Arboricultural ASSOCIATION
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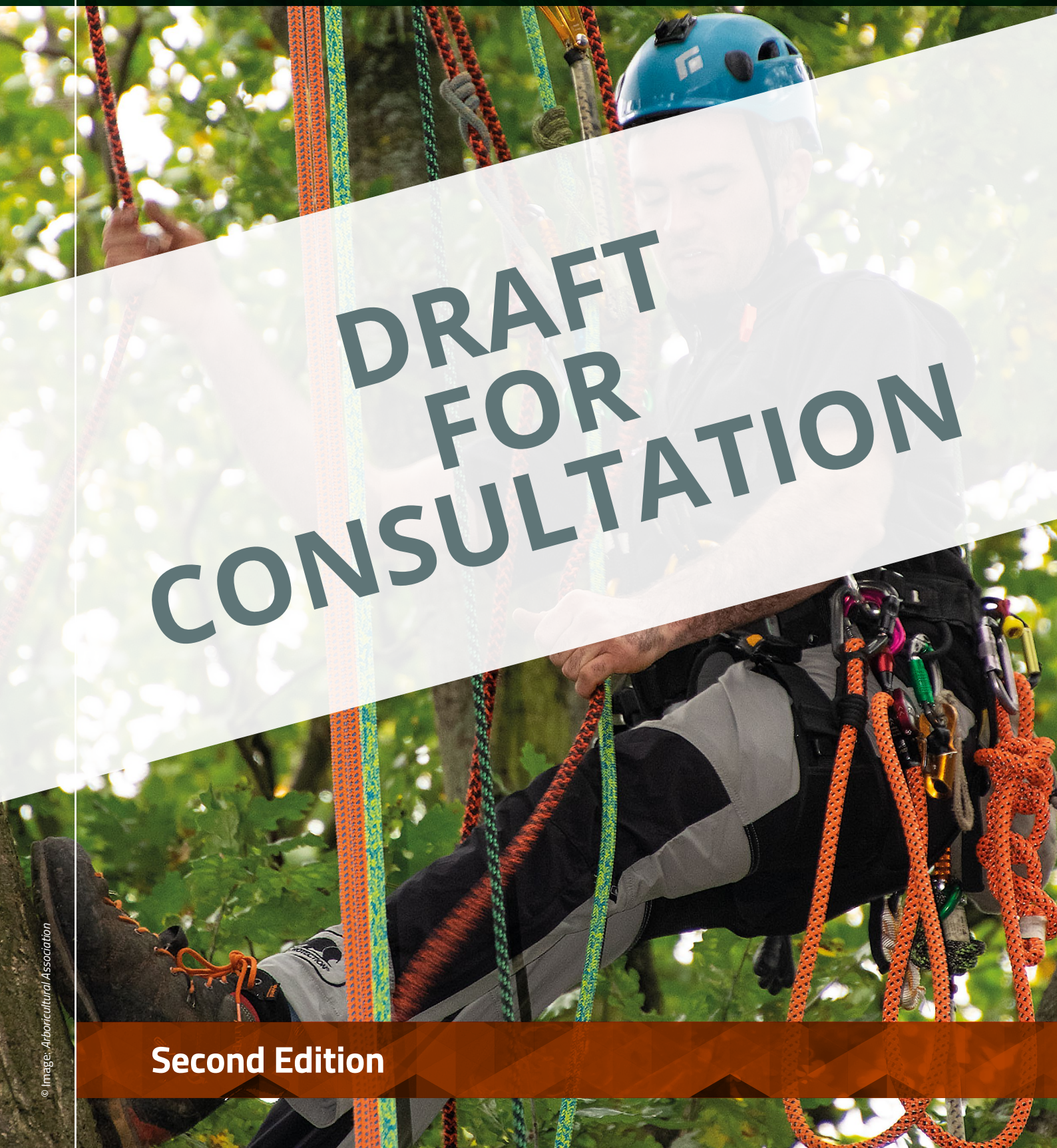
Industry Code of Practice for Arboriculture

Tree Work at Height



DRAFT FOR CONSULTATION

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2	Feb. 2020	Whole document reviewed and updated to reflect new legislation and industry developments since Edition 1. **Amendments in all sections.** The most significant changes affect: ■ 2.8.4 Crane ■ 2.8.6 Personal fall protection systems ■ 2.9 Work positioning and rope access ■ 2.11.6 [Equipment selection] Performance specifications

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1.1 Foreword

1.1.1 Arboricultural Association

The publication of the first edition of this document was a seminal moment in the development of the arboricultural industry, which has expanded exponentially over recent years. Through the innovation and creativity of numerous individuals working in the sector both practical techniques and management systems have evolved to support a highly skilled and professional workforce, which continues to grow.

Following recent developments and in order to meet the many challenges we face in managing tree work at height safely and efficiently, we are now at a point where we need to revise our guidance on the principles of managing tree work at height.

This industry code of practice (**ICoP**) provides that guidance, with planning protocols for managing resources, personnel and equipment to ensure safe and efficient working practices. It also provides the basis for the further development of detailed technical guidance on individual tasks and equipment.

1.1.2 Health and Safety Executive

To be completed after consultation process.

1.2 Acknowledgements

The Arboricultural Association wishes to express its gratitude to the following in respect of the preparation of this industry code of practice.

Technical authors: to be added

Peer review group members: to be added

Contributors: to be added

In addition to the individuals listed above, the Association and the technical authors would like to thank the numerous individuals for their thoughts and comments that have contributed to this publication.

1.3 Introduction

The aim of this ICoP is to identify the principal planning, management and supervisory requirements necessary to establish safe systems of work for tree work operations at height. Correct consideration, and application, of these elements will assist in the creation and maintenance of a safe working environment, thereby increasing productivity and reducing margins of **risk** and incidents, including near misses, injuries and fatalities.

Many of the guiding principles and considerations outlined within this ICoP may also be used in the planning, management and implementation of other arboricultural operations, e.g. ground-based chainsaw activities.

1.4 Structure

This ICoP comprises four parts and one appendix:

Part 1: Introductory Material

Part 2: Principles and Guidance

Part 3: Legislation (Local/National)

Part 4: Bibliography

Appendix: Terms and Definitions

Within this ICoP, sections are numbered according to the part in which they appear, e.g. in Part 2, section 2.2 covers Planning and Management. Sub-sections are also numbered, e.g. under 2.2 Planning and Management, 2.2.2 covers Planning and Resourcing. If you are accessing this document electronically, you will note certain words and phrases are highlighted; these are hyperlinks that will take you to Appendix: Terms and Definitions.

This ICoP may be subject to change over time through a process of revision and update. Version control, including edition number and date published, is set out on page 2.

1.5 Scope and Limitations

This ICoP provides guiding principles and considerations, along with technical definitions, in relation to tree work at height in arboriculture (including the provision of training for tree work at height), to help in designing safe systems of work that are specific to the work required, the location of its delivery and the people required to manage and/or perform the work.

It is intended for use by arborists, employers, suppliers, policymakers, awarding organisations, trade bodies, regional, national or international enforcement agencies, safety officers and those who commission arboricultural work. This ICoP is applicable to the planning, management, **supervision** and use of arboricultural techniques, methods and equipment for the completion of tree work at height.

This ICoP reflects principles of general good practice; it is not wholly definitive and there may be circumstances in which it is reasonable to adopt practices not described herein. Any departure from general good practice must be supported by a robust **hazard** and **risk assessment**. Users of the information in this ICoP should be aware of, and consider, any local or regional restrictions that may be in place.

This ICoP is not intended to provide guidance on how tasks and specific techniques should be performed. It identifies and considers the underpinning principles: these will inform the development of further technical guidance relating to specific arboricultural operations.

The diagram on page 7 provides a UK-specific model demonstrating where this ICoP may fit within the legislative framework.

Figure 1: The relationship of an ICoP to the legislative framework.

This ICoP is not intended to apply to the application of arboricultural techniques for the purposes of sport/competition or recreation, nor is it a substitute for adequate training.

PART 2: PRINCIPLES AND GUIDANCE

2.1 General

The aim of this ICoP is to set out core principles and specify a consistent approach to safely performing aerial tree work. The key principles are as follows:

a) defined standards of good management practice, including the commitment to provide leadership and direction in order to build relationships and communicate with operators respectfully so that skills and ability, along with efficient use of resources, can be maximised;

b) consistent application of safe systems of work (defined safe methods by which work is carried out)

c) adequate selection, supply, use and maintenance of work equipment;

d) correctly defined roles and responsibilities;

e) trained and proficient personnel;

f) effective planning, supervision and auditing.

2.2 Planning and Management

2.2.1 Principles and objectives of planning for tree work at height

The principles and objectives of planning for tree work at height are to ensure a consistent and safe method of undertaking that work which allows for a flexible approach to meeting the challenges of an ever-changing environment. The principles and objectives below do not present an exhaustive list but are designed to encourage a consistent approach to work planning and safety.

2.2.2 Planning and resourcing

In principle, any work at height should be avoided wherever possible. Therefore, a decision to undertake tree work at height must be based on a judgement that the work cannot be reasonably practicably undertaken from ground level. The decision to work at height must be adequately justified by an individual[1] who is **competent** to do so and, where necessary, authorised to make that judgement. Where it is not **reasonably practicable** to avoid work at height, the duration of the work and exposure to that risk should be minimised to as low as reasonably practicable.

All tree work operations at height must be planned by a person[2] who is competent and has sufficient **proficiency** in the required tasks to plan, assess and resource the work. The **competent person** must ensure that a safe system of work has been implemented.

Before any aerial tree work operations commence, the following must be in place:

a) an **assessment** of whether tree work at height is appropriate which is based upon a pre-work evaluation;

b) safe systems of work that define the methods to be used to carry out the work;

c) adequately trained and proficient operators to undertake the work;

d) a point-of-work (site-specific) risk assessment;

e) adequate emergency planning to include resources in the event of a requirement for aerial rescue, first aid and/or evacuation;

f) a clearly communicated plan which covers points (a)–(e).

It must be ensured that adequate resources are available to undertake the planned tree work at height safely.

FOOTNOTES

[1] The responsible or competent person (see section 2.3.1).

[2] The responsible or competent person.

The key resources required are as follows:

Operators:

Adequate number of proficient operators with the relevant competencies to work at height and to assist those working at height and to put into effect the emergency plan as required. An adequate level of supervision must also be in place to ensure suitable direction and control are provided to operators.

Equipment:

Equipment to undertake the work which is fit for purpose and (at least) meets the minimum safety requirements for the task in hand. The equipment must be adequately tested and certificated as appropriate.

Time:

Sufficient time to undertake the work, including a mechanism by which operators can raise concern to those supervising works where they feel insufficient time (or resources) has been allocated.

Specification:

A clear specification and job criteria which are easy to follow and can be used to monitor progress.

Insurance:

Adequate insurance to cover those directly or indirectly involved in the work being undertaken and those affected by the work.

2.3 Roles and Responsibilities

2.3.1 General

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

The following designations are used throughout this ICoP and detailed in the diagram below:

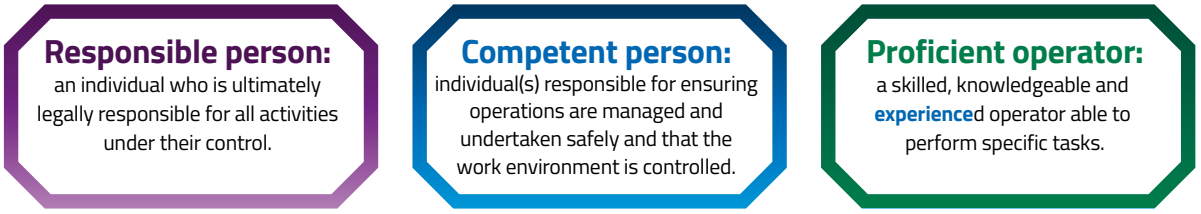
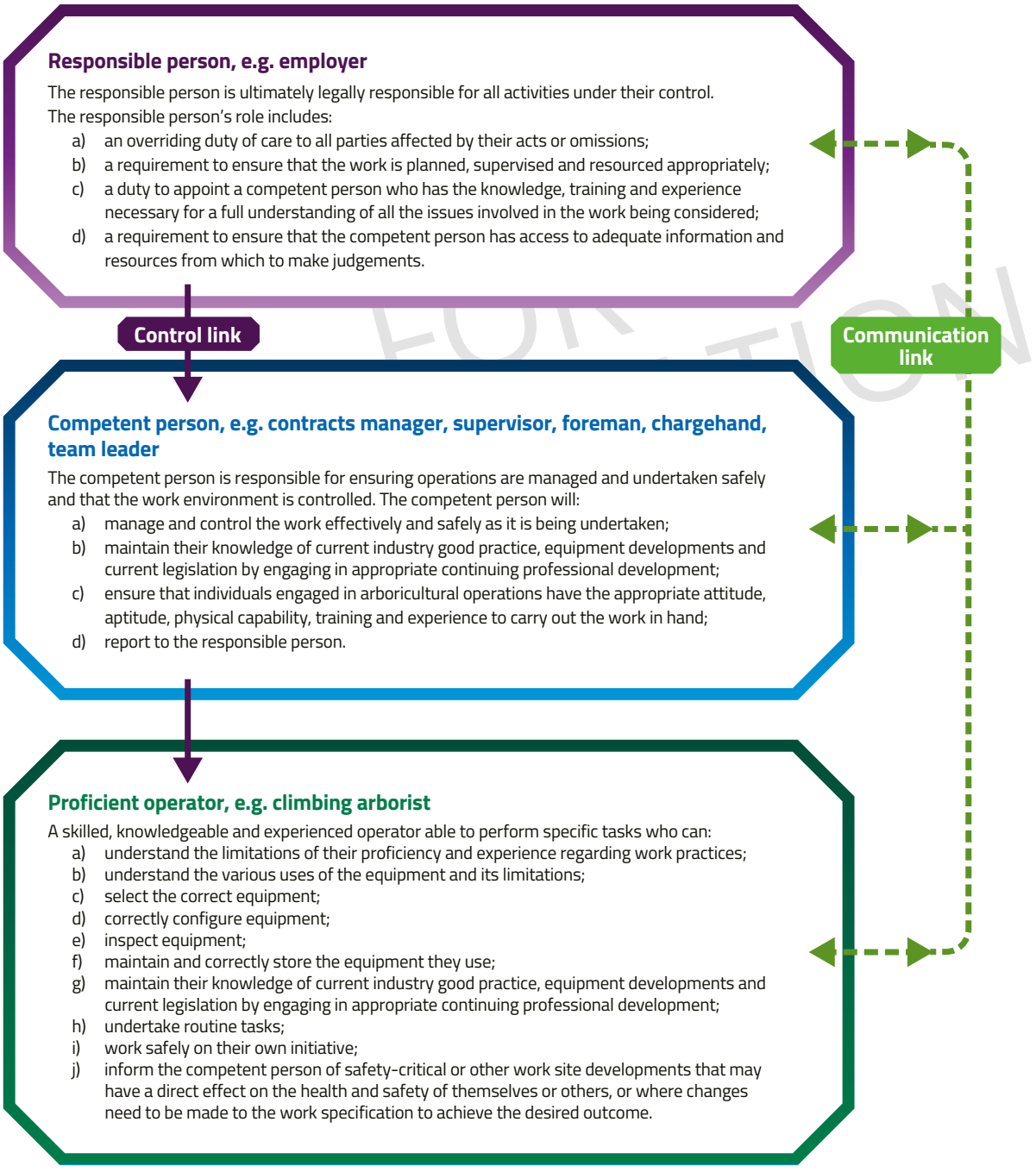


Figure 2: Roles and responsibilities of the responsible person, competent person and proficient operator.



In a situation where a self-employed individual is undertaking arboricultural work, the **responsible person**, the **competent person** and the **proficient operator** might be the same person.

Any person commissioning tree work has a responsibility to assess the competency and proficiency of any self-employed individual (contractor) to work safely. Factors that should be considered as part of this assessment may include but are not limited to:

a) the arrangements that have been put in place to manage the work, including what levels of supervision are appropriate;
b) matching the right individuals with the right proficiency levels to the risk and complexity of the work ;
c) the health, safety and environmental performance of the contractor;
d) the health, safety, environmental and quality processes in place;
e) accreditations demonstrating independent assessment of competence;
f) the contractor's ability to effectively manage, supervise and communicate with any individual(s) involved with the work;
g) the arrangements in place to maintain the health, safety and welfare of any party during the completion of works, including the provision of equipment;
h) the safe systems of work, work procedures, **method statements** and/or good practice to be followed during work activities.

2.3.2 Resources

The responsible person has an overriding duty to ensure that enough resources and equipment are provided or available for the planning, management and undertaking of tree work.

The competent person has a specific responsibility to ensure that there are enough operators with appropriate proficiency for the work to be completed safely and efficiently. This must also include enough operators and equipment to allow any emergency procedures or protocols to be carried out.

2.3.3 Communication

Everyone involved in the planning, management, supervision and carrying out of arboricultural works must engage in an effective chain of communication. An effective communication strategy within a business, project or work site will detail reporting lines between the task originator, e.g. the employer, and those required to undertake the task.

Effective communication must be determined and agreed prior to the start of any work activity and remain effective throughout. Factors influencing the effectiveness of this communication may include:

a) knowing who to speak to, e.g. the responsible and/or competent person, proficient operator, or client;
b) the type of communication system being used on site (verbal, hand signals, radio, telephone) and external factors that may influence its effectiveness (noise, weather, visual interference, dense canopy);
c) the level of understanding and correct interpretation of the on-site communication method, e.g. hand signals, language barriers and/or learning impairment.

2.3.4 Supervision

It must be ensured that there is always adequate and competent supervision for any arboricultural operation.
The level of supervision should be relative to the complexity of the task in hand, as well as the experience and proficiency of the operators on site.

Any individual acting in a supervisory capacity should as a minimum have:

a) a comprehensive understanding of the arboricultural techniques appropriate to the work;
b) responsibility for hazard identification and risk assessment for arboricultural operations;
c) the capability to apply, agree and enforce safe systems of work on site;
d) the capability and authorisation to stop work where necessary;
e) the ability to lead by example;
f) effective communication and interpersonal skills;
g) the ability to make sound judgements and to act in an authoritative, decisive and measured manner.

Any individual acting in a supervisory capacity should ensure that the overall conduct of an operator – ranging from their general demeanour and disposition towards the task in hand to how they demonstrate compliance with good practice – accords with the standards as defined within this code of practice and any specific requirements of the organisation they are working for.

Additionally, observing an individual's ability to communicate and integrate themselves within a work team can be critical to the safety of the work; therefore, supervision should include acting on instances of poor communication or isolation.

2.3.5 Operator proficiency

Any individual undertaking arboricultural work at height should have the appropriate level of knowledge and understanding relative to the operation, supported where appropriate by relevant qualifications and a range of practical skills to enable them to carry out the tasks listed in 2.3.5.1: Work at height operations.

Supporting the individual(s) working at height is critical to a safe and efficient operation. Consequently, the role of the ground staff is significant and their proficiency should be commensurate with the level of support required by the work at height operation. Many of the attributes listed in section 2.3.5.1 are applicable to ground staff with the possible exception of points 'k' through to 'o'.

In all cases, regardless of an individual's role or position they should be adequately fit and healthy to discharge their duties. No individual should undertake work where issues with fitness and/or health could compromise the health and/or safety of others either directly or indirectly involved with the operation.

2.3.5.1 Work at height operations

In any work at height operation, individuals should be able to:

a) understand, interpret and implement health and safety legislation and industry good practice;
b) be aware of and understand arboricultural technical guidance relating to specific tasks carried out as part of tree work at height operations, e.g. rigging, crane use;
c) meet legislative and environmental requirements in relation to carrying out the work;
d) perform operations in line with management objectives and any nationally accepted standard;
e) receive, understand and implement risk assessments, **method statements** or safe systems of work, including relevant emergency procedures;
f) identify hazards and assess risks associated with the working area and the proposed work;
g) select an appropriate work strategy and implement safe working methods and practices in accordance with the assessed risks;
h) work in a way which maintains health and safety and is consistent with relevant legislation and industry good practice;
i) select, inspect and prepare tools and equipment appropriate to the work and ensure they are, and remain, safe and fit for use under manufacturers' instructions and relevant legislation;
j) effectively communicate with other members of the work team;
k) perform a **tree condition assessment** prior to commencing work;
l) rate the severity of structural defects;
m) use access and positioning methods appropriate to the assessed risk, safe system of work and/or method statement;
n) select appropriate **anchor point/s** so that they will not be compromised by tree condition or any part of the work being carried out and evaluate their load-bearing capacity;
o) select and adopt appropriate work positions;
p) safeguard their own welfare;
q) assess the position of any work equipment to facilitate the required work.

In addition to the points listed above, the following task-specific skills will be necessary.

2.3.5.2 Pruning and free-fall dismantling

In pruning and free-fall **dismantling** operations, individuals should be able to:

a) interpret the specification including the measurements used and how to apply them;
b) have a working knowledge of any applicable industry recommendations for pruning;
c) understand the impact that completed works have on the tree;
d) identify the desired drop zone(s) and sequence of works.

2.3.5.3 Rigging

In **rigging** operations, individuals should be able to:

a) identify desired drop zone(s);
b) estimate log and crown section mass;
c) calculate expected peak **loads** and select **compatible components** to make up the rigging system;
d) understand strength loss due to knots within cordage components;
e) carry out appropriate and accurate cutting techniques.

2.3.5.4 Crane

In operations involving a crane, individuals should be able to:

a) agree and communicate a sequence of work;
b) assess the weight of the sections to be removed;
c) assess the balance and/or likely directions of pivot, and attach lifting accessories using the correct technique;
d) execute appropriate and accurate cutting techniques;
e) communicate with the **crane supervisor**, crane operator and ground staff in relation to the progress of operations.

2.3.5.5 Mobile elevating work platform

In operations involving a mobile elevating work platform (MEWP), individuals should be able to:

a) identify the desired drop zone;
b) execute appropriate and accurate cutting techniques.

2.3.5.6 Tower scaffold

In operations involving a tower scaffold, individuals should be able to:

a) identify dangerous methods of erection, defects in the scaffold or misuse;
b) understand the intended use of the scaffold;
c) understand the maximum working loads to be imposed upon the structure;
d) use the correct type of access onto the scaffold;
e) understand any restrictions that may affect the scaffold's use.

2.3.5.7 Ladder

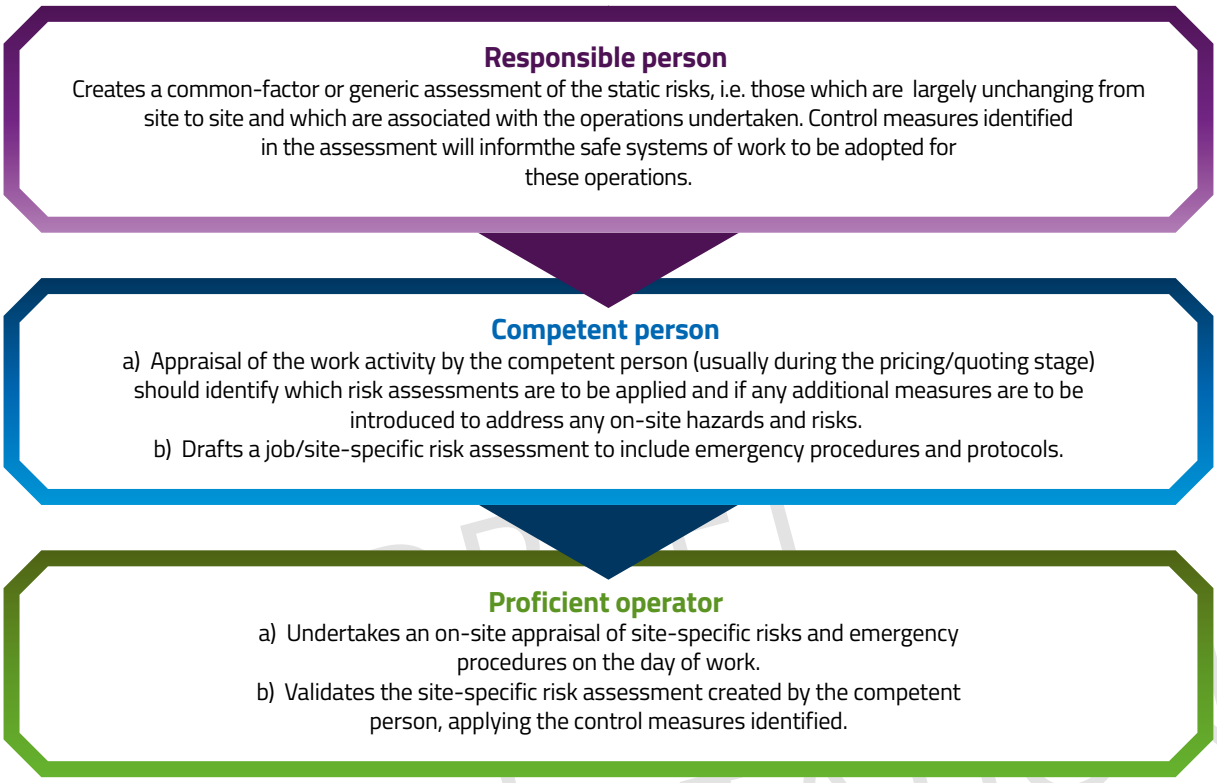
In operations involving a ladder, individuals should be able to:

a) erect, secure and dismantle work equipment safely;
b) recognise when a ladder is not a suitable means of access.

2.3.6 Risk control systems

Before tree work at height starts, a safe system of work must be in place to ensure the protection of people and property as far as is reasonably practicable. The safe system of work must be informed by a suitable and sufficient risk assessment.

Figure 3: Roles and responsibilities in risk control systems.



To ensure the risk control system is suitable and sufficient, it should be ensured that:

a) the significant findings have been recorded;
b) it is demonstrably clear and consistent in approach;
c) risks are determined and managed as objectively as possible;
d) control measures aim to implement both preventative and protective measures and those measures are reasonable.

A common set of principles should be adopted in identifying, directing and implementing appropriate precautions. They should include:

a) aim to eliminate the risk – for example, avoid work at height;
b) evaluate unavoidable risk by carrying out a risk assessment;
c) control hazards at source;
d) adapt work to the individual(s) concerned, especially regarding the choice of work equipment, **personal protective equipment** (PPE) and work methods;
e) take advantage of manufacturing, technical and industry progress that could provide an opportunity for improved and safer work methods;
f) replace the dangerous with the non-dangerous or the less dangerous;
g) develop a logical and consistent prevention policy;
h) give priority to collective protection measures over individual protection measures;
i) provide appropriate training, information and supervision.

A site-specific (point-of-work) risk assessment is to be prepared for the work to be completed. This assessment is to be specific to the actual location of the work site and the nature of the operation to be completed; it will usually be based on a preliminary pre-work assessment. Site-specific assessments should also contain emergency planning/emergency response information.

A mechanism is to be in place whereby the risk assessment can be updated, revised, reviewed and modified as the operation is undertaken.

All parties engaged in, or who may be affected by, the work activity (e.g. owners, clients, other contractors on site etc.) are to be made fully aware via effective communication of the risks they may be exposed to and the measures that have been or must be implemented within the workplace environment. It is important to differentiate between the hazards and risks affecting those involved in performing the work and the hazards and risks presented to third parties (e.g. the general public) as a consequence of the work taking place.

It is to be ensured that:

a) the contents of the risk assessment or risk control system are appropriately shared with others;
b) all parties are briefed before work starts;
c) appropriate evidence of individuals' acknowledgment is obtained.

2.3.6.1 Method statements

A method statement may be used to formally define and record the system of work. This will normally be prepared by the competent person.

The format of the method statement may vary according to the recipients' requirements. However, it will generally contain the following principal considerations:

a) scope/description, location and timing of the works to be undertaken, to include reference to job specifications;
b) access and egress arrangements;
c) sequence of operations;
d) the control measures that are being or have been introduced to ensure the safety of anyone who is affected by the task or process;
e) reference to good practice guidance where applicable;
f) specification, type and number of machines, personnel and equipment to be used;
g) reference to applicable **certification** and documentation relating to personnel and machinery;
h) provision for emergencies, to include first aid on site;
i) welfare;
j) communication methods between operators and the client as applicable;
k) safety-critical communication processes during operations, i.e. safety hold points for the exchange of safety-critical information such as site safety induction or permits to work;
l) measures to address any environmental impacts on the work site.

2.3.7 Auditing and inspection

To ensure that safe systems of work for tree work at height are complied with, the responsible person must ensure that the work planning system and process, from the initial pre-work assessment to job completion, are audited.

Auditing reviews the process of planning, implementation and completion; it is informed by an **inspection** of the various key elements of the work planning process. Auditing will consider the whole process or system.

A tree work planning audit may consider the following criteria:

a) tree work specification;
b) assessment of work methodology;
c) assigning resources:
   - time
   - labour
   - competency
   - equipment;
d) pre-work risk assessment and control;
e) site-specific (point-of-work) risk assessment and controls;
f) compliance;
g) completion to specified standard.

Work site inspections provide key point-in-time assessments of compliance with aspects of tree work and should be undertaken regularly to inform, amongst other things, the wider audit process.

Work site inspections may include the following criteria:

a) competency of operators on site;
b) resource provision;
c) condition and use of tools and equipment;
d) demonstration of task competency;
e) work site planning and control;
f) task planning and control;
g) compliance with risk controls and emergency procedures;
h) environmental factors;
i) work quality.

Work site inspections and tree work planning audits provide important opportunities to improve on standards of compliance with the criteria and promote a positive safety culture. They should be undertaken on a regular basis.

Audits and inspections should be documented, with clear criteria set for the auditor/inspector to assess against. Non-compliance with agreed processes and systems should be dealt with by clear action points which are assigned to individual personnel and are time limited.

2.4 Preliminary Work Site Assessment

2.4.1 General

To ensure that tree work at height is suitably and sufficiently planned, managed and carried out, a site survey/assessment will need to be undertaken before work starts.

Normally conducted as part of the work quotation/pricing stage, the findings of the site survey will need to be considered as an integral part of the work at height planning process.

It must be ensured that any individual carrying out site surveys is suitably competent to do so and can, where necessary and when required to do so, record and justify their findings.

2.4.2 Site parameters/survey

The parameters of the survey area should be defined by the maximum potential extent of proposed arboricultural operations. This must include access and egress routes; all areas where vehicles are to be operated (or parked); all areas where material may be processed, stored, dropped, felled or lowered; the maximum potential reach of any machinery (e.g. platform or crane).

2.4.3 Tree work requirements/specification

Detailed consideration should be given to the tree work required in order to ascertain:

a) if there is a need for tree work at height;
b) if individuals proposed for the tasks have the necessary proficiency levels to safely, efficiently and effectively carry out the required task;
c) what resources, including personnel and equipment, will be required.

2.4.4 Tree condition assessment

A tree condition assessment must be conducted to determine:

a) the implications for working at height;
b) the most appropriate system for safe working at height;
c) the most appropriate method of access to the tree.

Allowances must also be made for:

a) the tree species and timber characteristics;
b) parts of the tree obscured by vegetation, e.g. ivy, epicormic growth;
c) the site terrain and location;
d) the possible presence of biotic hazards, e.g. bees or wasps;
e) surrounding hazards;
f) structural defects present within the tree or adjoining trees;
g) protected species.

Any tree condition assessment should include an active survey and, where required, the monitoring and recording of protected species, in particular at peak periods, e.g. the nesting period for birds.

The condition of trees should be assessed by an individual/individuals competent to do so in relation to the work being proposed, in order to design a safe system of work.

Individuals conducting these assessments will require a broad understanding of basic tree biology, species identification and characteristics, and the tree as a mechanical structure, including the implications of apparent defects and protected species.

At the start of work, operators are required to perform a site-specific confirmation of tree condition and to validate the information gathered prior to work commencement.

Significant changes to tree condition, the system of safe working or the method of access should be not only recorded as part of the site-specific risk assessment, but also communicated directly to the competent person prior to starting any aerial tree work activity.

It is of the utmost importance that assessment of the condition of the tree continues while it is being accessed so that any hazards in the crown that were not visible from ground level can be identified and appropriate control measures applied.

2.4.5 Constraints

Due consideration must be given to constraints that may affect tree work activity such as, but not limited to:

a) tree protection or preservation;
b) protected species;
c) utilities (rail, road/footpaths, water, overhead/underground services);
d) public access;
e) the health and stability of neighbouring trees.

All constraints affecting a site should be carefully examined and considered as part of the tree work planning process. Where constraints are identified, specific control measures must be implemented:

a) to manage risk to as low as reasonably practicable (**ALARP**);
b) to ensure necessary third-party consents are obtained;
c) to help develop and inform a safe system of work for the intended operation;
d) to allocate specific resources to effectively manage, control and safeguard/protect against any constraints imposed;
e) to ensure environmental loss is not sustained and habitats are protected.

2.4.6 Site conditions

Site layout, access, egress, land use and terrain should be carefully considered as part of the site survey, informing the decision-making process regarding equipment access, management of arisings, available working space, ground conditions and the load-bearing capacity of surfaces.

From the start of work, the layout and organisation of the work area must protect all parties from the risk of falling objects.

Consideration must be given to the fact that certain operations may require the demarcation and identification of pre-determined zones:

a) Drop Zone: an area where it is anticipated materials may fall and therefore people or property would be at significant risk from falling objects;
b) Work Zone: an area where hazards could be encountered or created;
c) Buffer Zone: an area that anyone – work team or the public – may enter.

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.

The extent of the Drop Zone must always be demonstrably clear to all operators; this should be achieved where reasonably practicable through the use of signs, demarcation, site features or tree features, e.g. canopy dripline).

The limits of the Work Zone should be clearly marked, signed and guarded and should afford suitable protection to all parties. Additional resources may be required on site, such as lookouts, to help manage any risk associated with anyone possibly entering the work site, including the public.

Materials and objects must be stored in such a way as to prevent risk to any person arising from the collapse, overturning or unintended movement of the materials or objects.

To maintain the safety of operators, third parties and property, ensure that:

a) the extent of each zone is demonstrably clear to all operators;
b) operators are fully aware of the circumstances in which specific zones may or may not be entered;
c) pre-determined communication links are established between the climber(s) and ground staff.

2.4.7 Electricity (overhead and underground)

If aerial tree works are contemplated within 10m (United Kingdom specific) of power lines (measuring the shortest distance between any parts of the tree and the power line), a risk-based approach must be adopted. In practice this will mean seeking specialist advice and guidance from the owner of the power line before undertaking any work within this distance.

Consideration must also be given to operations that are outside of this distance but have **the potential** to breach it.

If work is being carried out within 10m proximity to power lines, the basic principle will be to work with the electricity switched off and/or to establish (and maintain throughout the works) a measured safety or exclusion zone to/from the electrical apparatus. Such arrangements will be set by, and agreed with, the owner of the power line.

Separate arrangements and competency levels exist for tree work contractors engaged directly by electricity companies that own or have responsibility for power lines.

Principal considerations relating to work in proximity to power lines are:

a) because of the different hazards posed, obligations in terms of managing the risks, staff training and competency requirements may differ;
b) the first choice for arborists when managing the risks from electricity should be to undertake the works with the lines de-energised;
c) any decision to undertake works with lines energised must be justified and documented;
d) all parties must be familiar with, and consider, any specific arrangements that the owner of the power line has in place. This may greatly impact upon safety distances and the use of access equipment on a given site;
e) all parties must be familiar with, and consider, both industry guidance and any manufacturer's advice regarding the suitability, and use, of access or climbing equipment and tools near to power lines;
f) where arrangements have been made to work with the lines de-energised, it must be ensured work methods are used that avoid damage to the electrical equipment;
g) work planning must provide for appropriate levels of supervision and emergency procedures specific to the site and working methods selected.

2.4.8 Underground services

Appropriate provision must be made for the identification and avoidance of danger from underground services. Whilst it is acknowledged contact with services may not be from excavation works, the free fall of timber within a defined drop zone may cause both impact and puncture damage.

As an overarching principle, where works are to be undertaken that have the potential to disturb underground services, it is the duty of those in charge of planning works to consult with the service owner/operator.

Where there is any doubt about the location of a service the provider should be contacted for further advice.

Safe systems of work must be developed by identifying the hazards that are likely to be encountered during the work and making a suitable and sufficient assessment of the risks posed by those hazards.

It is responsibility of the competent person to ensure that any individual carrying out any aspect of the work process has sufficient information, clear instructions and training to work safely, and that proper management and supervision of the work ensures that it is done safely.

2.4.9 Highways

Where aerial tree works take place that may affect the highway or pedestrian routes it must be ensured that:

a) correct procedures have been followed for works that involve the need for prior consultation, consent or agreement (e.g. highway closures, working in the vicinity of railways);

b) site-specific risk assessments have been completed that pay particular attention to the requirements of highway users, pedestrians and any vulnerable users;

c) before work starts, the work site layout should be planned, necessary equipment identified and knowledge relating to the correct site set-up obtained;

d) any pre-planned site safety requirements are implemented;

e) work areas are signed, guarded and where appropriate lit safely at all times;

f) works remain compliant and safe as work progresses or following any alteration;

g) the safety of both operators and those who pass near or through the works is paramount;

h) all members of the work team understand all the key safety issues and the site-specific risk assessment relating to the task;

i) only appropriately trained and competent operators, supervisors, managers or other competent persons are engaged in the assessment, design, setting up, maintenance and removal of signs, lighting, guarding and temporary traffic control;

j) where applicable, the assessment, design, setting up, maintenance and removal of signs, lighting, guarding and temporary traffic control is conducted in accordance with any published code of practice, good practice or legislative requirement.

2.4.10 Welfare

Suitable welfare facilities must be identified and available for the duration of the work activity. Arrangements should be recorded and communicated to all parties. These facilities are to include, as a minimum, clean drinking water, hand-washing facilities and sanitary conveniences.

The use of public facilities should be a last resort, where no other arrangement is possible. The use of such facilities should not be acceptable where the provision of better facilities would be reasonably practicable.

2.5 Arboricultural Work at Height

2.5.1 General principles for arboriculture

Careful and detailed consideration must be given to the need to work at height. Where reasonably practicable, work at height should be avoided, and where it cannot be avoided justifiable evidence should be available to support that decision.

An individual's or organisation's past working methods should not automatically set precedents for future practice. Therefore, the organisation (or individual) must ensure that their general management approach to work at height is based upon objective decisions which are documented, and that specific arrangements (i.e. risk assessments for work at height) are in place for assessing and managing the risks on each and every occasion, across the broad range of work sites likely to be encountered.

2.5.2 Organisation and planning

The responsible person must ensure that all work is:

a) properly planned;
b) appropriately supervised; and
c) carried out in a safe manner.

Planning must include the correct selection and use of equipment; the undertaking and effective communication of thorough and detailed risk assessments; and appropriate emergency procedures, including rescue provision.

Planning of any work at height operation should also include avoiding weather conditions that may jeopardise the health and safety of operators.

There must be sufficient opportunity for those implementing any agreed system of work at height:

a) to review the decision;
b) to validate it; and
c) where appropriate to make changes to it.

There must be sufficient and robust systems in place to ensure that any changes are communicated to and supported by the responsible/competent person before work starts, or a suitable system of delegation of responsibility is in place.

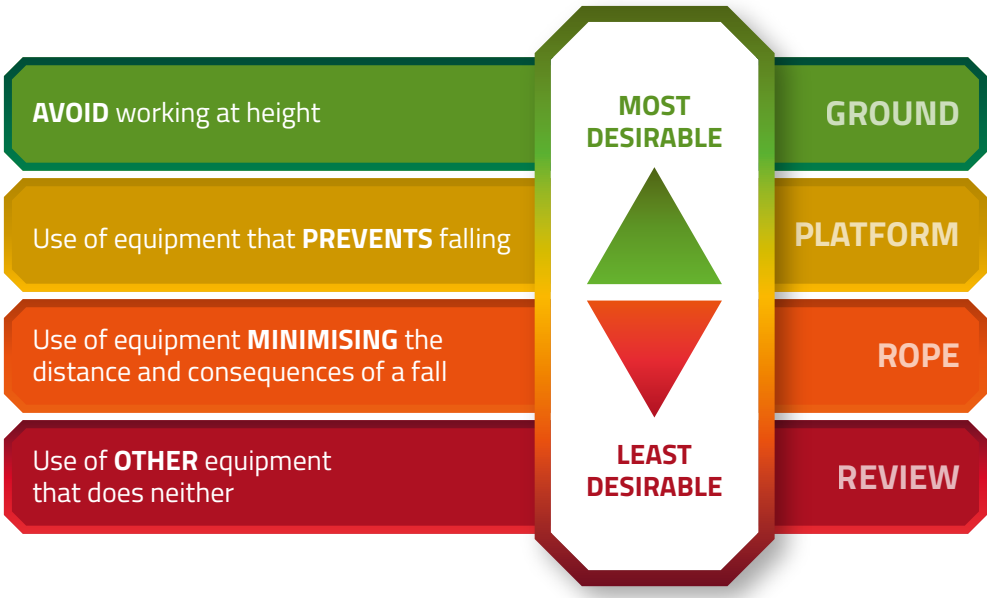
2.5.3 Competence

All tasks, from planning to implementation, must be undertaken by appropriately competent persons or others supervised by such persons.

2.5.4 Fundamental principles

This ICoP sets out a framework for the management of risks associated with working at height. The fundamental principles or risk hierarchy are:

Figure 4: Risk hierarchy for tree work at height.



When the most appropriate equipment, techniques or methods of working are being selected, the basic principles outlined within the 'Tree work at height – risk hierarchy' diagram above should be implemented.

When working through the hierarchy, the competent and/or responsible person must select any work method and/or equipment by taking into account the risks associated with its installation, use and/or removal once work is finished, including any rescue requirements for such a method and/or equipment.

It should also be ensured that for any work method chosen **collective protection** measures[3] have priority over **personal measures**[4].

Whilst working through the hierarchy, the responsible and/or competent person must determine the risks and reasonably practicable control measures associated with each level, and justify why a work technique or method that sits higher in the hierarchy has not been selected.

2.5.5 Implementation of the hierarchy

Decisions on working at height methods must be based on the preliminary work site assessment. A process undertaken by the responsible and/or competent person that considers the following key points will help determine whether methods or techniques are reasonably practicable:

a) site constraints, parameters and surrounding use;
b) legislative constraints;
c) the ergonomic constraints associated with the method of work, including operator efficiency and task duration;
d) the type and effectiveness of rescue provision;
e) the impact on other site users;
f) how to meet the arboricultural aims and objectives without causing significant harm to trees and the environment;
g) the duration of exposure to site-specific risks;
h) the duration of exposure to ergonomic-specific risks;
i) the duration of exposure to weather-specific risks;
j) equipment specification and availability;
k) the risks associated with installation and removal of equipment;
l) the costs and time associated with appropriate work methods and equipment.

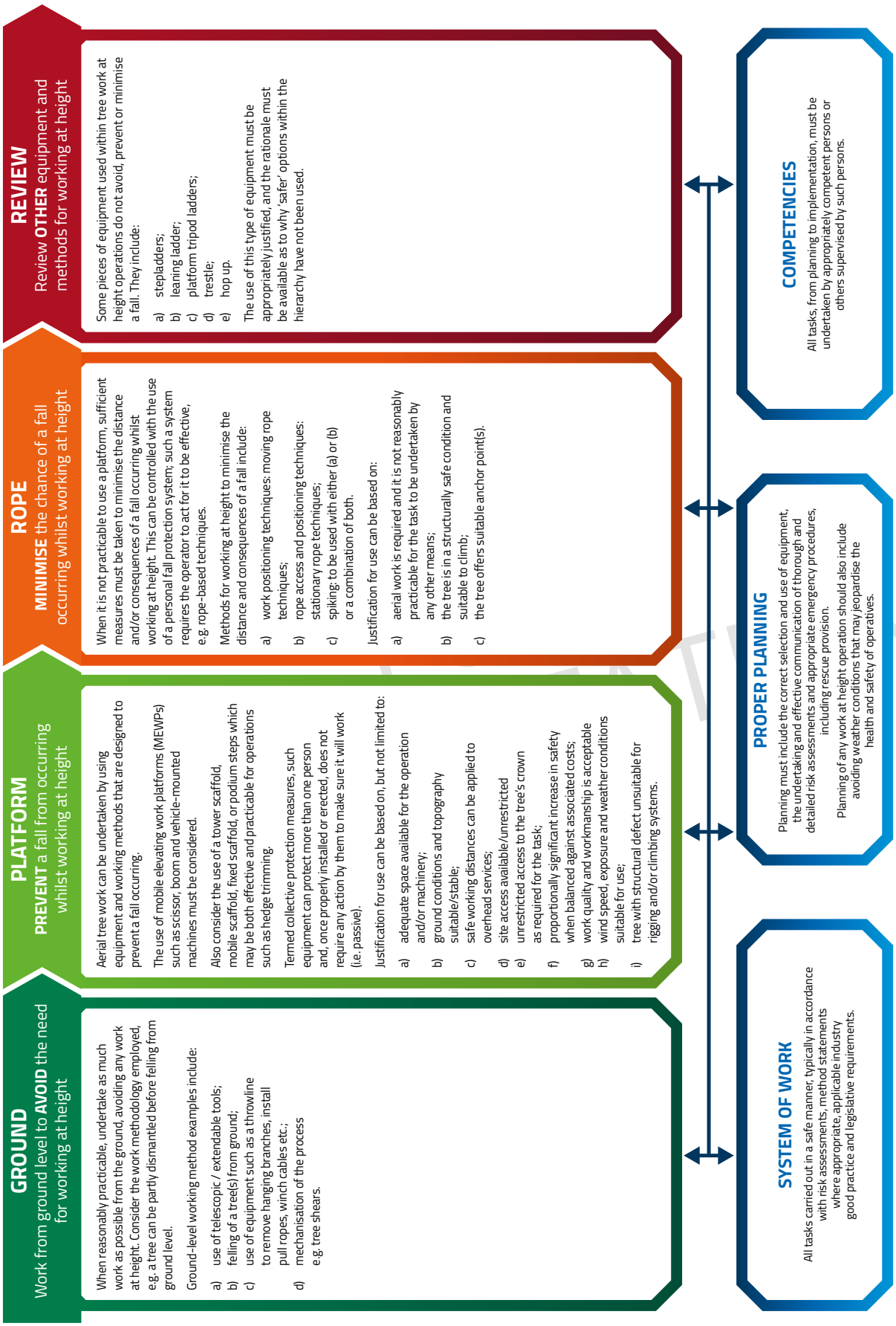
The implementation and working through a hierarchy requires a step-wise approach as detailed on page 24.

FOOTNOTES

[3] **Collective protection measures:** equipment which can protect more than one person and, once properly installed or erected, does not require any action by them to make sure it will work (passive).

[4] **Personal measures:** measures that are generally active (i.e. measures that require the user to do something in order to work effectively, e.g. knot tied and **karabiner** attached; friction hitch advanced manually) and will only protect one user at a time.

Figure 5: Step-wise approach to working through the hierarchy for tree work at height.



2.6 Rescue Planning

Appropriate rescue planning procedures, equipment and personnel requirements must be considered as part of a preliminary site assessment. It must be ensured that an effective, documented and well-communicated rescue plan is in place during aerial tree work operations.

All rescue planning and operations should address the following issues:

a) provision for rescue covering a range of scenarios relevant to the work, whether they be equipment/mechanical failure, operator incapacity or other;
b) the first aid needs of the operator to be rescued from height, with respect to personal injury and who will deliver the first aid;
c) the safety of those carrying out or assisting with the rescue;
d) the safety of the public, site owners and other parties;
e) provision for contacting, maintaining communication with and updating the emergency services;
f) site access, highlighting specific geographical constraints, e.g. remote location;
g) the effective deployment of the rescue equipment;
h) the suitability of the equipment that may have already arrested the fall of the casualty for use during the rescue;
i) the method that will be used to attach the casualty to the rescue system;
j) the direction in which the casualty needs to be moved to get them to the point of safety (raising, lowering or horizontal);
k) the possible needs of the casualty following the rescue.

Specific rescue equipment should always be present at the work site. This equipment should be sufficient to carry out a rescue of an individual from any situation on the site. The anticipated loads during the rescue situation should be within the loadings specified in the manufacturer's user instructions.

It must be ensured that those performing a rescue of an individual incapacitated at height are suitably trained, equipped and practised in rescue techniques appropriate to the work being undertaken and the equipment being used.

2.7 Delivery of Training for Tree Work at Height

Operators should be adequately trained for the tasks that they are to undertake. All training for work at height must be delivered to a nationally recognised (or equivalent) high standard, in a safe, controlled environment, and by competent and experienced individuals.

All individuals who receive training for tree work at height should, as a minimum, also be trained to participate in the rescue of an injured worker from the tree.

Instructors/trainers must be able to demonstrate a high level of knowledge and practical ability. They must be competent and have proven working experience, and commercial credibility, within the sector. A competent instructor must be able to provide an exemplary demonstration of the relevant task on demand. They should have an in-depth understanding of the principles being taught and be able to explain the relevant knowledge and understanding to learners using a range of clear and effective methods appropriate to the learners' needs and the skills being taught. To further support this, documented evidence of prior and current experience, training undertaken, relevant qualifications and the continuing professional development of the instructor must be maintained.

Instructors should be able to demonstrate the following abilities, training, knowledge and experience:

a) experience of tree work at height;
b) knowledge of relevant industry sectors;
c) relevant health and safety training;
d) practical arboricultural knowledge, including a working knowledge of tree biology and associated pests and diseases relevant to the safety of tree work at height;
e) instructional techniques training;
f) experience of the equipment on which he/she is to provide training;
g) ability to supervise;
h) ability to carry out safely and efficiently any emergency procedures that may be necessary.

Any formal training provision must have clearly defined and recorded aims and objectives, including a course syllabus.

Appropriate records should be kept by training providers to confirm appropriate levels of fitness of verifiers, instructors, **assessors** and learners, and any medical conditions which may affect an individual's ability to work at height.

Any structure used for work at height training, whether natural or engineered, must be subject to thorough pre-use examination, along with ongoing periodic inspection to confirm its continued status as safe for use.

Relevant literature, legislation, good practice and reference material referred to during any training provision should be made available to learners for reference.

It should be ensured that appropriate equipment, facilities and personnel are available at any training location to enable first aid treatment to be provided if required. Instructors must ensure that they are appropriately trained in the provision of first aid.

2.8 Work Methods

A work method will be chosen and implemented following a suitable and sufficient risk assessment. Consideration must be given to the duration of the access and therefore the duration of exposure to any risk(s) presented by the chosen method.

2.8.1 General

During any work at height activity, all measures should be taken to minimise the risk of a fall.

Should the risk of a fall not be mitigated through the implementation of such measures, the distance and consequences of a fall must be minimised.

A person fully trained, equipped and proficient in the rescue of tree work operators at height must always be present during tree work at height operations.

The strategic planning and selection of a work method should take account of:

a) assessment of hazards and risks: take account of the work to be undertaken, the work site conditions and the effect of the work method and associated equipment on the site and the individuals engaged in the proposed operation;
b) access and egress: does the work method provide safe and suitable access and egress to the place of work?
c) falls from height: what are the distance and consequences of a potential fall and does the selected work method provide adequate risk reduction?
d) duration of exposure to potential risks presented by the work method;
e) operator proficiency: is the operator adequately trained and proficient in the use of the selected method?
f) the tree: to include consideration of size, structure, species and condition;
g) the identification and installation of suitable anchors;
h) available equipment;
i) rescue: the selection of work method must include planning and provision for rescue.

2.8.2 Ladder

The use of ladders or steps must be restricted to low risk, short duration tasks, such as accessing the lower portion of the tree canopy in order to begin a staged ascent or limited duration access for hedge trimming. If ladders are to be used for tasks which require the user to be 'hands free', the operator should ensure they are also correctly anchored into the tree structure. If the task requires working from a ladder for extended periods of time, another work method must be considered.

2.8.3 Mobile elevating work platform (MEWP)

MEWPs are versatile pieces of work equipment that can provide an efficient and appropriate access solution. In addition to access, operational activities may also be conducted from a MEWP.

As collective protection equipment, a MEWP can protect more than one person and, once properly installed or erected, does not require any action by the operator to make sure it will work (i.e. passive).

The selection, strategic planning for the use of and deployment of MEWPs in tree work should take account of the following:

2.8.3.1 Planning and management

A proficient arborist with the assistance of the MEWP-competent person (where appropriate) should plan and establish a safe system of work for the operation on each site, taking into consideration:

a) the nature of the task to be undertaken;
b) the selection of an appropriate MEWP with regard to the work site conditions, the **safe working load** (SWL), working height and outreach of the MEWP;
c) access and egress to the site with regard to the height and width of entrances, the width of access roads, the gradient and condition of the ground the MEWP will travel on;
d) proximity hazards (e.g. buildings, vehicles, overhead and underground services);
e) space for placing the MEWP, other equipment such as vehicle and chipper, and the drop zone for tree sections to be dropped or lowered into;

f) the suitability of the ground to take the loads imposed by the MEWP in preparation for and during the operation, and the gradient of the ground on which the MEWP will operate;
g) selection of an appropriate personal **fall prevention** system for those in the MEWP;
h) method of communication between the MEWP operator and those on the ground;
i) existing and foreseeable site conditions that may affect the operation, such as the proximity of electrical storms and other adverse weather (e.g. snow and ice), wind speed in excess of the wind speed limits of the MEWP or wind acting adversely on trees that are to be worked on at wind speeds below the wind speed limits of the MEWP;
j) safety of those not involved in the operation;
k) identifying emergency contingencies.

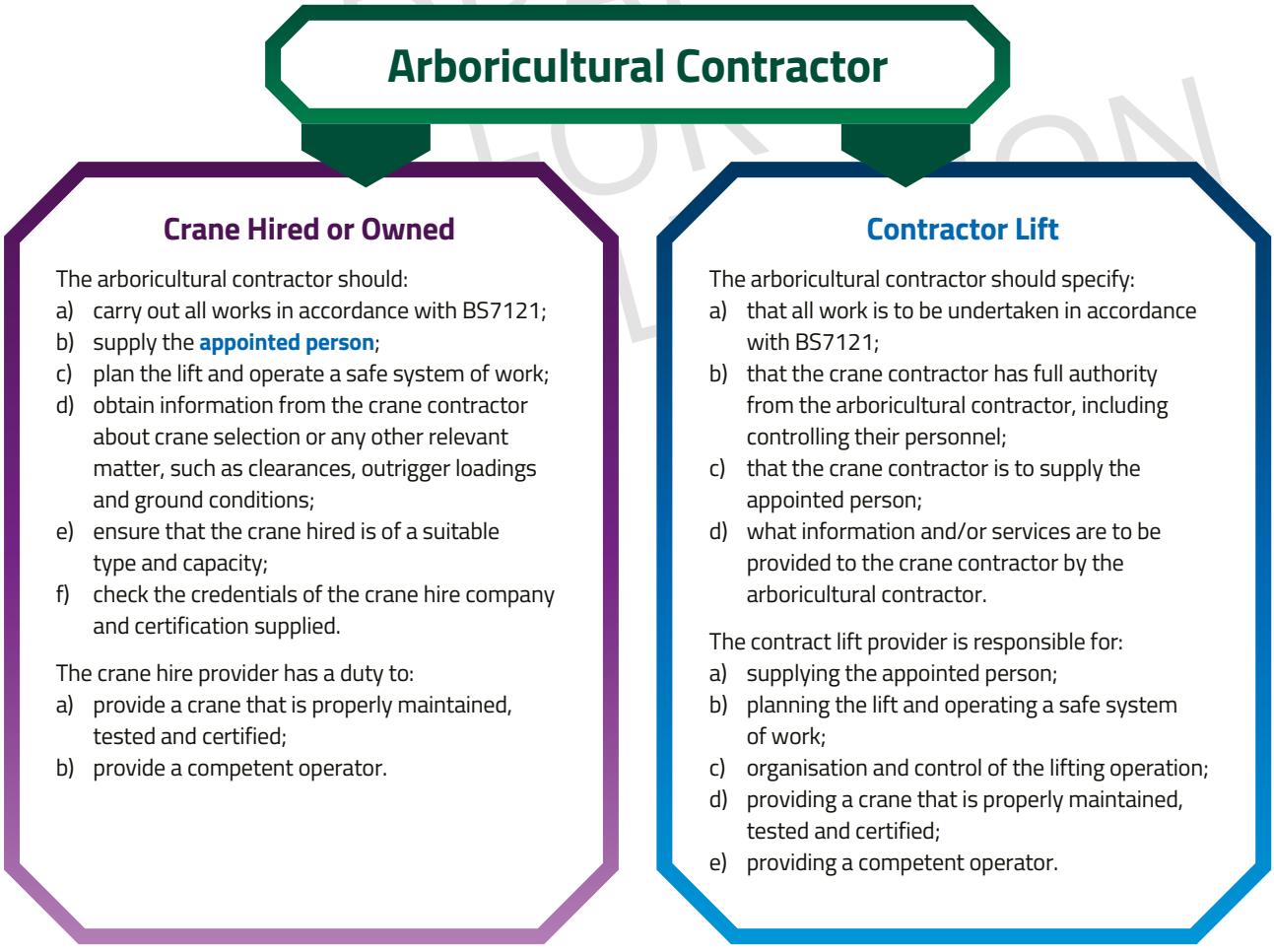
2.8.4 Crane (mobile, telescopic jib, wheeled type)

Arboricultural contractors who want to undertake tree work operations using a crane but who do not have their own crane have two options:

a) crane hire: hiring a mobile crane, planning, managing and undertaking the lifting operation themselves;
b) contract lift: employing a crane contract lift provider to carry out the lifting operation.

Arboricultural contractors who do not have in-house qualified expertise in tree work operations using a crane should not hire cranes but should opt for a contract lift to ensure that the operation is properly planned.

Figure 6: Options for undertaking tree work using a crane.



Regardless of whether arboricultural operations using a crane are undertaken by a crane hire or contract lift agreement, the arboricultural contractor and the crane contractor must work closely together to ensure that:

a) a qualified and competent appointed person plans all aspects of the proposed work;
b) all relevant information about site conditions is obtained;
c) the operation is planned and a safe system of work is followed;
d) the operation is appropriately supervised;
e) the operation is conducted in a safe manner in line with the lift plan;
f) the crane is appropriately maintained, inspected and thoroughly examined;
g) a competent crane operator is provided;
h) lifting operations are carried out in accordance with specific arboricultural crane good practice.

2.8.4.1 Planning and management

Arboricultural lifting operations using a crane must be planned by the appointed person to ensure that they are carried out safely and that all foreseeable risks are eliminated or controlled so far as is reasonably practicable. The outcome of the planning process should be a written lift plan which includes a risk assessment, a method statement and supporting information, such as a site drawing and photographs.

The risk assessment carried out by the appointed person as part of the planning process must identify all hazards associated with the proposed lifting operation. In situations where the appointed person lacks the adequate practical and theoretical knowledge and experience of specific arboricultural aspects of the lift, then the responsible person for the arboricultural contractor must ensure that they provide that information and input into the risk assessment. In such cases, the lift plan may be an integrated document including information from the appointed person and arboricultural contractor.

The planning should consider:

a) the selection of an appropriate crane with regard to the lift radius/height and weight of both the crane and the intended load;
b) the selection of appropriate lifting accessories;
c) the number of arborists on the team;
d) access to site for the crane and other equipment;
e) the site of the lifting operation including proximity hazards such as electricity cables, other plant and equipment, structures, members of the public;
f) the suitability of the ground to take the loads imposed by the crane during preparation for the lift and during the lift itself and other environmental conditions;
g) areas where the crane and/or parts of the crane and load-lifting attachments are prohibited from entering or oversailing, such as railways;
h) rigging and derigging of the crane;
i) appropriate communication system;
j) weather conditions – prevailing and forecast;
k) lifting people with the crane and aerial tree work operations;
l) the load, its characteristics and the method of lifting, including the stability of the load when being lifted and set down;
m) ground-based operations including chainsaws and chippers;
n) vehicle movements around the work site;
o) slips, trips and falls;
p) emergency procedures.

The risk assessment should include an evaluation of the risks involved and the nature and extent of any measures required to mitigate those risks. The results of the risk assessment should be recorded in writing and used in the preparation of the method statement for the operation.

2.8.4.2 Lifting people

Cranes are not specifically designed for the raising and lowering of people in a tree climbing harness or personnel carrier. An arborist should only be raised or lowered by a crane to access the tree during tree work operations where it is not practicable to access the crown using a MEWP and following the completion of a risk assessment which fully justifies the plan.

When a risk assessment has determined that the safest method of accessing the tree is by using a crane, each raising and lowering operation must be carefully planned and must address the following:

a) the weight of any climbing equipment and attachments should be included as part of the load;

b) when the tree is accessed by attaching the personal fall protection system, the attachment must be suitable and safe and must take into consideration the presence of other lifting accessories;

c) the crane safety hook must have a latch;

d) the climbing rope must be bagged and the rope bag clipped to the climber's harness to prevent trailing and possible entanglement with lifting accessories, the tree or other obstacles;

e) the crane should have a rated capacity for the crane configuration to be used which is at least twice the weight of the climber, climbing equipment and its lifting accessories;

f) the crane should be equipped with a motion control system that automatically stops the movement of the crane when the controls are released;

g) the crane should have power lowering. Cranes with a free fall facility should not be used to lower and raise people unless the free fall facility is locked out;

h) load bearing hydraulic cylinders on the crane should be fitted with a device to stop movement in case of hose failure;

i) crane movements should be gentle and the working speed of the crane for all movements should be limited to a maximum of 0.5m/s;

j) wire ropes used for raising and lowering people should have a minimum diameter of 8mm;

k) the crane should be fitted with an anemometer or other device to monitor wind speeds during lifting operations;

l) the rated capacity limiter/rated capacity indicator on the crane should be maintained in good working order;

m) when lowering below the crane base level, a fail safe procedure should be provided to ensure that sufficient hoist rope remains on the drum at all times to prevent the end of the rope running off the drum while lowering;

n) the crane operator should be present at the normal crane control station when people are being lifted;

o) proximity hazards during the lift must be taken into account;

p) constant communication should be maintained between the arborist being lifted, the crane supervisor and the crane operator at all times during the lifting operation, preferably by the use of two-way radios;

q) the raising and lowering of people should not be carried out in the following conditions:
   - winds exceeding 7m/s (25km/h)
   - thunderstorms
   - snow, sleet, or ice
   - fog
   - any other weather conditions that could affect the safety of personnel.

r) the crane, lifting attachments and climbing equipment should be subject to regular pre-use inspections and **thorough examination** where appropriate at specified intervals;

s) planning must be carried out for emergencies and rescue.

2.8.5 Scaffold (mobile tower scaffolds)

Mobile scaffold towers may be convenient for tree/hedge work at height which involves frequent access to a height over a period of time. The locations where work at height is scheduled to take place may also be a distance apart, e.g. hedge trimming.

A competent person (competent in the type of scaffolding work being undertaken and suitably trained) with the assistance of a competent arborist should plan and establish a safe system of work for the operation on each site, taking into consideration:

a) site location;
b) period of time the scaffold is required to be in place;
c) intended use;
d) height and length and any critical dimensions which may affect the scaffold;
e) maximum working loads to be imposed and maximum number of people using the scaffold at any one time;
f) type of access onto the scaffold;
g) any specific requirements or provisions;
h) nature of the ground conditions or supporting structure;
i) any restrictions that may affect the erection, alteration or dismantling process;
j) proximity hazards (e.g. buildings, vehicles, overhead and underground services).

When a scaffold is used, it should be ensured that:

a) ground conditions are suitable, including slopes;
b) weather conditions are accounted for;
c) the risk associated with people or objects colliding with the structure is appropriately managed and precautions implemented;
d) it is erected and dismantled by trained, proficient personnel;
e) erection and dismantling are conducted in accordance with specific manufacturer's instructions;
f) all component parts are free from material defect, of sound condition and construction and compatible with all other elements of the structure;
g) the height of any untied, independent structure does not exceed manufacturer's recommendations;
h) access to scaffold towers is sought via safe means;
i) there is no unauthorised alteration or modification to the structure.

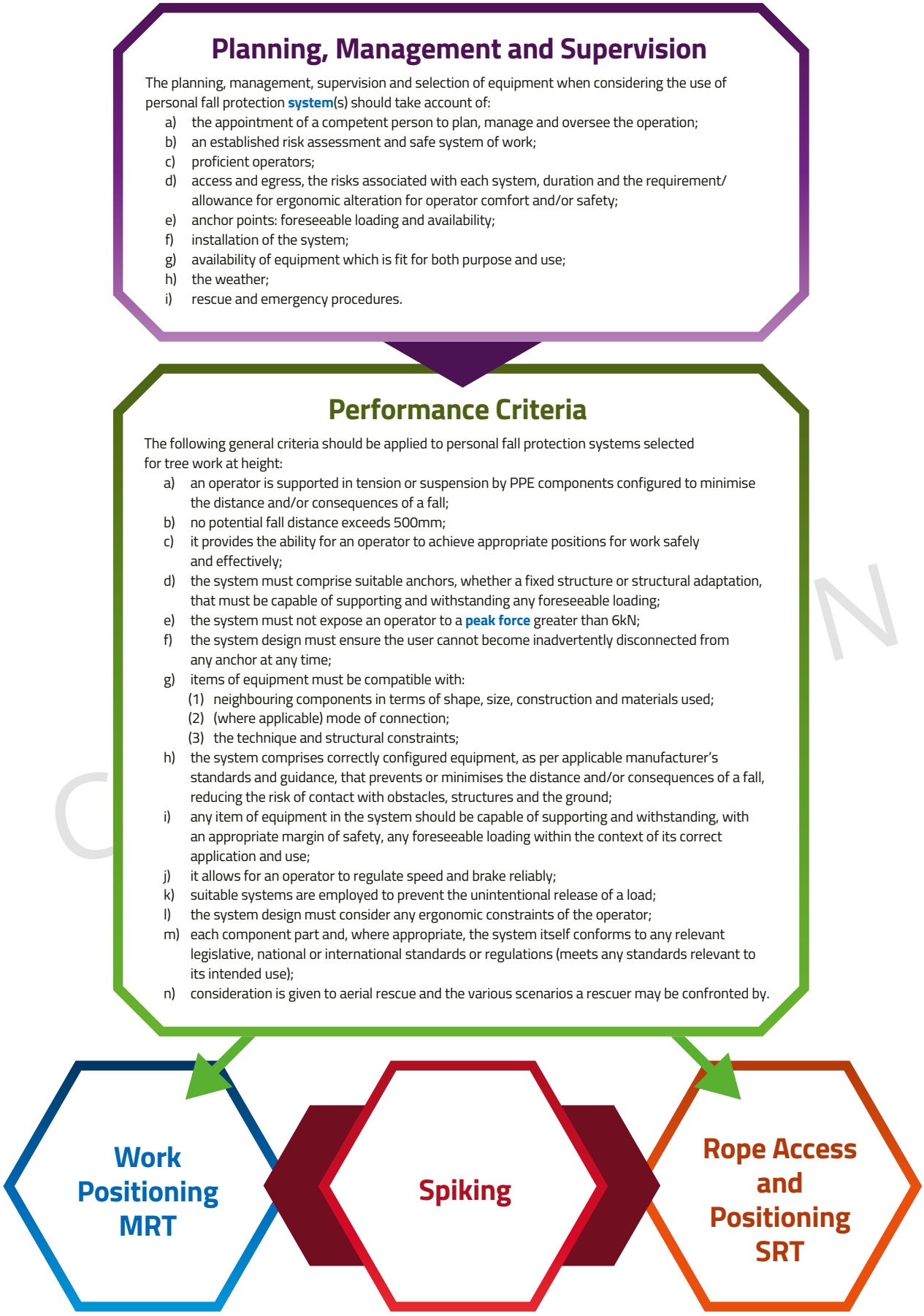
2.8.6 Personal fall protection systems

When a **personal fall protection system** is chosen, a comprehensive risk assessment must determine that it is the most appropriate for the proposed operation. Personal fall protection systems encompass a range of systems and equipment (see figure 7).

2.8.6.1 Personal fall prevention

In circumstances where an operator is working from the bucket of a mobile elevating work platform, the use of a **work restraint** system (personal fall prevention) may be required. An operator using personal fall protection equipment such as **harness** and **lanyard** would be prevented from reaching an area where there is a risk of a fall, e.g. climbing on the guard rails.

Figure 7: Planning, management and supervision of fall protection systems.



2.9 Work Positioning and Rope Access

2.9.1 General

The following techniques can each be used for aerial tree work operations. The techniques can either be used individually or combined where they may provide the safest and most efficient method of work.

These techniques can allow the user to ascend, descend and move laterally using the branch structure for support whilst tending slack.

It may be that in some cases the access technique is also the technique employed for movement around the canopy of the tree. However, where two separate techniques are used, consideration must be given to the suitability and compatibility of the techniques, and the transition from one to the other around the crown, and ultimately obtaining and maintaining safe work positions.

The two techniques described within this section are both considered to be personal fall protection systems. They are subtly distinct in their functionality but have specific requirements incumbent upon the operator as to the use of **back-up** or secondary systems.

2.9.2 Work positioning – Moving Rope Technique – MRT

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 operator connects to both parts of the rope; one part remains static (often the **termination** of the rope) and the other is connected via a midline attachment in the form of a friction-based adjustment **element**, i.e. a friction **hitch** or mechanical device.

During ascent, descent or lateral movement the rope travels through or over the anchor as a result of the operator's inputs, i.e. the taking in or letting out of rope from the adjustment element.

When this technique is used, the system must incorporate a suitable back-up which the user must be connected to. The use of a single system (i.e. without the use of a back-up) is only acceptable when it can be demonstrated that installing a back-up is not reasonably practicable.[5]

2.9.3 Rope access and positioning – Stationary Rope Technique – SRT

A technique where the rope passes over or through an anchor or multiple anchors and is secured so that the rope remains stationary. The operator connects to one part of the rope using one or more friction-based adjustment elements and can ascend, descend and move laterally along the rope whilst it remains stationary at the anchor.

An SRT system can also consist of two parallel sections of rope in order to enable a friction hitch or a mechanical device to be secured around both parts simultaneously. This could be a single rope doubled over and secured to prevent separation, two independently anchored lines or two independently acting lines.

When SRT is used, the system must comprise two independently anchored lines and may only utilise a single line where the use of the second line entails higher risk.[6]

FOOTNOTES

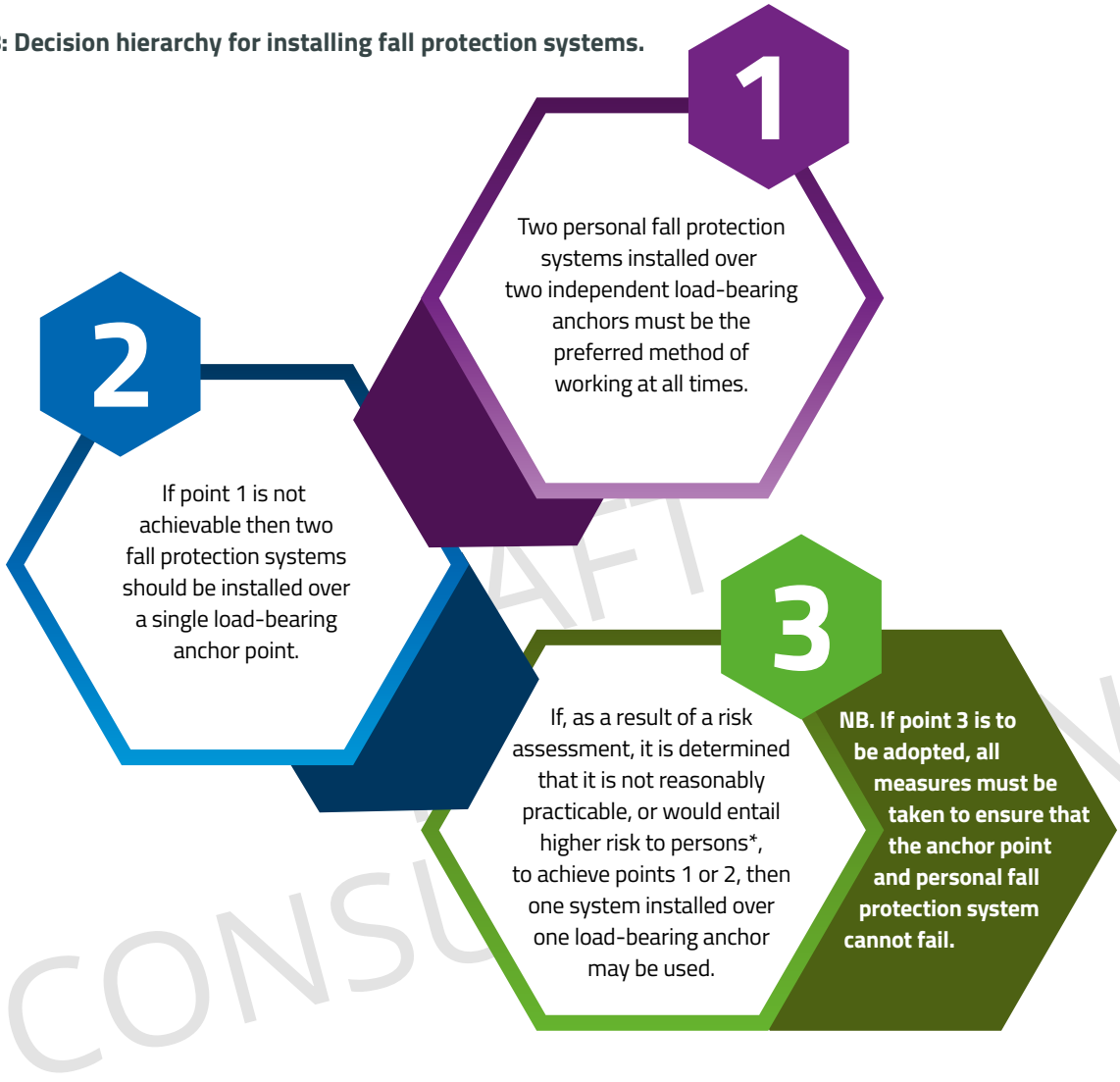
[5] **Reasonably practicable:** A calculation made where the amount of risk is placed on one side of the scales and the measures necessary to reduce or eliminate it are placed on the other. The measures to reduce or eliminate the risk may be considered in terms of money, time or trouble. It is important to remember that the outcome of the risk(s) may be major or fatal injury*, in which case any measures that reduce or eliminate the risk are unlikely to be grossly disproportionate. (*These outcomes are context specific to arboricultural work at height and used for illustrative purposes.)

[6] **Higher risk:** To entail higher risk in practice would mean to increase the likelihood of major or fatal injury, e.g. during rescue where the use of another rope would introduce a delay or cause an entanglement hazard, the consequences of which could jeopardise the safety of the rescuer and/or the casualty. The use of a single line is only justifiable in a few exceptional circumstances.

2.9.3.1 Decision hierarchy

Regulations require that using a back-up or second independent line as part of a fall protection system must be the preferred method of working at all times. The following hierarchy provides a stepped approach to determining the appropriate course of action in a particular situation.

Figure 8: Decision hierarchy for installing fall protection systems.



* The decision not to use the second system will be based on the following: either it is not reasonably practicable to use two lines or it would entail higher risk to do so. This is dictated by the type of system in use and is outlined in sections 2.9.2 and 2.9.3.

2.9.4 Spiking

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

Spiking, including the use of a flip line where appropriate, is not a stand-alone technique and must be used with MRT, SRT or a combination of both.

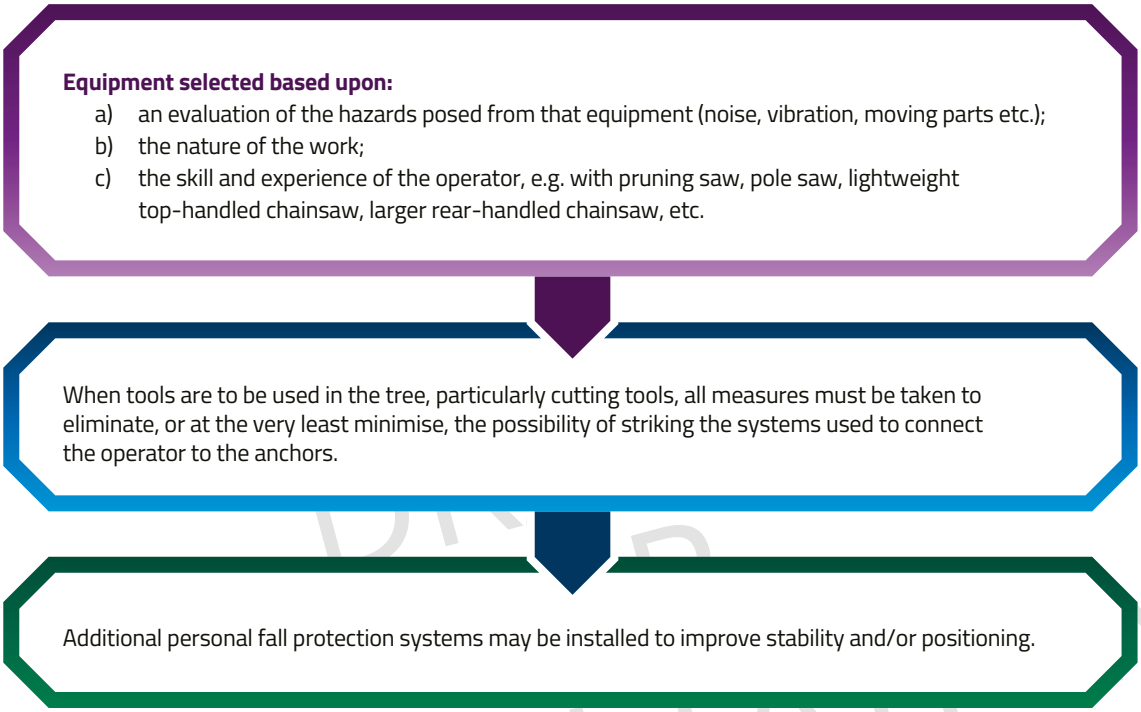
The use of spikes is invasive and can significantly damage the tree. For this reason, their use should be considered carefully and they should be employed only where tree health is of negligible consequence, e.g. when the tree or tree section being climbed is being removed, or during aerial rescue where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

2.10 Use of Tools for Tree Work at Height

2.10.1 General

A risk hierarchy should be implemented in determining what equipment is to be used. The risk hierarchy is based on an evaluation of the hazards presented by using a particular tool and the measures necessary to mitigate those hazards.

Figure 9: Risk hierarchy: use of tools for tree work at height.



2.10.2 Equipment hauling

When in use, equipment hauling systems should be configured using some form of **fail-to-safe** so as to minimise the potential for loads to be inadvertently released.

In order to avoid dropping tools, it is important to secure them in the tree or to the operator's harness prior to disconnection from the hauling line.

If the climbing or access lines are used for equipment hauling, care should be taken to ensure no damage is inflicted to the ropes by way of the method of attachment, direct contact with the tool or exceeding the load rating of the rope.

2.11 Equipment Selection

2.11.1 General

Before any tree work at height begins, an assessment should be carried out to select the most appropriate equipment.

It is essential to have a thorough understanding of the methodology behind the system, the technique and the individual components to be used. This can be gained through training, consulting specialists (e.g. competent persons) and manufacturers and through written instructions or guidance for using the products and systems.

Component configuration and compatibility will have a significant bearing on the overall efficiency and system safety. Therefore, operators must select and configure components so that when they are in use, neighbouring elements are compatible.

The selection process must consider not only whether equipment is fit for purpose but also whether it is fit for use. For this reason, inspections must take place at suitable intervals. It is expected that operators will carry out visual and tactile pre-use inspections, in addition to recorded inspections carried out at intervals determined by the intensity of use and specified by a competent person under an examination scheme.

2.11.2 Principles of selection

An application-specific assessment should be made for the purposes of establishing a piece of tree access and rigging equipment's suitability and should be made prior to its use or integration in a system. To enable a user to carry out an application-specific assessment, the following principles of selection are suggested as points for consideration and guidance:

a) application: where and how the item is to be used – primary ascent system or secondary system, PPE, non-PPE, load-bearing/non-load-bearing, lowering and/or lifting, **dynamic loading** or gradual loading;
a) construction, design and materials: abrasion, heat resistance and elongation;
b) anticipation of foreseeable misuse;
c) compatibility: with neighbouring components in terms of shape, size, construction and materials used; with (where applicable) the nature and mode of connection; with the technique and structural constraints;
d) correct configuration and alignment: reducing the possibility of items becoming cross-loaded when not appropriate as per manufacturer's guidance, e.g. three-way loaded;
e) functionality: friction control and reliability, overall dimensions;
f) strength and loading: equipment should be capable of supporting and withstanding, with an appropriate safety margin, any foreseeable loading within the context of its correct application and use; users should refer to the manufacturer's guidance for information on the safe working load and correct application of any attachment points;
g) mode of attachment: to structure, device or system;
h) type: a single component or an **assembly** of components;
i) duration of use;
j) ergonomic constraints;
k) resistance to: UV degradation, chemical contact, abrasive surfaces, resin/sap and general wear;
l) environmental exposure: extremes of heat and cold, tolerance to wet, dry or dirty conditions, poor storage, lack of maintenance.

NB: The principles of selection are a basis from which to begin equipment selection and can be applied to textile components, hardware components, equipment combining both elements and items of PPE worn by the user.

Textile-based items should be made of suitable materials and be fit for purpose.

2.11.3 Loading parameters

The loading parameters can be described as the minimum and maximum foreseeable loads that a piece of equipment or a system will be subject to during its operational service.

Before equipment is selected for use, consideration should be given to the loading parameters presented by the proposed operation in order to ensure the equipment is suitable for its intended application.

All tree access and rigging equipment should be capable of supporting and withstanding, with an appropriate margin of safety, any foreseeable loading within the context of its correct application and use.

Manufacturer's instructions will provide guidance about the equipment, its intended purpose, applications and limitations, and should therefore be taken as a point from which to begin the selection process. Most equipment will be supplied with load ratings; these ratings can specify minimum or maximum loading, a safe working load (SWL) or **working load limit** (WLL). Whether set out in manufacturer's instructions or specified by a competent person, load ratings should not knowingly be exceeded and any event causing a load to be placed on a piece of equipment or system which exceeds the specified load rating must result in that equipment or system being removed from service and subjected to a thorough examination. After the thorough examination, the equipment and/or system in question can either be reintroduced[7] or removed from service.

2.11.4 Manufacturer/supplier information

Equipment for use in tree work at height should be supplied with information, instructions or guidance pertaining to its safe use, maintenance, storage, examination and repair.

Instructions or guidance should include:

a) name and contact information for the manufacturer or authorised representative;
b) statement describing the equipment model, type, identification marks and if appropriate the document and year to which it conforms;
c) evidence of conformity and reference to any test standard(s) and if appropriate the corresponding notified body;
d) information about the meaning of any markings and/or symbols on the equipment;
e) details describing the equipment, where and how it should be used and any limitations;
f) warnings about: medical conditions affecting the safety of the user in normal and exceptional conditions; the equipment only being used by personnel trained in its safe use; aftermarket alterations, additions, modifications or repairs; using the equipment outside its safe operating parameters; the dangers that may arise from combining the equipment with other items; hazards affecting the performance of the equipment;
g) guidance as to the compatibility of the equipment when assembled into a system;
h) instructions as to the nature and frequency of any inspection to ensure the equipment is serviceable and operational;
i) information about the safe useful life expectancy of the equipment and/or any part of it and how to determine when the product is no longer safe to use.

If the equipment is to be used, configured, loaded or function in a way not prescribed by a manufacturer, this must be sanctioned by the manufacturer or their appointed representative prescribing the parameters for safe use.

2.11.5 User knowledge

Manufacturers are required to supply instructions providing guidance about the equipment, its intended purpose, applications and limitations. It is expected that the user will read and understand the information pertaining to the use, care, maintenance and repair of the equipment before it is put into service. This will also apply to any subsequent versions of the equipment where the manufacturer may have modified, altered or repaired the equipment and such changes that could affect the functionality. Users can further improve their knowledge by referring to manufacturers' catalogues and websites and other similar publications.

FOOTNOTES

[7] The reintroduction into service may be conditional, i.e. the equipment and/or system may be de-rated.

2.11.6 Performance specifications

Tree work at height may require the use of a number of different techniques and types of equipment for both work positioning and rope access systems to allow an operator to access, work within and descend from a tree structure.

Operators will often self-build their personal fall protection system which as a minimum should be made up of certificated components. For any items of equipment, a set of standards or characteristics is required which describes the minimum performance criteria.

Operators should seek to use relevant performance criteria when:

a) introducing a new piece of equipment into their system;
b) developing alternative methods or techniques for work positioning or rope access;
c) determining an item's suitability as part of a personal fall protection system.

2.11.6.1 General

The following performance specifications for personal fall protection components selected will apply:

a) each item will be selected such that the anticipated loading is commensurate with the mass of the operator, including any equipment worn;
b) consideration of the environmental conditions to which the item is exposed and the effects of dirt and debris on its functionality;
c) components are compatible and cause no conflict with others, including inadvertent opening;
d) each item is clearly identifiable, carrying sufficient information to allow traceability back to the manufacturer, product name and construction properties;
e) components are manufactured against validated performance criteria;
f) components are subject to independent verification by a notified/approved body
g) components are used in accordance with manufacturer's guidance relating to their application, **configuration** and compatibility with other components.

2.11.6.2 Personal fall protection systems

Reference should be made to section 2.8.6 which outlines the general criteria that should be applied to all personal fall protection systems selected for tree work at height.

Specifically, it must be ensured that the system:

a) enables an operator to achieve appropriate positions for working safely and effectively;
b) does not expose an operator to a peak force greater than 6kN;
c) allows an operator to regulate speed and brake reliably.

2.11.6.3 Anchors

In all cases, anchors (including temporary anchors) should be capable of supporting and withstanding, with an appropriate margin of safety, any foreseeable loading within the context of their use. If there is any doubt over the structural integrity of an anchor and its ability to support or withstand any foreseeable loading, it must not be used and an alternative must be selected.

2.11.6.4 Temporary anchor devices

It must be ensured that:

a) any equipment used is manufactured to the standard for temporary anchors;
b) anchors are configured so that they cannot slip up or down the stem;
c) any connectors used are configured in such a way as to prevent inadvertent opening and/or release of the rope or system which it is supporting;
d) the anchor has a **minimum breaking strength** (MBS) of at least 18kN.

N.B Components used to create a primary anchor during rescue should not rely on 'open' systems that may lead to inadvertent opening.

2.11.6.5 Ascending devices

Ascending devices are components which provide a connection to the rope which when correctly configured allows the rope to travel through during ascent but will 'lock-off' when loaded to prevent unintentional descent.

Ascending devices must:

a) be compatible with ropes used in terms of diameter and type;
b) provide ease of adjustment when moving up and down the working line;
c) provide effective grip on the working line.

2.11.6.6 Back-up devices

The role of the back-up device as part of a back-up system is to protect the user in the event of a catastrophic failure of the primary system, its components and/or anchors.

Back-up devices must:

a) ensure that any fall distance is as short as possible;
b) be configured so that they cannot be inadvertently disconnected from the safety line;
c) be compatible with rope type and diameter;
d) require minimal intervention by the operator if the device is to be used as a 'trailed' or 'follower' device.

2.11.6.7 Connectors

Connectors must:

a) be configured in such a way as to ensure that only major axis is loaded (where applicable);
b) be selected with a locking mechanism to prevent inadvertent opening and reduce the risk of rope roll out;
c) be compatible with other items of the system, or devices used;
d) have an MBS of at least 22kN.

2.11.6.8 Rope adjustment devices

It must be ensured that:

a) any rope adjustment device used within a system can grab positively and reliably at each use;
b) rope diameter and type used within the device is in accordance with manufacturer's specifications;
c) any device used as part of a personal fall protection system can be operated under control and act predictability across a range of work and rescue scenarios;
d) preference is shown for devices that allow an operator to gradually apply or release pressure in order to grab.

2.11.6.9 Descending devices

Descending devices must:

a) be designed or configured in such a way that when they are released, a fall cannot occur;
b) be appropriate for the length and duration of the descent;
c) be capable of two-person loading if required for the purposes of rescue;
d) have the ability to regulate the speed of descent;
e) be compatible with rope type and diameter;
f) not introduce a shock load into the personal fall protection system when the operator stops.

2.11.6.10 Rope and friction cord

It must be ensured that:

a) rope used for work positioning and/or rope access has a diameter of 10mm or greater;
b) rope length allows for at least one of the systems in use by the operator to be capable of providing an uninterrupted descent to the ground;
c) when it is new, rope with a termination has an MBS of 15kN and rope without a termination has an MBS of 22kN;
d) splices in rope are only formed by the manufacturer or with their consent against a validated performance criterion and subject to independent verification.

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

a) suitable for its intended use, based on its diameter and construction from materials suitably resistant to the abrasion and temperatures experienced during work and rescues;

b) be of a diameter 8mm or greater;

c) the way in which cord is attached to a connector or placed within a system does not inhibit or restrict the functionality of the hitch, locking positively and reliably when advanced or during descent;

d) has an MBS of at least 18kN.

2.11.6.11 Harnesses

A harness must:

a) allow the user a full range of movement whilst providing the necessary connection points for the personal fall protection systems;

b) have a means of adjustment and provide support for the operator, including provision for a seat or shoulder straps for support;

c) allow for the replacement of components, subject to authorisation from the manufacturer (follow user instructions).

d) include any fixings, straps, buckles or adjusters: when in use and under load, avoid inadvertent opening or loosening.

2.11.6.12 Lanyards

Lanyards are a multi-functional piece of equipment often comprising a series of components. Lanyards can be fixed or adjustable. However, in the most common context of use, an adjustable lanyard is preferred because of its ability to minimise slack and therefore reduce the distance and consequences of a fall.

A lanyard selected for use as part of a personal fall protection system must:

a) be compatible with the connectors being used;

b) have a means of adjustment and be of a suitable length;

c) have various modes of operation, including single leg and doubled configuration;

d) be efficiently, positively and reliably adjustable in terms of its length when under load from an operator;

e) be suitably attached to the harness to prevent torsion or cross loading of components;

f) have an MBS of at least 15kN.

2.11.6.13 Lowering devices

Lowering devices are based upon the design principle of a tube or bollard around which the rope is wound to create friction or a deviation in the rope. They can range from simple tubular components with attachments to more advanced modular systems incorporating a winching function.

Lowering devices must conform to the following performance specification:

a) «rated appropriately for the anticipated loads, including any potential dynamic loading experienced during rigging point below operations;

b) compatible with the proposed technique: lowering, lifting or a combination of both;

c) compatible with neighbouring components, particularly rope diameter relative to tube/bollard diameter;

d) configured to prevent the device slipping excessively when in use.

2.11.6.14 Pulleys, blocks and trolleys

The use of pulleys, blocks or trolleys can allow for a range of functions. They can be used to create deviations in the course of a rope, incorporate valuable friction reduction, generate mechanical advantage or facilitate lateral movement.

Pulleys, blocks and trolleys must conform to the following performance specification:

a) rope diameter is compatible with sheave diameter and cheek plate profile;

b) mode of connection to neighbouring components prevents misconfiguration when in use and under load;

c) when configured as part of the system, does not cause detriment to its neighbouring components;

d) sheave efficiency is commensurate with application, e.g. a bearing may provide greater levels of efficiency and be better suited to an application where friction reduction is beneficial;
e) design and configuration of the cheek plates prevent inadvertent opening in use.

2.11.6.15 Slings and strops

Slings and strops are textile components which can be found in a variety of configurations, sizes and lengths. Because of their diversity, slings have numerous applications.

Slings and strops must conform to the following performance specification:

a) mode of connection prevents unintentional or uncontrolled movement or inadvertent release;
b) when configured and in use, SWL is not significantly reduced, i.e. when chokered;
c) application will not cause conflict or detriment to the material construction, e.g. high modulus fibres may provide greater strength to weight, but they may be less abrasion-resistant.

2.11.7 Rods

Rods can provide a viable alternative to certain work at height operations if they are selected and used for the correct application.

Rods must conform to the following performance specification:

a) any attachment used must be securely fixed to the rod as defined by the manufacturer to facilitate safe and accurate function;
b) if length adjustable and the context of their use requires that they remain so, they must have the facility to be secured in position;
c) any flexibility in the rod experienced during operation must not compromise the safety of the operator/operation or the accuracy of the task being performed.

2.11.8 Personal protective equipment

Personal protective equipment (PPE) should be worn when the task being undertaken, or the machine being operated presents a risk or risks and those risks can be adequately controlled by wearing PPE.

For the purposes of the following selection criteria, PPE is considered to be items worn by the user, for example, helmet, gloves, boots, trousers, ear and eye protection.

The selection of PPE should take into account the following criteria:

a) appropriate for the intended task;
b) adequately controls the risks presented by the task and/or machine being operated;
c) fits the wearer correctly and if adjustable can be fitted appropriately within the range of adjustment;
d) where applicable, allows the wearer an unrestricted range of movement and/or vision within the scope of the task and/or operation;
e) compatibility (if required to be worn simultaneously) with other items of PPE;
f) does not expose the wearer to risks greater than those presented by the task and/or machine being operated.

2.12 Equipment Inspection, Care, Storage and Maintenance

2.12.1 General procedures

All equipment should be supplied with sufficient information about its inspection, care and maintenance, and it is advised that all such procedures are followed carefully.

When implementing or undertaking equipment inspection, care and maintenance, consideration should be given to:

a) the type of equipment;
b) where and how it is used;
c) intensity of use;
d) operating environment;
e) consequences of failure and/or malfunction;
f) how and where it is stored out of use.

Equipment should be inspected on a periodic basis using the above criteria.

The care, storage and maintenance of equipment should comply with the manufacturer's instructions and should not deviate from those instructions unless on the advice of a competent person with the consent of the manufacturer or the manufacturer's chosen representative.

Items of equipment that are defective or displaying symptoms that could lead to their defect in use should be withdrawn from service.

Any individual carrying out pre-use checks or **interim inspection** of arboricultural **lifting equipment** should be able to:

a) understand the parameters for use of the item being inspected;
b) detect defects;
c) establish whether the nature of the defect poses immediate risk;
d) exercise autonomy when removing the defective item(s) from service.

In addition to the factors listed above, the individual carrying out thorough examination of arboricultural lifting equipment should:

a) be able to act without fear or favour;
b) be sufficiently independent and impartial to make objective decisions;
c) have appropriate practical experience and theoretical knowledge of the equipment being inspected;
d) certify, with confidence, whether the equipment is free from patent defect and entirely suitable for the work for which it is required.

When undertaking the pre-use and interim inspections of the equipment it may be necessary to carry out routine maintenance[8] such as cleaning and lubrication. This will most often be done by the operator of the equipment; however, it may also be done by the thorough examiner where the risk mitigated by the maintenance is low.

Routine maintenance may also entail rectifying minor defects, such as re-sealing terminations, milking ropes and trimming broken fibres. Any and all of these actions must be done judiciously to avoid causing safety-critical damage.

FOOTNOTES

[8] Any maintenance activities must strictly accord with the information and guidance issued by the manufacturer of the product, or their chosen representative. Any actions taken outside of their authorisation could be considered as alteration and/or modification and could result in the item being unsafe or non-compliant.

2.12.2 Textile and hardware components

Textile and hardware components include a wide variety of pieces of equipment ranging from single items to multifunctional modular systems incorporating multiple moving parts. It is for this reason that a considered approach to their inspection, care, storage and maintenance is required, in addition to a comprehensive understanding of the materials and their safe operating parameters.

The degree to which any one or more types of damage or deterioration will affect a component and its continued integrity in use will depend upon the specific type of material(s) used and the nature of construction. It is therefore essential to refer to the information supplied with the equipment and/or obtain the advice of the manufacturer or their chosen representative regarding continued use following inspection.

2.12.3 Personal protective equipment

The inspection, care and maintenance of all items of personal protective equipment (PPE) should be done in accordance with the manufacturer's guidance. Any deviation from this could result in the malfunction and premature deterioration of the equipment.

2.12.4 Equipment lifespan

The **lifespan** of equipment is determined as the period for which an item of equipment remains safe for use within the tolerances specified by the manufacturer or competent person.

Manufacturer's guidance should be referred to when assessing the lifespan of an item of equipment; the age, use and storage conditions will have a significant bearing in relation to continued use.

Where manufacturers specify a lifespan, this should be adhered to. Any equipment outside the specified timeframe should be withdrawn from service. Lifespans may only be exceeded where manufacturers have granted special dispensation which can be evidenced.

2.12.5 Storage and transport

The storage and transport of equipment must follow the manufacturer's guidance. Storage and transport must be carried out in such a way that the equipment will be preserved in a chemically neutral, dry and dark environment away from extremes of heat, sharp edges, corrosive substances and rodents. All equipment must be dried before storage to prevent corrosion and fungal attack (particularly textiles).

2.12.6 Marking and traceability

All equipment should be marked to enable its identification and maintain traceability. The nature of the marking and content of the information may vary between items of equipment; however, information relating to the safe use and operating parameters should be displayed.

The marking of equipment may include:

a) a unique identification mark, e.g. a manufacturer's serial number;
b) where applicable, the name of the manufacturer, model, type or class of equipment;
c) a reference to documentation relating to its conformity and/or safe use;
d) a clear indication as to its application, i.e. PPE, rigging or other;
e) where applicable, a load rating.

Where the equipment is required to be marked by the user or by a competent person acting on their behalf, the markings should be made in such a way as to not adversely affect the integrity of the item. This may only be done with the approval of the manufacturer or their chosen representative.

2.12.7 Records

Records of equipment should be kept to enable a reasonable level of accountability for each item. The following list provides a basis from which more detailed and context-specific information could be gathered:

a) name of manufacturer;
b) name of model, type or class;
c) date of manufacture (where applicable);
d) date of purchase;
e) date into service;
f) date of obsolescence (where applicable);
g) serial number or other unique identification number;
h) any information supplied by the manufacturer;
i) any information pertaining to load ratings and safety-critical configurations;
j) any information regarding storage requirements;
k) the nature and frequency of inspections;
l) dates of inspections;
m) details of any alterations, modifications or repairs (particularly who undertook the work).

Records of inspections should be kept at least until subsequent inspections take place and should be available on request (where applicable).

2.12.8 Equipment withdrawal

Any equipment found to be defective whilst in use or following an inspection must be immediately withdrawn from service pending a thorough examination by a competent person.

Defective equipment must be labelled, and any equipment which cannot be repaired and reintroduced into service should be indelibly marked in such a way as to prevent inadvertent use or, if necessary, destroyed.

Subject to the nature and context of the defect, it may be necessary to implement a quarantine procedure in order to preserve the condition of the equipment and allow for a thorough examination to be undertaken by a competent person.

2.12.9 Equipment alterations and/or modifications

Alterations and/or modifications should only be done by the manufacturer or by a competent person with the consent of the manufacturer or the manufacturer's chosen representative.

PART 3: LEGISLATION (LOCAL/NATIONAL)

The following list details UK statutory provisions applicable to tree work at height, alphabetically by title. This section does not intend to provide an interpretation of the law; rather it is guidance in the form of a summary and/or outline of key points.

The Construction (Design and Management) Regulations (CDM)

are about focusing attention on the effective planning and management of construction projects, from design concept onwards. The aim is for health and safety considerations to be treated as a normal part of a project's development, not an afterthought or bolt-on extra. The object of the CDM Regulations is to reduce the risk of harm to those who have to build, use, maintain and demolish structures.

Consultation with Employees

The law sets out how employers must consult their employees in different situations and the different choices they have to make. There are two sets of general regulations outlining employers' duties to consult with their workforce about health and safety:

- The Safety Representatives and Safety Committees Regulations
- The Health and Safety (Consultation with Employees) Regulations

These regulations will apply to most workplaces. They are designed to enable employers and employees to work together:

a) to develop, maintain and promote measures that ensure health and safety at work; and

b) to check the effectiveness of such measures.

Employers are required to consult with employees or their representatives about the following:

a) the introduction of any measure which may substantially affect their health and safety at work, e.g. the introduction of new equipment or new systems of work, such as the speed of a process line or shift-work arrangements;

b) arrangements for getting competent people to help them comply with health and safety laws;

c) the information employees must be given on the risks and dangers arising from their work, measures to reduce or get rid of these risks, and what employees should do if they are exposed to a risk;

d) the planning and organisation of health and safety training; and

e) the health and safety consequences of introducing new technology.

The Control of Noise at Work Regulations require employers to prevent or reduce risks to health and safety from exposure to noise at work. Employees have duties under the regulations too. The regulations require an employer to:

a) assess the risks to employees from noise at work;

b) take action to reduce the noise exposure that produces those risks;

c) provide employees with hearing protection if the noise exposure cannot be reduced enough by using other methods;

d) make sure the legal limits on noise exposure are not exceeded;

e) provide employees with information, instruction and training;

f) carry out health surveillance where there is a risk to health.

The Control of Substances Hazardous to Health Regulations require employers to:

a) assess the risks that arise from the use of hazardous substances. This will include any arrangements to deal with accidents, incidents or emergencies, such as those resulting from serious spillages. The assessment must also include the health and safety risks arising from storage, handling or disposal of any of the substances;

b) prevent, or if this is not reasonably practicable, control exposure to such substances;

c) provide staff with information, instruction and training about the risks, steps and precautions the employer has taken to control these risks, e.g. provision of appropriate rubber gloves or appropriate eye protection.

The Control of Vibration at Work Regulations require employers to prevent or reduce risks to health and safety from exposure to vibration at work. Employees have duties under the regulations too. The Control of Vibration at Work Regulations require an employer to:

a) assess the vibration risk to employees;

b) take action to reduce vibration exposure that produces those risks

c) decide if employees are likely to be exposed above the:
   - daily exposure action value (EAV) and if they are: introduce a programme of controls to eliminate risk, or reduce exposure to as low a level as is reasonably practicable;
   - daily exposure limit value (ELV) and if they are: take immediate action to reduce their exposure below the limit value;

d) make sure the legal limits on vibration exposure are not exceeded;

e) provide information and training to employees on health risks and the actions that are being taken to control those risks;

f) carry out health surveillance (regular health checks) where there is a risk to health;

g) consult a trade union safety representative or employee representative on proposals to control risk and to provide health surveillance;

h) keep a record of risk assessment and control actions;

i) keep health records for employees under health surveillance;

j) review and update the risk assessment regularly.

The Health and Safety (First-Aid) Regulations require employers to provide adequate and appropriate first aid equipment, facilities and people so employees can be given immediate help if they are injured or taken ill at work.

What is 'adequate and appropriate' will depend on the circumstances in the workplace; an assessment of first aid needs should be undertaken to assess what is required.

The minimum first aid provision on any work site is:

a) a suitably stocked first aid box;

b) an appointed person to take charge of first aid arrangements;

c) information for employees about first aid arrangements.

The Health and Safety (Safety Signs and Signals) Regulations implement a European Council Directive on minimum requirements for provision of workplace safety signs. The directive standardised use throughout EU member states to ensure particular signs provide the same message wherever witnessed.

The Health and Safety at Work etc. Act places general duties on employers, the self-employed and employees to ensure the health, safety and welfare of people at work and for protection of other people who may be affected by the work activity. Various sets of regulations are made under the Act and spell out more clearly the specific duties for those in control or managing work activities.

The Lifting Operations and Lifting Equipment Regulations aim to ensure that:

a) all lifting operations are properly managed;

b) lifting systems are properly designed;

c) lifting equipment is inspected and maintained to ensure that it is safe to use;

d) lifting equipment is fit for purpose;

e) equipment is regularly inspected to ensure it remains fit for purpose;

f) equipment is marked and any other information is provided to inform the user of the parameters of the use for that piece of equipment;

g) equipment is uniquely identifiable and there is differentiation between 'equipment used for lifting people' and 'rigging equipment'.

LOLER requires equipment strength, stability and installation to be addressed as well as setting out how equipment should be marked and thoroughly examined at prescribed intervals.

In addition to the required pre-use checks of climbing equipment by the operator, there are requirements under LOLER for:

a) recorded interim inspections for items subject to high levels of wear and tear;
b) thorough examination of arboricultural equipment by a competent person who has genuine authority and independence to make an objective decision about whether the equipment remains safe to operate or not;
c) equipment used for lifting persons must be thoroughly examined at least every 6 months;
d) other equipment, such as rigging equipment, must be thoroughly examined at least every 12 months.

The Management of Health and Safety at Work Regulations (as amended)

require risk assessments to be carried out to identify the measures necessary to comply with health and safety legislation. In particular the assessments should cover risks to the health and safety of employees, the self-employed and others who are not at work, i.e. members of the public. They also require arrangements for managing the work to be put in place and for control measures to be used to reduce the risks to an acceptable level. These regulations also detail requirements for employees to be suitably trained.

The Manual Handling Operations Regulations

The employer's duty is to avoid manual handling as far as is reasonably practicable if there is a possibility of injury. If this cannot be done, then the employer must reduce the risk of injury as far as is reasonably practicable. If an employee is complaining of discomfort, any changes to work to avoid or reduce manual handling must be monitored to check they are having a positive effect. However, if they are not working satisfactorily, alternatives must be considered.

The regulations set out a hierarchy of measures to reduce the risks of manual handling. These are:

1. avoid hazardous manual handling operations so far as reasonably practicable;
2. assess any hazardous manual handling operations that cannot be avoided;
3. reduce the risk of injury as far as reasonably practicable.

In addition, employees have duties to take reasonable care of their own health and safety and that of others who may be affected by their actions. They must communicate with their employers so that they too are able to meet their health and safety duties.

Employees have general health and safety duties to:

a) follow appropriate systems of work laid down for their safety;
b) make proper use of equipment provided for their safety;
c) cooperate with their employer on health and safety matters;
d) inform the employer if they identify hazardous handling activities;
e) take care to ensure that their activities do not put others at risk.

The Personal Protective Equipment at Work Regulations

require employers and others to carry out an assessment to determine whether PPE is required and if so, what type is required for the job to be done. All PPE should be properly maintained, and appropriate information, instruction and training should be given to those using the equipment, so they know how to use it.

The Provision and Use of Work Equipment Regulations

apply to all work equipment used within arboriculture including ropes, harnesses, strops etc. The regulations require the selection of suitable work equipment bearing in mind where it is to be used and the purpose for which it is to be used. The regulations also set out requirements for instruction, training and supervision of those using work equipment.

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations require employers, and other people in control of work premises, to report and keep records of:

a) work-related accidents which cause death;
b) work-related accidents which cause certain serious injuries (reportable injuries);
c) diagnosed cases of certain industrial diseases; and
d) certain 'dangerous occurrences' (incidents with the potential to cause harm).

Reporting certain incidents is a legal requirement. The report informs the enforcing authorities (HSE, local authorities and the Office for Rail Regulation (ORR)) about deaths, injuries, occupational diseases and dangerous occurrences, so they can identify where and how risks arise, and whether they need to be investigated. The Health and Safety Executive's reporting of accidents and incidents at work allows the enforcing authorities to target their work and provide advice about how to avoid work-related deaths, injuries, ill health and accidental loss.

The Work at Height Regulations apply to all work at height where there is a risk of injury in the event of a fall. The regulations set out arrangements required for the effective management of work at height. They cover selection, installation and use of work equipment and techniques for working at height. In addition to the general measures, tree climbing using a rope and harness has to meet specific requirements set out within Schedule 5; parts 1, 2 and 3 are relevant (dependent upon the system being used). Ladder use is covered within Schedule 6.

The Workplace (Health, Safety and Welfare) Regulations cover a wide range of basic health, safety and welfare issues and apply to most workplaces. Employers are required to demonstrate regulatory compliance with regard to issues relating to: ventilation, temperature, lighting, cleanliness, room dimensions, workstations and seating, floor conditions, falls or falling objects, transparent and translucent doors, gates and walls, windows, skylights and ventilators, traffic routes, escalators, sanitary conveniences and washing facilities.

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Appendix: Terms and Definitions

The terms in this list are defined specifically in relation to their application to tree work at height.

ACoP: approved code of practice: provides practical advice on how to comply with UK law.

ALARP: as low as reasonably practicable. The core concept of ALARP is 'reasonably practicable'; this involves weighing a risk against the trouble, time and money needed to control it.

anchor: *(noun)* a structural place, fixing or fixture to which a safety line or anchorage device is attached; *(verb)* the act of attaching to an anchor point; **anchored** *(adjective)* being attached to an anchor.

anchor device: a component or assembly of components that allows connection to an anchor or anchor point.

anchor point: a point of attachment for personal fall protection systems or anchor devices, providing a means of support or suspension.

appointed person: a person with training, practical and theoretical knowledge and experience of lifting operations.

ascender: a mechanical device used for ascending a rope which slides when advanced up a rope but grips when loaded in the opposite direction.

assembly: a unit consisting of two or more connected components.

assessment: a judgement based upon physical, verbal or observed evidence and/or fact (in isolation or combination). An examination or test containing elements of practical demonstration, verbal questioning or recorded answers.

assessor: an individual with the necessary knowledge, ability, training and experience to make visual and cognitive judgements and decide upon an appropriate course of action.

back-up: a device, safety line or system used to provide protection and/or support in the event of structural or system failure.

certification: the action or process of providing someone or something with an official document attesting to a status or level of achievement.

collective protection: equipment which can protect more than one person and, once properly installed or erected, does not require any action by them to make sure it will work (i.e. passive).

compatibility: the ability of components to function together, without detriment to any element.

competent: a person with the knowledge, ability, training, skills and experience (theoretical and practical) to enable them to perform the required tasks to a safe and efficient standard.

competent person: individual(s) responsible for ensuring operations are managed and undertaken safely and that the work environment is controlled.

component: an element of a system.

configuration: a collection of parts where the relative organisation of components is defined.

configured strength: the **minimum breaking strength** of a component, assembly or system when in use. A **safety factor** should be applied to configured strength to provide a safe working load for use.

connector: a component that can be opened and/or closed in a secure or locked position.

crane supervisor: a person who controls the lifting operation and ensures that it is carried out in accordance with the appointed person's safe system of work.

descending devices: a mechanism used for descending a rope, often incorporating a smooth cam, a roller or other friction system to regulate the speed of descent. Some descending devices incorporate auto-locking functions and fail-to-safe mechanisms.

dismantling: the process by which trees or parts of trees are taken down in sections. This can be done using free-fall techniques or with the aid of ropes, pulleys and/or friction devices or mechanised systems such as cranes.

dynamic load: forces created by a moving load.

element: a component part of a system.

experience: the accumulation of knowledge and/or skills that results from the observation of or participation in an activity or task.

fail-to-safe: returning to a point of safety in the event of a failure. Often used to describe components or systems used as a back-ups.

harness: an assembly of elements designed to be worn by a user and to provide points for connection to systems. It can be adjusted to fit and used to support an operator in suspension or support by means of a ventral, sternal or dorsal attachment.

hazard: something with the potential to cause harm, injury or damage to people, property or the environment.

hitch (friction): the term used to describe a variety of different knots and hitches that will slide in either of two directions when force is directly applied but will lock when released.

ICoP: industry code of practice. A document providing recommendations and guidance pertaining to the planning, management and undertaking of tasks and operations within a specific industry.

inspection: to inspect closely or scrutinise a process, system or equipment.

interim inspection: an inspection which is undertaken periodically. Often by the operator and based upon the frequency of equipment use. The nature of this inspection will be largely the

Appendix: Terms and Definitions

same as the pre-use check, however the results will need to be recorded. Interim inspections will commonly happen on a weekly or fortnightly basis.

karabiner: an opening connector which self-locks (at least partially) when the gate is released.

kilonewton (kN): 1000 newtons.

lanyard: a short adjustable system used to provide a means of connection to an anchor.

lifespan: the period for which an item of equipment remains safe for use within the tolerances specified by the manufacturer.

lifting equipment: items of equipment used to lift, lower, raise or suspend a load.

load: the mass to be lifted, lowered, raised or suspended. A person is considered to be a load.

method statement: a written document detailing how a task or operation will proceed in order to ensure a safe system of work: used particularly where tasks and/or sites are safety critical or complex.

minimum breaking strength (MBS): the load above which an item of equipment might fail when it is new, as determined by the manufacturer.

moving rope technique (MRT): 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 operator connects to both parts of the rope; one part remains static and the other is connected via a midline attachment in the form of a friction-based adjustment element, i.e. a friction hitch or mechanical device.

peak force: the maximum force experienced during the cycle of a fall. Often measured in kilonewtons (kN) or decanewtons (daN).

fall prevention: prevention of the operator/user of fall protection equipment from going into a free fall.

personal fall protection (systems): a collection of components which, when used correctly, combine to prevent a fall, limit the potential for a fall or minimise the distance and consequences of a fall. Personal fall protection systems include: Moving Rope Techniques and Stationary Rope Techniques.

personal measures: measures that are generally active (i.e. measures that require the user to do something in order to work effectively, e.g. knot tied and karabiner attached; friction hitch advanced manually) and will only protect one user at a time.

personal protective equipment (PPE): all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects against one or more risks to health and safety, and any addition or accessory designed to meet that objective.

proficiency: the combination and application of different skills, knowledge and experience, both trained and latent, to achieve a desired outcome consistently. Proficiency may be assessed by the efficiency, quality and effectiveness of the outcome.

proficient operator: a skilled, knowledgeable and experienced operator able to perform specific tasks.

reasonably practicable: A calculation made where the amount of risk is placed on one side of the scales and the measures necessary to reduce or eliminate it are placed on the other. The measures to reduce or eliminate the risk may be considered in terms of money, time or trouble. It is important to remember that the outcome of the risk(s) may be major injury or death,* in which case any measures taken to reduce or eliminate are unlikely to be grossly disproportionate. (*These outcomes are context specific to arboricultural work at height and used for illustrative purposes.)

responsible person: an individual who is ultimately legally responsible for all activities under their control.

rigging: the process by which trees or parts of trees are removed in sections, controlled using ropes, pulleys and friction devices.

risk: the potential or likelihood combined with the severity of outcome for a hazard to cause harm, injury, loss or damage to people, property or the environment.

risk assessment: an assessment of the hazards and risks pertaining to a particular task, operation, site or machine.

rope access: a technique which can be used for ascent and/or descent which incorporates independently anchored or independently acting lines secured to an anchorage in such a way as to prevent or arrest a fall. One of these lines is the primary line for ascent and descent; the other acts as a back-up in the event of primary system failure.

safe working load (SWL): the load that an item of equipment can safely lift, lower, raise or suspend based on particular working conditions as specified by a competent person. The safe working load may be lower than the working load limit.

safety factor: the relationship between the minimum breaking strength and the safe working load, often expressed as a ratio.

signaller: a person responsible for directing a crane operator to ensure safe movement of the crane and load.

slinger: a person responsible for supervising the attachment and detachment of crane loads.

stationary rope technique (SRT): a technique where the motion of the rope remains stationary in relation to the user/harness when the system is in use.

supervision: to watch over, direct or check.

supplier: manufacturer or appointed representative, distributor, retailer or employer.

system: the collection of components that connect a load to an anchor.

termination: the end of a piece of rope. The termination can be a knot, a splice, a stitched eye or a combination of these.

thorough examination: an examination that is carried out in sufficient depth to ensure safety, detect defects or weaknesses and assess their importance. This examination is based on assessment of the risks involved with the type of lifting equipment being used, where it is installed and how it is to be used.

tree condition assessment: the assessment of a tree, predominantly by visual means, for characteristics, hazards and defects that may have implications for tree work at height.

working load limit (WLL): the load that an item of equipment – when new – can safely lift, lower, raise or suspend as specified by a manufacturer. This does not account for particular service conditions.

work positioning: a technique allowing a person working at height to be supported in tension or suspension, by PPE configured to prevent or reduce falls.

work restraint: (fall prevention) a technique where a person working at height is prevented by personal fall protection equipment e.g. harness and fixed length lanyard, from reaching areas where there is a risk of a fall.

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