitations of equipment in use by other climbers on site whom they may need to rescue.

16.2 Rescue Provision

16.2.1 It is crucial that an aerial rescue can be carried out without delay. Therefore, at least one team member must be available, proficient and equipped to perform aerial rescue without delay. This will normally be a member of the ground staff.

16.2.2 In particular circumstances (e.g. if two climbers are working in the same tree) it may be better for climbers to act as aerial rescue provision for each other as their response time to the casualty will often be far shorter than for someone starting from a position on the ground.

16.2.3 If two climbers in adjacent trees are to be tasked with the role of rescuing one another, a detailed examination must be undertaken to consider whether they would be immediately available to carry out a rescue. Any decision to use this method must be justifiable, giving due consideration to the speed and efficiency of a safe rescue.

16.2.4 The following factors should be considered when deciding whether the person nominated to carry out an aerial rescue could be on the ground, working in the same tree, or working in an adjacent one:

a. Proficiency level of rescuer, i.e. is the rescuer suitably proficient to access the casualty in time to perform an effective rescue?
b. Equipment resources, e.g. if access from a ladder would be the quickest method but that ladder is not available, it may be better to have the rescuer in the tree.
c. Proximity of trees to each other, e.g. are the trees close enough to enable the rescuer to traverse directly into the tree where the casualty is located, or will they need to descend prior to accessing? If access needs to be from ground level first, are there any obstacles which may hinder rapid access, e.g. needing to cross a boundary like a fence, wall or a road?
d. Complexity of crown structure, e.g. in a dense canopy the route through to the casualty may be difficult to negotiate or in a sparse canopy lateral movement may be challenging due to a lack of limb structure.
e. Method, speed and ease of access, e.g. it may be worth using SRT as opposed to MRT as SRT may prove to be a quicker and more efficient mode of access.
f. Whether it is possible to install a rescue line. A pre-installed line will significantly increase the speed at which a rescuer will be able to access the canopy to facilitate rescue.
g. Nature and severity of likely injury, e.g. if the climber is using a chainsaw in the tree, the severity of the injury is likely to be greater than if the climber is using a handsaw.
h. Task being undertaken, e.g. suitability of having two climbers in the same tree during dismantling operations.

16.3 Rescue Plans

16.3.1 An effective rescue plan must be created by the climber and those designated to carry out rescue.

16.3.2 The aerial rescue plan must consider any changes required as a job progresses, e.g. during dismantling as the outer crown, inner structural crown and stems/trunk are removed.

16.3.3 As part of rescue planning, those designated with the responsibility for rescue should consider all safety aspects and potential hazards associated with the rescue, the availability of the equipment to be used for a rescue and how the tree could be accessed.

16.3.4 The following factors should be in the rescue plan:

a. emergency procedures as part of a point-of-work risk assessment have been comprehensively and accurately completed;
b. equipment required and competent individuals are available;
c. competent and designated aerial rescuer and/or Emergency Action Plan coordinator have been identified and nominated in that role;
d. first aid equipment is available including tourniquet and haemostatic gauze/cloth;
e. access route into the tree has been determined;
f. method of access has been agreed upon; *and*
g. anchor points have been identified and, where practicable, pre-installed.

16.3.5 Effective rescue planning will give primary consideration to the installation of a separate access line or pre-installed throwline which can be left in the tree while the work is carried out to provide rapid access in an emergency. Climbers must be able to justify why such an option has not been included as part of a rescue plan.

16.4 Communication

16.4.1 The location of the nearest telephone must be known to all staff on site and noted down. Mobile phones are widespread, but reception levels vary. Make sure the designated mobile phone has a signal and functions on the work site and that all staff can use it and know its number in case you have to be called back.

16.4.2 Climbers should ensure that they can quote their location accurately – i.e. a grid reference, GPS co-ordinates or street name/postcode – so they can give the emergency services adequate details of site access points.

16.4.3 When necessary, a rendezvous point should be agreed, together with details of how to navigate emergency services to the site.

16.4.4 Emergency communication details should be recorded on the site-specific risk assessment.

16.5 Safety Issues and Considerations (for all rescue types)

16.5.1 The climber must be fully aware of the risks associated with undertaking any form of rescue and the potential limitations of equipment during the task.

16.5.2 If equipment might be subjected to exceptional circumstances – such as a rescue – check the manufacturer's instructions. Where two-person loading may occur, make sure the equipment is suitable for the task. Is the equipment capable of supporting the intended loads? If it is subject to specific manufacturer's instructions under such conditions, these instructions must be followed to the letter.

16.5.3 All climbers should be aware of the following general principles and apply them to the specific requirements of rescue scenarios they may face:

a. equipment used as part of tree climbing operations may not be suitable as rescue equipment under manufacturer's instructions;
b. friction hitch systems subject to the loading of two people should incorporate an element of additional friction to ensure the hitch maintains its functionality;
c. where additional equipment such as a pulley is used to control a casualty's friction device, this must be strictly in accordance with the manufacturer's guidance;
d. where a rescue system incorporates a basal lowering system, the ground staff must know how to lower the casualty using an appropriate method;

e. the use of false anchors during any rescue should show preference where possible for closed connectors or components, to reduce the risk associated with inadvertent opening as rescue is carried out;
f. anchor points must be selected taking into consideration the increased loading during rescue. At the very least, there could be twice the load on the line, and this would be particularly relevant during a rescue by Method B (see 16.6.3) with the rescuer working from a ground anchor;
g. all equipment in use during rescue should be subject to the requirements of this Technical Guide in terms of selection, compatibility, configuration, inspection and examination; *and*
h. equipment used in a rescue may need to be quarantined and inspected by a competent person before being returned to service.

16.6 Rescue Types/Methods

16.6.1 General

During any aerial rescue, the use of a backup may be omitted in favour of carrying out a swift, efficient and safe rescue. The priority here must always be the safe evacuation of the casualty.

16.6.2 Rescue Method A – MRT/SRT

Where the casualty's rope is undamaged and long enough to descend on.

1. Climb to the nearest suitable anchor point above the casualty which can support the weight of both the climber and the casualty.
2. Descend to the casualty; assess and make safe any hazards that threaten the casualty or would impede the rescue, e.g. chainsaw, other equipment/tools, tree debris.
3. Attach the casualty to the main attachment point of the rescuer's harness to protect and aid descent and prevent separation of casualty and rescuer.
4. Assess the casualty's condition and administer first aid if appropriate.
5. The casualty's backup may be disconnected.
6. The rescuer operates their own and the casualty's friction hitch/device to give a controlled descent whilst guiding the casualty through branches.

If the casualty is conscious then the rescuer should be aware that the casualty may be able to help during the rescue. This can help to keep the casualty occupied and aids rescue.

16.6.2 Rescue where the casualty's rope is undamaged and long enough to descend on.

16.6.2.3 Harness-to-harness connection.

16.6.3 Rescue Method B – MRT

Where the casualty's rope is damaged, trapped or too short to descend on without re-tying into a lower anchor point. This means the entire weight of the casualty must bear upon the rescuer's system.

16.6.3 Rescue where the casualty's rope is damaged, trapped or too short to descend on.

1. Climb to the nearest suitable anchor point above the casualty which can support the weight of both the climber and the casualty.
2. Descend to the casualty; assess and make safe any hazards that threaten the casualty or would impede the rescue, e.g. chainsaw, other equipment/tools, tree debris.
3. Attach the casualty to the main attachment point of the rescuer's harness.
4. Assess the casualty's condition and administer first aid if appropriate.
5. Connect the casualty to the rescuer's rope using an additional friction hitch, tied to the fixed side of the rescuer's rope and connected into the main attachment point on the casualty's harness, and transfer the casualty's weight to the new connection, taking up any slack to prevent the casualty falling any distance when their rope is cut/disconnected.

Image to come

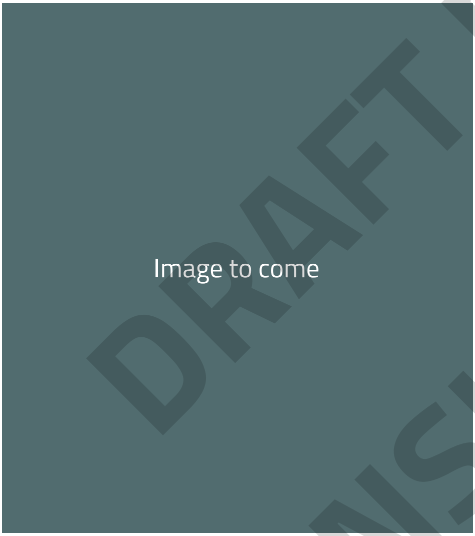
16.6.3.5 An additional load-bearing attachment secured to the casualty.

6. Slacken the casualty's friction hitch to test the rescue system and then disconnect the casualty's original primary system and backup.
7. The rescuer descends with the casualty attached to their own harness and climbing system.

16.6.4 SRT Rescue

When the rescuer elects to climb using an SRT technique, the style of rescue may need to be different from that previously described. This is because the rescuer's rope will remain stationary during descent and if the casualty is connected to it using a friction hitch, the hitch may slide down and contact the rescuer's friction device causing an uncontrolled descent or it may bind, preventing the casualty from descending.

The following rescue technique is conducted on the assumption that the casualty's rope is damaged, trapped or too short to descend on. It requires the use of an additional MRT climbing system.

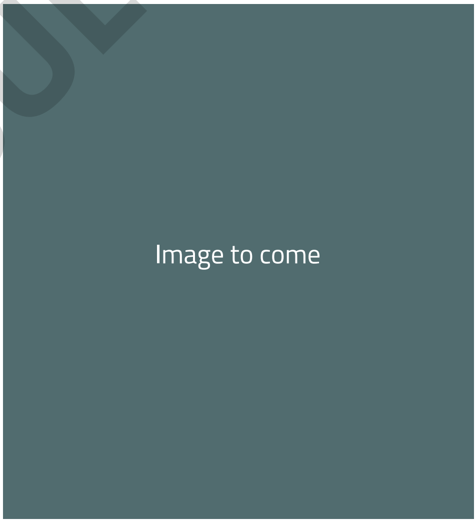


16.6.4 SRT rescue.

1. Ascend to a suitable point above the casualty, ensuring that the chosen anchor point can support the weight of both the climber and the casualty.
2. On the rescuer's line, install an in-line anchor above the friction hitch/device. Connect the additional MRT climbing system from the rescuer's main attachment to the in-line anchor.

16.6.4.2 Installing an inline anchor on the rescuer's line.

3. Take up tension in the additional MRT system, causing the rescuer's SRT system to go slack. Whilst suspended in the MRT system from the in-line anchor, the rescuer introduces enough slack above the SRT friction hitch/device to tie a suitable blocking knot below the in-line anchor.



16.6.4.3 The rescuer suspended in the MRT system, knot blocking the inline anchor.

4. The rescuer then disconnects their original SRT system and has two options:

- **Option 1** – Descend to the casualty and undertake MRT rescue Method B as described in **16.6.3** points **3–8**.
- **Option 2** – Descend to the casualty taking the original SRT system. Connect the SRT system to the casualty and undertake a rescue by Method A as described in **16.6.2** points **3–5**.

If the casualty is conscious then the rescuer should be aware that the casualty may be able to help during the rescue. This can help to keep the casualty occupied and aids rescue.

16.6.5 Lifting/Hauling/Counterbalance MRT/SRT

It may be necessary to lift or haul the casualty where immediate descent is impractical or challenging. This could be where the casualty is positioned in a fork or resting in a tensioned system which cannot be disconnected without first being unloaded.

Lifting and hauling can be achieved using a basic climbing system or with the introduction of more complex equipment set-ups.

Image to come

16.6.5 Counterbalance rescue.

A counterbalance rescue technique can be used to assist in the movement of the casualty by offsetting the rescuer's weight against the casualty. In doing so the rescuer can effectively lift or haul a casualty a short distance.

Image to come

16.6.5 Lifting the casualty.

Image to come

16.6.5 Hauling techniques using a ground-based system.

1. Climb to the nearest suitable anchor point above the casualty which can support the weight of both the climber and the casualty.
2. Install a temporary anchor. The use of friction efficient components such as a pulley to create the anchor will improve overall efficiency and ease.
3. Descend to the casualty. Assess and make safe any hazards that threaten the casualty or would impede the rescue, e.g. chainsaw, other equipment/tools, tree debris.
4. Attach the casualty to the termination side of the rescuer's system.

Image to come

16.6.5.4 Casualty connected to the rescuer's system.

5. Attach the casualty to the main attachment point of the rescuer's harness to create a direct harness-to-harness connection.
6. The rescuer descends with the casualty attached to their own harness and climbing system – any friction hitch system used will be subject to the loading of two people and therefore should incorporate an element of additional friction to ensure the hitch maintains its functionality.

Image to come

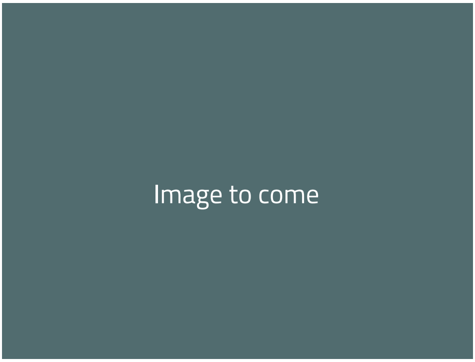
16.6.5.6 Descent with the casualty ensuring normal friction hitch/device function.

16.6.6 Belay Rescue

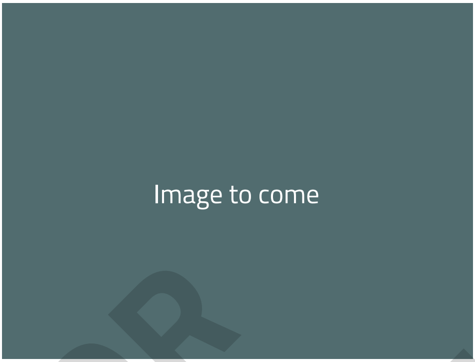
16.6.6.1 The belay line is installed in the tree at a point above the casualty.

16.6.6.2 The belay rope is passed over or through a suitable anchor point (such as a branch or temporary anchor device) and attached to the casualty who is then lowered to the ground via a ground belay.

16.6.6.2 Belay rescue.



16.6.6.4 Use of a mechanical device for belay rescue.



16.6.6.4 Friction hitch-based system for belay rescue.

16.6.6.3 It may be necessary for the casualty to be accompanied to the ground by the rescuer if there are branches or other obstacles to navigate on descent.

16.6.6.4 The belay device could be either a suitably rated mechanical device or a friction-hitch-based system. If a friction-hitch-based system is used, it must comprise some means of creating additional friction to take load away from the friction hitch. The belay system must always fail-to-safe.

16.6.6.5 The ground belay must be attached to an anchor capable of supporting the casualty's weight with a suitable margin of safety, e.g. a tree or a vehicle.

16.7 Casualty Support and Control

16.7.1 Anyone undertaking aerial rescue should promote the recovery and maintain control of the casualty throughout. The rescuer's own equipment or the casualty's equipment can be used to achieve two principal aims:

a. a direct harness-to-harness attachment from rescuer to casualty; *and*
b. supporting the casualty in an upright position to help maintain an airway and provide additional control of the casualty.

16.7.1a The use of a tape sling to create a direct harness-to-harness attachment.

16.8 Suspected Spinal/Neck Injuries

Climbers with suspected spinal/neck injuries will still need to be lowered carefully by several rescuers (if possible). Where applicable, such extraction of a casualty should be carried out under the guidance of emergency personnel. During any rescue, maintaining a casualty's airway and breathing must always be a priority.

16.9 Handover

16.9.1 When a casualty is seriously injured, effective handover from an on-site first aider to the emergency services has a significant impact on the casualty's care and recovery. First aiders should be able to handover the following information as a minimum:

a. patient's name and age;
b. time of accident;
c. how the injury happened;
d. injuries top to toe;
e. vital signs (first set and significant changes);
f. treatment provided so far; *and*
g. medical information, e.g. blood type, insulin dependency, allergic reactions to medication.

16.9.2 The level of medical information provided to the emergency services can affect a casualty's emergency and ongoing care. Operators should carry and be able to convey key medical information about themselves such as the medication they take, allergies, rare blood types, dietary requirements (such as gluten free) and next-of-kin details.

16.10 Actions after the Event

16.10.1 Following any accident on site, the preservation of evidence for collection and analysis can form a key part in any accident investigation process.

16.10.2 Operators will be expected to:

a. preserve the scene where possible;
b. notify management of the incident and record the occurrence in line with the organisation's requirements; *and*
c. note the contact details of any witnesses.

16.10.3 As part of further investigation operators may be asked to:

a. take photographs and make drawings; *and*
b. provide a witness statement.

16.10.4 Operators must cooperate with enforcing authorities in their duties to investigate workplace accidents. However, it is expected that an operator will not:

a. publicise a workplace accident on social media; *or*
b. provide details to third parties not directly involved with the accident, unless with the consent of the employer.

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