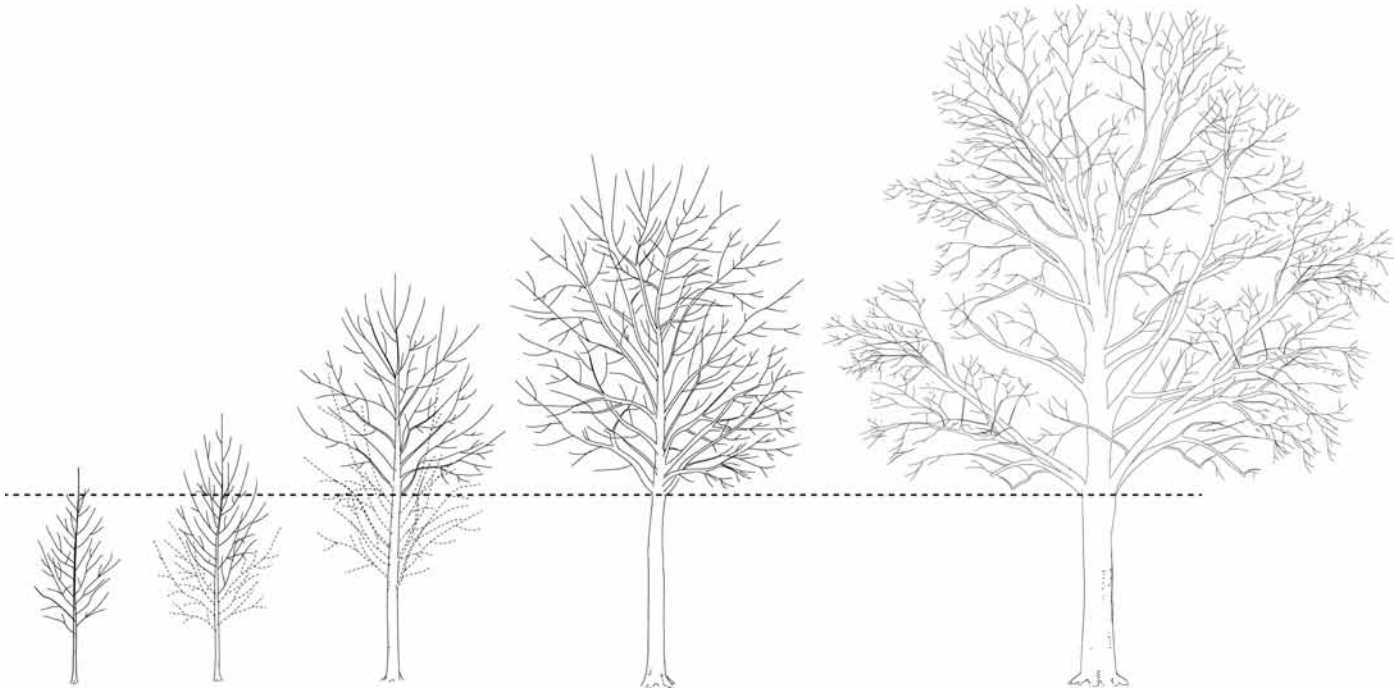
STANDARD

TREE PRUNING AND CARE



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Drzewa dla Zielonej Infrastruktury Europy

Tytuł: STANDARD – Tree pruning and care

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This publication is issued under Project LI FE15GIE /PL/000959 entitled "*Trees for Europe's Green Infrastructure*", as co-financed under the *LIFE+* Programme of the European Union, as well as by the Voivodeship Fund for Environmental Protection and Water Management (*WFOŚiGW*) based in Wrocław.

Foreword
Understanding trees

What is a tree? It would not seem hard to supply a correct answer to that question, but when we start to analyse things this does not emerge as particularly obvious. For most of us, trees are omnipresent features, as they survive or thrive in practically every climate and place on Earth. They have always been with human beings, and at the levels of both our species and the individuals that form it. But while we were often climbing those knobbly trunks even as children, we have not truly got to know them, and indeed misunderstand them at regular intervals.

Irrespective of the size and age of the given specimen, each represents a phenomenon generated by nature, each year engaging in renewal as it sends out new shoots and leaves or needles, increases in height and grows in girth. Thanks to reserves of nutrients being stored in both trunk and roots, a tree "comes back to life" each spring. It pumps up water containing dissolved mineral salts – often to quite heady heights above the ground, and then develops leaves so that it can engage in that process of photosynthesis that is of the greatest importance to Planet Earth. Thanks to this, organic matter arises, and allows a great variety of other life to be sustained. And, among the photosynthesisers, it is trees that are the largest and the most effective … at emitting the most oxygen and absorbing the most carbon dioxide.

It is usually as spring ends and summer begins that a tree starts to flower, going on to fruit and set seed in autumn. And we face a further phenomenon when we witness a new tree germinate out of the embryo packed up neatly inside a seed.

Thanks to the process, not of photosynthesis, but of phylogenesis, trees have generated and split into separate genotypes that translate into specific features: a crown that is more or less compact, characteristic ways of branching, and a unique foliage mosaic. The many species that we know and recognise have also matched their growth and development to different latitudes and habitats.

Then, thanks to a further process known as ontogenesis (individual development), each individual tree works to adjust to the particular place it finds itself in. In line with the soil conditions it experiences, a tree creates a well-developed root system that anchors it in the ground sufficiently to ensure that it remains in place and can sustain above-ground growth even in the face of the drastic atmospheric phenomena that nature may sometimes throw in its direction. What we see above ground is a trunk (sometimes single, but quite often multiple) and a crown. And – in line with light conditions above all – the latter may be narrow or broad, with erect or pendulous stems, and of greater or lesser density.

Through the simultaneous impacts of genetic and habitat-related conditioning, each individual is different and unique. It has its integrity, and if we are seeking to interfere with that in any way, we must take account of the individuality. That is true of the crown – in relation to which our vision as to the best form it can take may not necessarily be the right once – hence the need to look into the specifics carefully.

A tree is indeed an inseparable and indivisible whole, with the root system supplying the above-ground part with water and mineral nutrients, to the extent that any weakening below ground is certain to be reflected in what is visible to us. Conversely, damage to the crown results in dieback of roots, given the way these will become malnourished. In between, any wounding of the trunk can interrupt the continuity due to xylem and phlo-

em in wood, hence interfering with the connectivity of the above- and below-ground parts. Again, the negative effects can be seen through the living organism as a whole.

Indeed, as large organisms deploying well-developed and often highly efficient defensive systems, trees react to changes of habitat and all kinds of damage after a certain time-lag. So may the effects of detrimental activity be visible many months or even years later. The weakening or impairment of a tree in a given year will usually only make itself known in the following year, or even after that.

And trees do not live in isolation, but compete with each other, even as they may cooperate over the drawing of water and the obtainment of nutrients. Trees are connected via a series of complex linkages with many other different organisms, including insects, birds and mammals. In many cases, they supply irreplaceable habitats for the latter.

It is basically true to say that each tree lives symbiotically alongside fungi – as without these proper development is basically impossible. But fungi are omnipresent, and they are also in a position to harm trees, just as insects are. It is quite common for a very delicate balance to be maintained between trees and fungi – with the gap between symbiosis and destruction not being all that difficult to bridge.

First of all, do no harm

Even the most resilient trees grow old and experience steady decay for natural reasons, though they may also be damaged by people's thoughtless acts. If such weakened or impaired trees pose a threat to us, we resort to different interventions that will bring the danger back under control. But each such intervention has its consequences, and not all of those are positive. Thus, for example, the desire to restore statics gives rise to some intervention pruning, with each cut potentially offering a route for infection (most typically fungal).

We engage in pruning to be rid of dead branches and limbs, given the way that these can pose a threat to us. However, it is important to recall that trees would achieve this by themselves under natural conditions – and would do so with much less loss of the energy needed further on to heal the wounds.

We cut trees to confer a desirable shape upon them, e.g. where this also means stunting their growth by sticking to a determined height that we impose upon them – for example to manage a road verge or to obtain a particular form for the trees lined up along an avenue. Such activity requires and must be founded on an awareness that it is desirable to us, from our human point of view, as trees growing as nature intended do not need pruning; and indeed, from an arboreal point of view, intervention is unnecessary – in line with either the physical or mechanical aspects.

But back with the human point of view, and a cut may be enforced and imperative where trees come into collision with infrastructure, including buildings, traction lines, all kinds of wires and cables, underground pipes, roads and pavements, etc. At this point we infringe the integrity of the tree, interfering – often very severely – with the crown or root system. In line with our concept of the actions that are necessary, we act in non-compliance with the wellbeing of the tree – which ought to be our priority.

For this reason too, we ought to avoid intervening too much as we pay heed to certain doubtful ideas about the shading of a building or disruption of the work of an antenna; or as we seek to destroy trees because of the need to run some power lines or traction lines through an area. Quite often such collisions of interest can be avoided without any harm being done to trees. It is also unacceptable to disable a tree on account of the need to remove fallen leaves or fruit.

Our Standards are based around an approach to trees rather different from those that have been binding up to now. Thus far, the names used to describe measures (not al-

ways adequate) have related to the reasons for them to be carried out. We thus have descriptions like “technical pruning”, ”natural pruning”, ”tending” or ”exposure pruning” (with the purpose of allowing more light in). While not going into the matter of whether the nomenclature existing up to now is justified or not, we here present a different one. We rather choose to link the measures taken with the parts and places to which they are applied. This is why our Standards include the terms ”removal pruning”, “reduction pruning” and “intermediate pruning”. The area of the crown also has names of cuts relating clearly to it, being “structural”, “lateral” or “apical”. This kind of approach to measures taken allows a whole system of cuts to be presented in the Standard. A further novelty here is the use of terms to describe the crown such as “temporary” and “permanent”. These names reflect the way in which often have to deal with just these types of crown. It is our hope that the whole tending system – along with the nomenclature we have chosen to adopt for it – will find acceptance in the circles involved in work with trees.

1. How to read the Standard?

This Standard was prepared and published by Fundacja EkoRozwoju, and entered into force on April 1st 2021. Within its text and wording, the word ”should” is taken to indicate a recommendation, while references to measures being justified or something for which there is justification indicate activity that is postulated. The term ”may be” is in turn applied to actions whose pursuit is possible. The content here includes parts that are shown in Italics, and the aim in this case is to indicate definitions, or concepts applied, that are also presented in other parts of this work. All of the defined concepts are also presented alphabetically in the Glossary.

2. Introduction

2.1. The objective of introducing the Standard

2.1.1. Scope

This Standard constitutes a description of guidelines, procedures and techniques applied in work with trees, which has as its aim the raising of levels of public safety and also the preservation and safeguarding of trees' integrity and wellbeing.

The Standard **concerns** the pruning of trees growing in ***greenspace*** (areas of ***greenery***) in ***phases of development*** from the young through to the mature, but including also damaged trees.

This Standard **is not concerned with** the pruning and maintenance of:

- trees in forestry and under forest management,
- trees dedicated to orchard fruit production,
- decorative forms (achieved by pruning and trimming in a topiary context),
- veteran and over-mature trees.

Keeping in mind the value and scope of the ecosystem services rendered by trees, this Standard also does not encompass work justified ***inter alia*** in line with:

- shading (the capacity of trees to limit access to daylight),
- disrupted television or radio reception, etc.,
- the shedding of pollen (threatening allergic reactions),
- alleged facilitation of damp in building walls and on building sites.

2.1.2. Use in public procurement

This Standard may be applied in public procurement as a component thereof, forming part of the subject description. However, participation in a proceedings may not be made conditional upon it, and nor may it represent a criterion in line with which a given bid or offer is assessed. However, a commissioning party might require that work is done in line with this Standard – which will then be regarded as a means of quality assurance as effect is given to the subject of a commission.

The Standard may be written in as content under an ***SIWZ*** (***Specyfikacja Istotnych Warunków Zamówienia*** – or specification of the key conditions that are to underpin a given procurement order), or as an element of a contract, with the performance of the relevant task(s) then being assessed on the basis of it.

As such a commissioned task or order is being pursued, verification of compliance with conditions may involve the Standard solely as a contract provision relating to the acceptance of work or the imposition of fines. Where failure to meet the criteria set out in the Standard are concerned, it is the provisions laid down in the contract that have application.

2.2. The qualifications of those carrying out work

The pruning of trees is subject to regulation by law, with responsibility, accountability and possible liability for the proper pursuit of this work laying first and foremost on the side of the owner/manager or other person indicated by the latter. The consequences of pruning may prove irreversible, hence the need

The pruning of trees is subject to regulation by law, with responsibility, accountability and possible liability for the proper pursuit of this work laying first and foremost on the side of the owner/manager or other person indicated by the latter. The consequences of pruning may prove irreversible, hence the need for it to be done by competent persons only. A key confirmation of the relevant status and qualifications is supplied by certification as regards completed training relevant to this area of employment and work.

2.2.1. Recommended qualifications for those pruning trees

The basic qualifications for those engaged in the pruning of trees using a saw gain confirmation in pure (theoretical) and applied (practical) training lasting at least 40 hours and ending with an examination. Where mechanical saw are to be used to cut branches supplementary training is required. It is the obligation of the Contractor to ensure supervision over pruning activity of the appropriate quality, with safety also assured. Where the qualifications of those engaged in pruning activity are to be raised, this is achieved through advanced training on the basis of presented basic qualifications, as well as additional experience and further training.

The confirmation of these is the possession of certification, like that involving:

- *European Tree Worker*
- *Certified ISA Arborist*

It is possible for Specifications in respect of tree-pruning tasks to introduce extra requirements regarding experience and qualifications.

2.3. Biosecurity

Those linked professionally with the pruning and tending of trees fall within the high-risk group when it comes to the spread of diseases and pathogens. For this reason, they should follow relevant procedures in order to limit spread. Essential if this is to happen is the use of clean, disinfected instruments and tools.

Where work is carried out on trees found to harbour infectious disease, the cessation of that work should be followed by the cleaning and disinfecting of footwear, clothing, tools, lines and other items made use of at work.

3. The legal basis

Some legal provisions relate to bans on the planting of trees in so-called protective areas associated with technical infrastructure (such as gas pipelines, water and wastewater systems, and so on) – with a view to their safe operation being assured. Polish (PN) Standards relate in particular to the safety of power installations and infrastructure, and refer to the distance separating tree-crowns from power lines[1.] However, application in this case is actually voluntary (there being no binding legal provision)[2]. It needs to be recalled once again that, as radical pruning of a tree may lead to it being damaged or even killed, some regulations lay down principles on the extent to which branches may be removed.

3.1. Regulations relating to work with trees

- The possibilities for, and scope of, activity as regards the removal of branches from tree crowns (relating to all trees whose removal requires permission)[3]

- For trees classed as Monuments of Nature[4]

- For trees growing at sites included in the Register of Monuments[5]

- For areas indicated in local physical development plans[6]

- For protected areas (National Parks, Nature Reserves, Landscape Parks, Areas of Protected Landscape, ***Natura 2000*** sites, etc.)[7]

- For trees supplying biotopes[8] for protected species[9] or species of priority conservation significance in the EU as a whole

- For trees growing in the protective zones around above- or below-ground items of technical infrastructure and in special areas (e.g. river banks and airports)[10]

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1 Polish Standard PN-E-05100-1:2000 relating to power lines and entitled Elektroenergetyczne linie napowietrzne. Projektowanie i budowa – Linie prądu przemiennego z przewodami roboczymi gołymi.

2 The Act of September 12th 2002 on standardisation (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2015, item 1483).

3 Art. 87a, paras. 2, 4 and 5, Art. 88, para. 1 points 3-4 and para. 9, Art. 90 of the Act of 16th April 2004 on Nature Conservation (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 55, as amended subsequently).

4 Art. 2, para. 1, point 6, para. 2, point 6; Art. 3, points 1 and 3; Art. 6, para. 1, point 6; Art. 45, para. 1, point 1, para. 2, point 1 of the Act on Nature Conservation.

5 Art. 37b para. 3, the Act of 23 July 2003 on the protection and care of monuments (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 282, as amended subsequently).

6 Art. 3, point 1; Art. 83f, para. 14, point 1, letter b) of the Act on Nature Conservation.

7 Act of 16 April 2004 on Nature Conservation.

8 Habitats or refuges that represent areas for the breeding, rearing of young, rest, migration or feeding of birds. Including birds' nests.

9 Art. 131, point 14; Art. 132 of the Act on Nature Conservation; the Code of Offences Act of 20th May 1971 (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2019, item 821, as amended subsequently).

10 The Act of March 28th 2003 on rail transport (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 1043, as amended subsequently); The Regulation of the Minister of Infrastructure of 7th August 2008 on distance requirements and conditions underpinning the siting of trees and shrubs and elements of acoustic screening, as well as the carrying out of earthworks, in the vicinity of railway lines, as well as the ways of organising and maintaining snowbreaks and fire belts (i.e. The Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 1247); the Act of July

Working procedures defined as Standard may be eschewed to the extent necessary where the removal of a tree or part thereof is essential due to a threat posed to the safety of persons (and/or property), provided that the threat in question is dealt with by the State Fire Service[11].

A Contractor is obliged to operate in a manner not harmful to trees and other organisms associated therewith, as well as to ensure the safety of the public. The Contractor bears liability for harm arising through non-compliance with requirements set out in law, save where it is demonstrated that actions were in line with an explicit commission on the part of the Employer.[12]

8th 2010 on detailed principles regarding preparations for new flood-protection installations (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2019, item 933); the Act of June 29th 2011 on the preparation and pursuit of new developments in atomic energy and accompanying infrastructure (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2018, item 1537); the Act of 22nd February 2019 on the preparation and pursuit of strategic new developments in the oil sector (the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2019, item 630); the Act of 10th April 2003 on detailed rules for the preparation and pursuit of new developments as regards public roads (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 1363, as amended subsequently); the Act of 24th July 2015 on the preparation and pursuit of strategic new developments as regards transmission networks (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 191, as amended subsequently); the Act of 12th February 2009 on detailed principles for the preparation and pursuit of new developments as regards public airports (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2018, item 1380); the Act of 7th May 2010 on support for the development of telecommunication services and networks (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2019, item 2410, as amended subsequently); the Act of 13th December 2013 on allotments (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2017, item 2176); the Aviation Law Act of 3 July 2002 (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 1970, as amended subsequently); the Water Law Act of 20 July 2017 (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2020, item 310, as amended subsequently); the Regulation of the Minister of Infrastructure of 12th April 2002 on technical conditions to be met by buildings and their sites (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2019, item 1065); the Regulation of the Minister of the Economy of 26th April 2013 on the technical conditions to be met by gas networks and their sites (the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2103, item 640); the Regulation of the Minister of Transport and the Maritime Economy of 2nd March 1999 on the technical conditions to be met by public roads and their sites (i.e. the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2016, item 124, as amended subsequently); the Regulation of the Minister of Infrastructure of 16th January 2002 on technical and construction regulations as regards toll motorways (the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2002, No. 12, item 116, as amended subsequently); the Regulation of the Minister of Infrastructure and Development of 20th October 2015 on the technical conditions to be met by on the technical conditions to be met by railways crossings and sidings and their sites (the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2015, item 1744, as amended subsequently); the Regulation of the Minister of Infrastructure of 26th October 2005 on the technical conditions to be met by built telecommunications structures and their sites (the Dziennik Ustaw Official Journal of Laws of the Republic of Poland of 2005, No. 219, item 1864, as amended subsequently).

11 Art.1 para. 2 and Art. 7 of the Act of 24th August 1991 on the State Fire Service (***Państwowa Straż Pożarna***) (i.e. the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2020, item 1123, as amended subsequently).

12 Art.88, para. 2 of the Act on Nature Conservation; the Civil Code Act of 23rd April 1964 (i.e. the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2020, item 1740, as amended subsequently).

4. Protected species

Those doing work in, on and around trees need to recall that these may serve as and represent habitats for other associated organisms. The detailed regulations introduced in the interests of the latter's protection and conservation include:

- the Act of 16th April 2004 on Nature Conservation (i.e. the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2020, item 55, as amended subsequently)
- the Regulation of the Minister of the Environment of 16th December 2016 on the species protection of animals (the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2016, item 2183)
- the Regulation of the Minister of the Environment of 9th October 2014 on the species protection of plants (the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2014, item 1409)
- the Regulation of the Minister of the Environment of 9th October 2014 on the species protection of fungi (the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2014, item 1408).

All work done on trees or in their vicinity should take account of the potential or possible presence of accompanying organisms, and in particular those enjoying the status of protected species. Indeed, the presence of such organisms may be regarded as a probable circumstance where trees are in the over-mature phase or in other ways display enhanced natural value (for example given the presence of holes, decay, decayed wood-mulch, etc.).

There is an absolute requirement that due care be taken to prevent damage and destruction to the habitats of species of value and protected species (or indeed the scaring of animals present on or in trees), both at the time a tree is being accessed (e.g. where climbing or the use of equipment damages protected lichens or causes birds' nests to be lost) and as actual work on a tree is being carried out (e.g. through the removal of a part that includes a hole resided or nested in by birds, bats, invertebrates and so on).

Before proceeding to work on a tree, a person should engage in reconnaissance, with a view to determining the potential presence on a tree of habitat for protected species.

It will need to be recalled that:

- should the presence of protected species be confirmed, it will need to be determined whether work commissioned requires a permit from a Polish Regional (or in some cases the General) Environmental Protection Inspectorate in relation to a departure from the prohibitions associated with the protection of plants, animals (including birds and insects) and fungi;
- where the consent-waiving prohibitions referred to above is in a person's possession (for example permitting destruction of habitat in the form of a bird's nest), appropriate care should anyway be taken (e.g. to not damage or destroy other natural sites); and work should be done under appropriate expert supervision.

It further needs recalling that there are prohibitions on the scaring and disturbing of animals (where the term "animal" is taken to include birds), with this denoting a need to take heed of this condition irrespective of the type of work to be carried out on a tree.

Where the party commissioning work on a tree has failed to obtain a permit offering exemption from the prohibitions in force, it will be necessary:

- to abandon the pursuit of the work in question,
- to inform the Employer that a given tree constitutes a site or habitat for protected species,
- to inform the Employer that the work might recommence once the necessary permits have been issued by a Regional (or in certain cases by the General) Environmental Protection Inspectorate,
- to carry out work with all due care even where the aforesaid permits or consents have been obtained.

Overall, there is a requirement to minimise as far as possible the destruction or damage of sites of habitats for protected species.

5. Health and Safety at Work

Work associated with the pruning and tending of trees may pose a threat to people and property, while also requiring that proper safety measures be taken and supervision exercised. Prior to the commencement of any work, all possible threats associated with work close to, on or in a tree should be identified – and limited by way of appropriate procedures[1].

Participants in the work involved should have passed the courses and be in receipt of the certification relevant to the activity that is to be engaged in, with H&S training, a knowledge of first aid, a medical all-clear (in the occupational medicine context) for performance of the work, and other things that may be necessary in the given situation.

Machines, tools and equipment used should all be in good technical condition, deployed in the manner they were designed for, and in possession of the necessary certification.

The work zone needs to be safeguarded appropriately against access and ingress by non-authorised people.

1 The Regulation of the Minister of the Economy of 20th September on Health and Safety at Work involving the use of machinery and other equipment in the context of earthworks, construction works and roadworks (i.e. the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2018, item 583); the Regulation of the Ministers of Communication and Administration, Land Management and Environmental Protection of 10th February 1977 on Health and Safety in respect of works involving roads and bridges (the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 1977, item 30).

6. Pruning techniques

6.1. Work on a tree-crown

The selection of an optimal method of work should allow for the pursuit of necessary measures in a precise way, and with full account taken of safety rules. The key ways of gaining access to the crown of a tree involve ***lines*** or ***lifts***. Ladders are also in use.

It is not permitted:

- to use ***tree-climbing irons or spurs*** and other equipment damaging to trees,
- to make inappropriate use of lines (as for example where cambium-guards are lacking),
- to damage other parts of a tree or objects in the vicinity thanks to the uncontrolled ejection of parts being removed,
- to engender change in the state of the site in the surroundings of a tree, including through vehicle-induced compaction of the soil.

6.2. Tools and equipment

Wherever practically possible, pruning of living parts of a tree should involve the use of hand-held equipment and hand tools. These should be sharp, clean and designed for the task to be engaged in.

Given the limited possibilities where precision of pruning and disinfection are concerned, chainsaws should be confined mainly to the felling of trees; though they may be used in the removal of ***dry deadwood***.

Where work is targeted at apical or peripheral parts of the crown not accessible directly, use may be made of secateurs and handsaws mounted on extension poles.

Circular saws on extension poles should not be used to cut living tree-branches or limbs.

6.3. Wounds resulting from pruning

The maximum diameters[1] of wounds arising as living branches are cut off should not exceed:

- 10 cm in the case of trees recognised as more effective in compartmentalisation (such as beech, oak (native species), elm, hawthorn, lime (native species), hornbeam, sycamore, field maple, Scots pine and yew);
- 5 cm in the case of remaining types of tree (i.e. ash, birch, horse chestnut, poplar, willow, fruit trees and spruce).

As cuts are being made, it will always be necessary to limit numbers of branches removed. And that pruning needs to be carried out in line with the principles set out in Chapter 7 – in such a way that wound surfaces are smooth, in the right place and cut at the correct angle.

[1] The diameter as measured at the widest point of the wound.

One session of pruning should not involve the removal of branches adjacent to each other, either around the trunk, or higher or lower along it. The distance between wounds should be no smaller than 3 times the diameter of the largest removed branch.

Only in justified cases may the sizes of branches removed go beyond those given above – mainly where this relates to categories of ***tree damaged severely***.

Dry branches whose basal diameters are below 2 cm may be left in place. It is permitted to leave remaining dry branches and limbs once these have been checked for stability.

There is no requirement that preparations of different sorts should be applied to wounds.

6.4. The timing of pruning

Specific features of ***tree physiology*** ensure that the second half of the year represents the best time to cut and prune. A time while the growing season is still continuing is optimal. A permitted period (though not regarded as optimal) is that of plant dormancy. Of course, the optimal time at which to engage in pruning may be a species-specific feature, and/or relate to vitality or habitat conditions; hence the need for re-evaluation each time. Pruning in time of drought needs to be avoided (Table 1).

In the case of broadleaved species, the pruning of living branches should not be engaged in:

- as the period of dormancy is ended – and thus from the time buds begin to develop through to the time of full foliage
- prior to the dormancy period – and thus from the time leaves start to change colour through to the time they cease functioning altogether.

Table 1. The timing of tree-pruning

Time of year	Winter	Spring	Summer	Autumn	Winter
Pruning possibilities	Possible	Not recommended	Recommended	Not recommended	Possible
Phase of development of tree	Phase of dormancy	Phase of foliage development	Growth phase	Phase of preparation for dormancy	Phase of dormancy

The best time for **pruning conifers is spring** (with the measure for example taken in the first half of March).

Summer also represents a good time, with this usually taken to denote the period through to the end of August (though such pruning is typically of lesser intensity). As with broadleaved trees, there is a need to avoid pruning at times when the sun's rays are powerful and/or heatwaves are taking place. Pruning should be done on days with good weather, with no frost or precipitation.

6.5. The scope of cuts

Table 2. Limits on the pruning of branches of diameters up to 5 cm in relation to the degree of reduction of tree crowns

Trunk dimensions at breast height (1.3m)			Scope of reduction					
			10% reduction		20% reduction		30% reduction	
Girth (cm)	Diameter (cm)	Cross-sectional area (cm^2)	Permissible total area of cut (cm^2)	Permissible number of cuts	Permissible total area of cut (cm^2)	Permissible number of cuts	Permissible total area of cut (cm^2)	Permissible number of cuts
40	13	127	13	**1**	25	**1**	38	**2**
50	16	199	20	**1**	40	**2**	60	**3**
60	19	287	29	**1**	57	**3**	86	**4**
70	22	390	39	**2**	78	**4**	117	**6**
80	25	510	51	**3**	102	**5**	153	**8**
90	29	645	64	**3**	129	**7**	193	**10**
100	32	796	80	**4**	159	**8**	239	**12**
120	38	1146	115	**6**	229	**12**	344	**18**
140	45	1561	156	**8**	312	**16**	468	**24**
160	51	2038	204	**10**	408	**21**	611	**31**
180	57	2580	258	**13**	516	**26**	774	**39**
200	64	3185	318	**16**	637	**32**	955	**49**

Table 3. Limits on the pruning of branches of **diameters up to 10 cm** in relation to the degree of reduction of tree crowns

Trunk dimensions at breast height (1.3m)			Scope of reduction					
			10% reduction		20% reduction		30% reduction	
Girth (cm)	Diameter (cm)	Cross-sectional area (cm^2)	Permissible total area of cut (cm^2)	Permissible number of cuts	Permissible total area of cut (cm^2)	Permissible number of cuts	Permissible total area of cut (cm^2)	Permissible number of cuts
40	13	127	13	**0**	25	**0**	38	**0**
50	16	199	20	**0**	40	**1**	60	**1**
60	19	287	29	**0**	57	**1**	86	**1**
70	22	390	39	**0**	78	**1**	117	**1**
80	25	510	51	**1**	102	**1**	153	**2**
90	29	645	64	**1**	129	**2**	193	**2**
100	32	796	80	**1**	159	**2**	239	**3**
120	38	1146	115	**1**	229	**3**	344	**4**
140	45	1561	156	**2**	312	**4**	468	**6**
160	51	2038	204	**3**	408	**5**	611	**8**
180	57	2580	258	**3**	516	**7**	774	**10**
200	64	3185	318	**4**	637	**8**	955	**12**

Cuts should be minimised in terms of size and scope. The permissible scope of pruning is dependent on ***the phase of development*** and ***the condition of the tree***. The means of defining pruning scope to meet the needs of the Standard was formulated by reference to a ratio between trunk cross-sectional area at breast height (1.3 m above the ground) and the total area arrived at by adding together the cross-sections of branches removed. Table 2 presents the recommended maximum number of cuts, applying a simplification to the effect that all cuts are of the same size. The values given are approximate in nature.

The scope of pruning takes in the living parts of a tree, with no account taken of branch or limb deadwood as the limits on pruning are set.

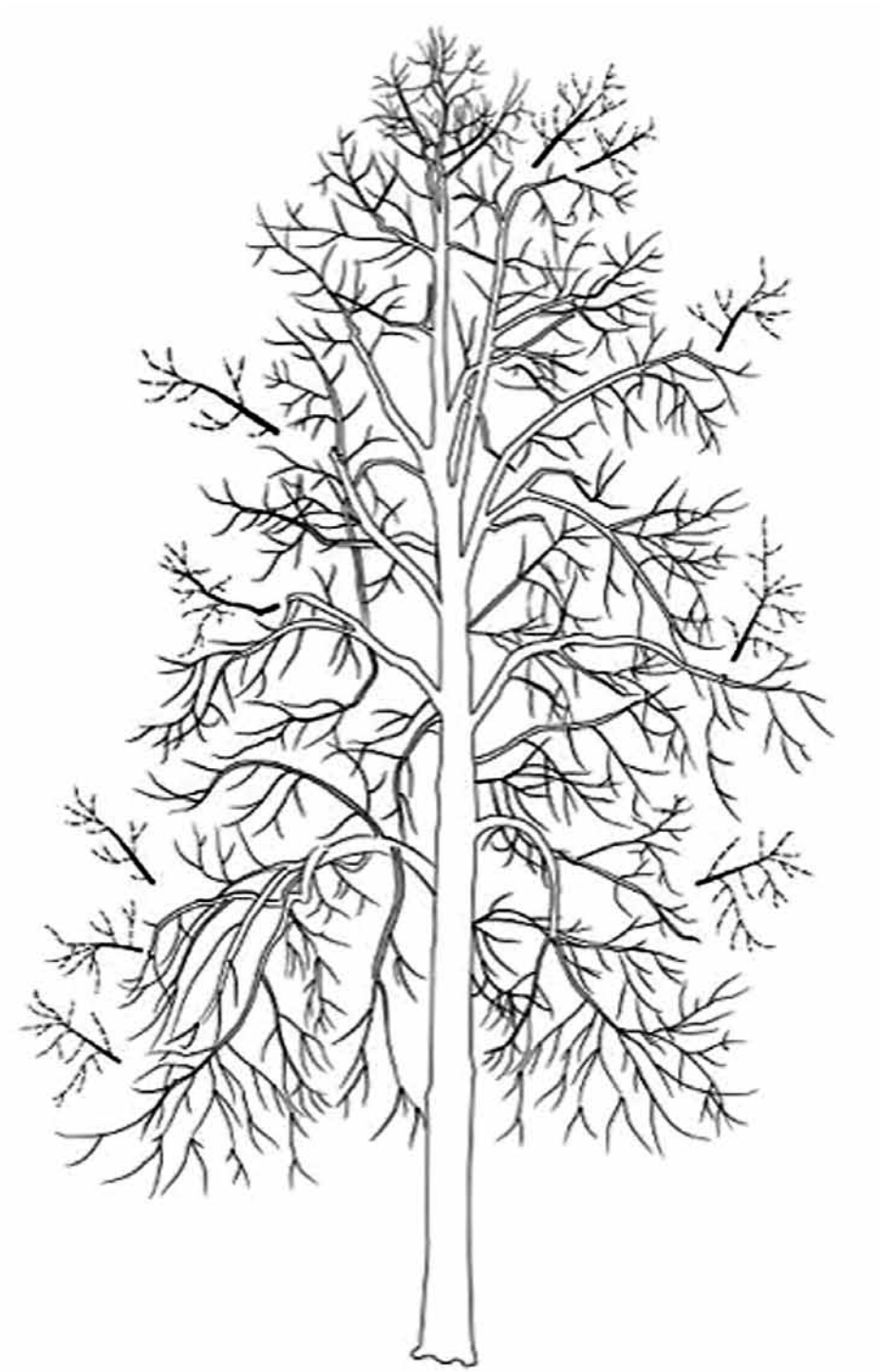


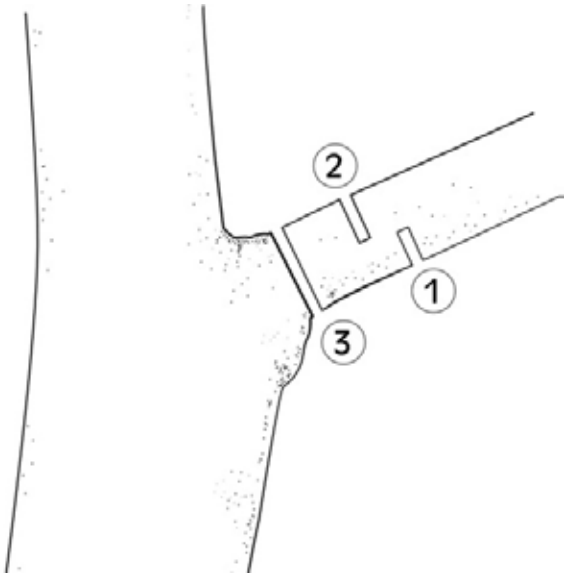
Fig. 1. A review diagram showing crown reduction of 10% on a tree of trunk diameter equal to 50 cm – limit 10 cuts of diameter 5 cm.

7. Pruning

7.1. General principles for the pruning of living branches

7.1.1. Step-cut

It is recommended that this kind of pruning be applied where branches are large and cannot be held in the hand safely. In this case, the first (under) cut is made several centimetres away from the intended, target place, on the lower side of the branch to a depth of about 1/3 of its diameter. The second cut is made on the outer part of the branch, rather closer towards the trunk. Only after that is the levelling-off cut made in the desired place.

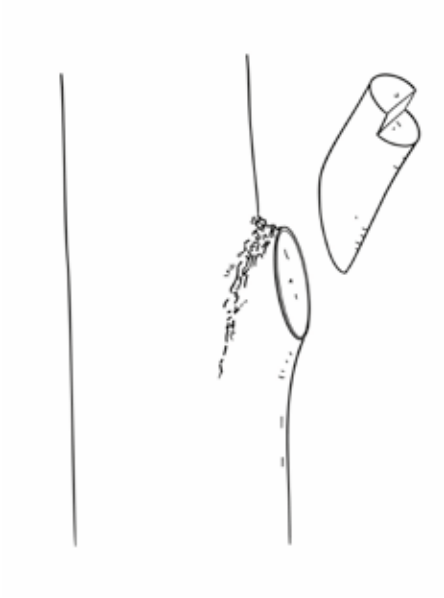


7.1.2. Removing a branch with a collar

The collar is the typical thickened area at the base of a branch, though in fact belonging anatomically to the trunk, with the effect that it may not be removed or injured. Pruning must be done as close to the trunk as possible, though beyond the collar and the bark ridge. In line with the shape of the collar, the cut should be made obliquely downwards.

7.1.3. Removing a branch without a visible collar

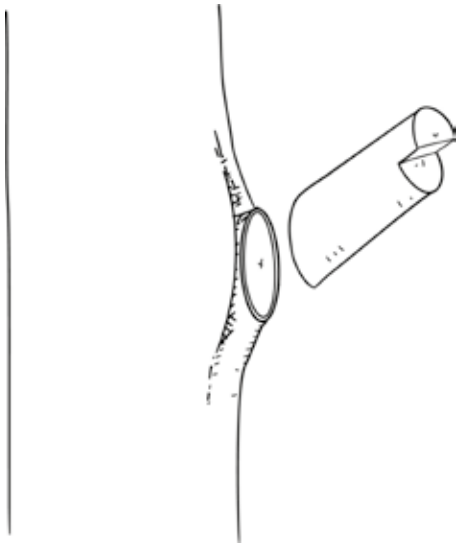
Where a visible collar is lacking, the cut needs to be made before the bark ridge, though almost parallel with the trunk. This is unlike in the case of a cut on a collar, which is made obliquely.



7.1.4. Removing a branch with included bark

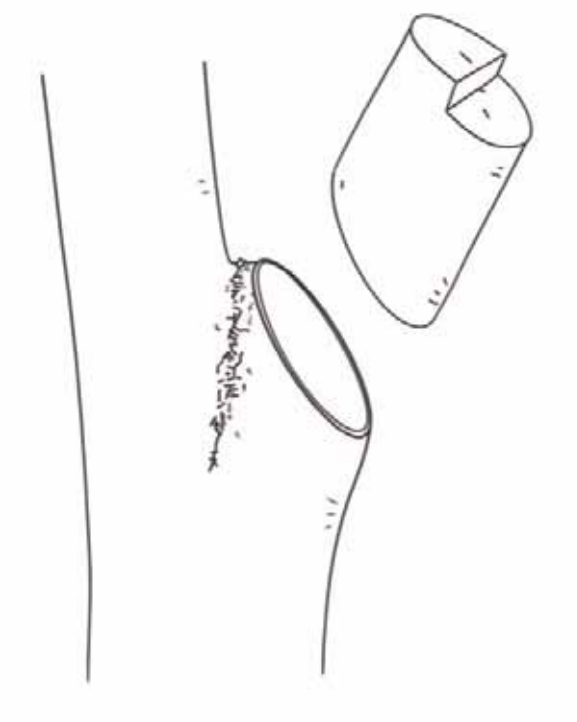
Where included bark is present in a fork, the cut needs to be as near to the trunk as possible, though in such a way as to not damage the tissue of the latter.

It needs to be borne in mind that, as the presence of a pocket hinders the supply of nutrient components to the upper part of the wound, even a cut made properly may suffer from impaired wound-healing.



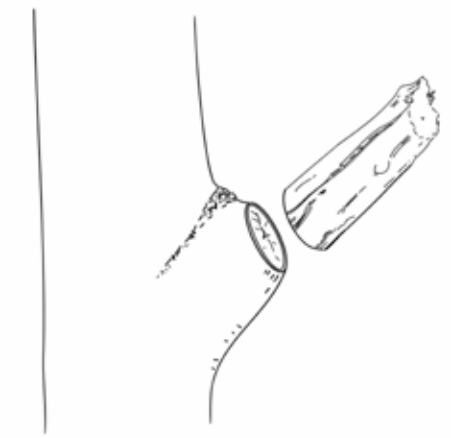
7.1.5. Removal of competing leaders

The branch selected needs to be removed by way of an oblique cut just before the bark ridge, in the area of the remaining branch.



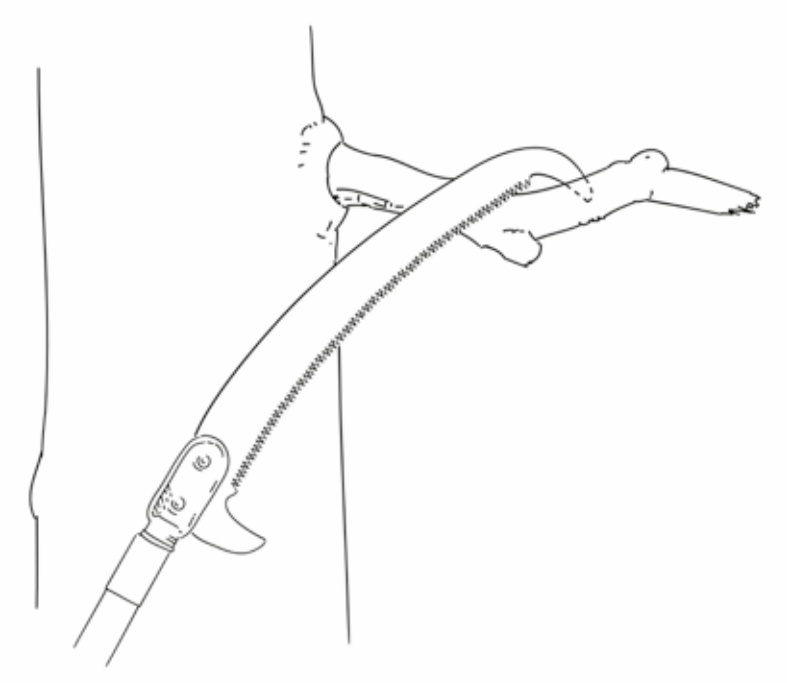
7.1.6. Removal of dead branches

Thin branches of this kind can simply be broken off. Thicker dead branches need to be removed with heed paid to the step-cut principle and the recommendations also applying in the case of living branches.



7.1.7. Checks on deadwood

Permanent dead branch or limb can be left on the tree if it has once been checked. Test pruning may for example be performed with the aid of lines, throwline or poles.

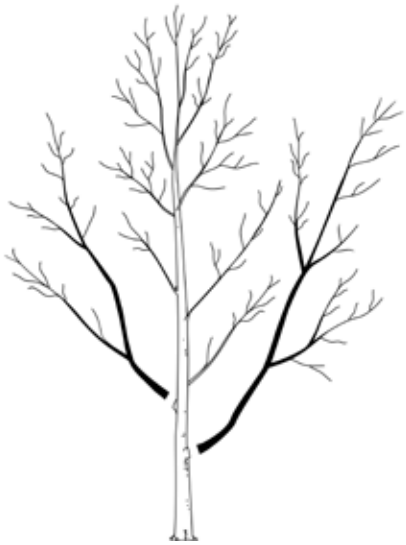


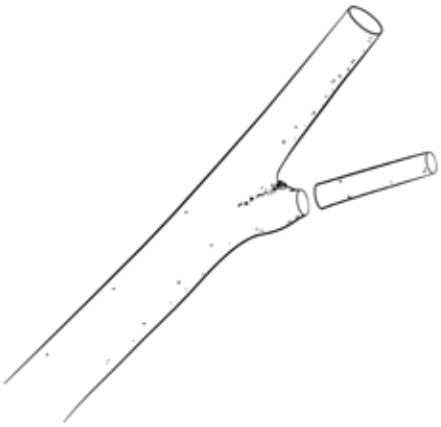
7.2. Types of cut

The main types of cut are design to achieve removal, reduction or something intermediate between the two, and together these approaches or goals account for a majority of the cuts carried out in practice. Other kinds of cut exist at the specialist level, including braking, pollarding cuts etc. However, none of the latter can be regarded as standard measures, and all are procedures of an expert nature not discussed in the context of the present Standard.

7.2.1. Removal cut

By way or removal cut we cut a whole smaller branch at a fork with the original trunk, limb or branch. Such pruning leaves no stub.

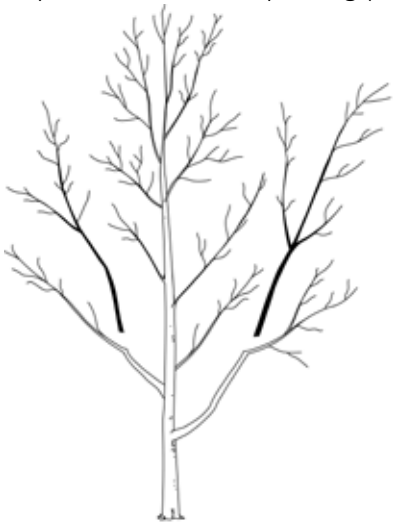


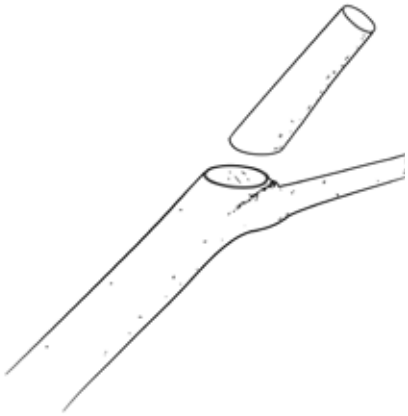


7.2.2. Reduction cut

Reduction cut removes the larger of two (or more) branches or leaders at a fork, with a part whose diameter amounts to at least 1/3 of the removed part.

This cut leaves no stub. A cut leaving less than 1/3 of the diameter of the removed part requires intermediate pruning (7.2.3.).

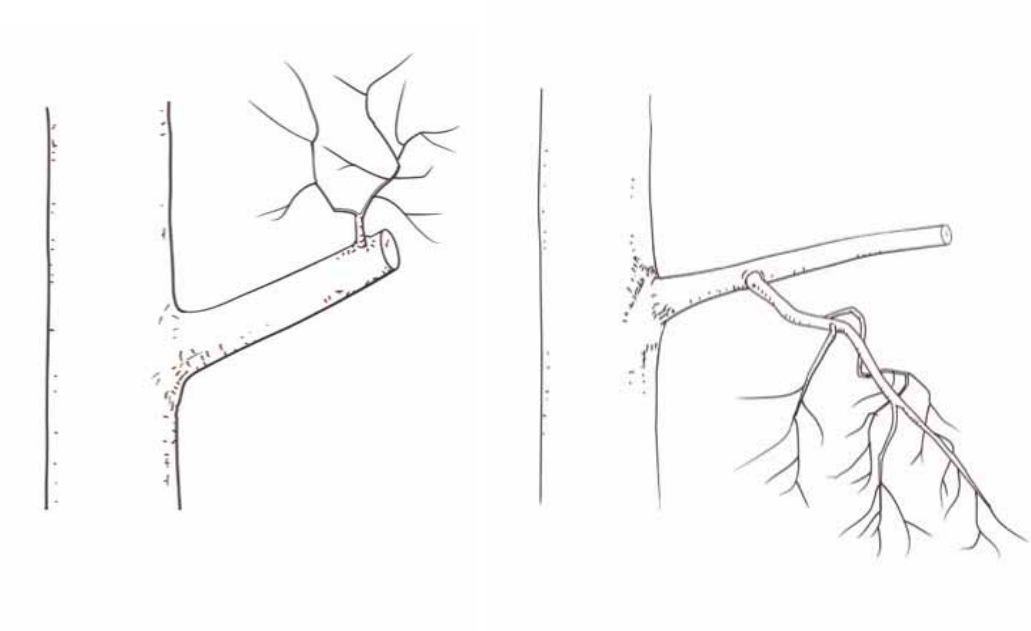




7.2.3. Intermediate pruning

Pruning of this kind is done between forks or on a living branch whose diameter is less than one-third of the removed. Other than where this pruning involves small side branches it can be said to leave a stub. Such pruning may be applied and seen as justifiable in exceptional cases **only**, for example:

- to reduce annual stem increments;
- to start the process by which a tree develops a ”head”- pollarding;
- to reduce the height of young regrowth;
- to avoid the pruning of thick branches and consequent inflicting of wounds that are too large.



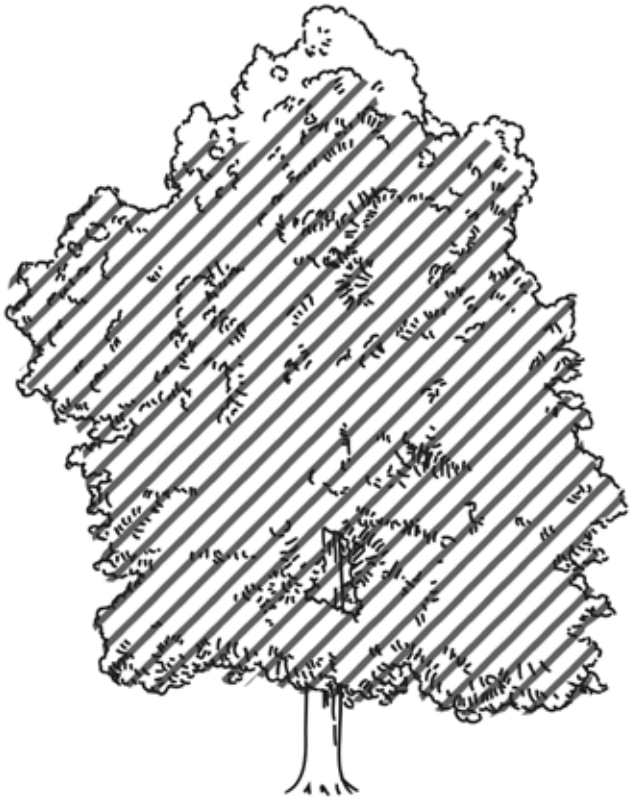
8. Pruning systems

A system of cuts is defined in terms of the area of the crown found to be in need of intervention – as linked to the phase of development the given tree has reached. It is on this basis that a Specification is arrived at, setting out in more detail such aspects as the permissible types and scope of pruning, as described in detail in Section 9.

8.1. The area of pruning

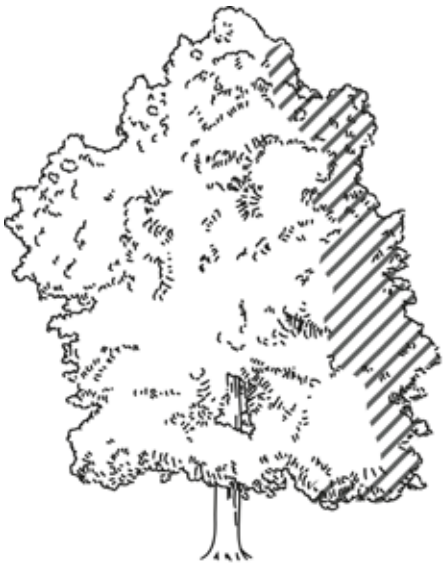
8.1.1. Structural cuts

Carried out anywhere in the crown other than along the main upright stem or leader, these cuts seek to develop or improve crown structure. The main tasks are to eliminate branches already or potentially soon posing a threat to stability. This can be done with young, maturing, mature and damaged trees. Pruning in the apical parts of the crown is not permissible.



8.1.2. Lateral cuts

Only carried out in peripheral and lower parts of the crown, the main tasks here are again to raise the level of stability (addressing crown asymmetry, runaway branches), to limit conflicts arising in relation to infrastructure and to rein in parts that begin to protrude excessively. Pruning in the uppermost parts of the crown is not permitted. Cuts may be made to maturing, mature and damaged trees.



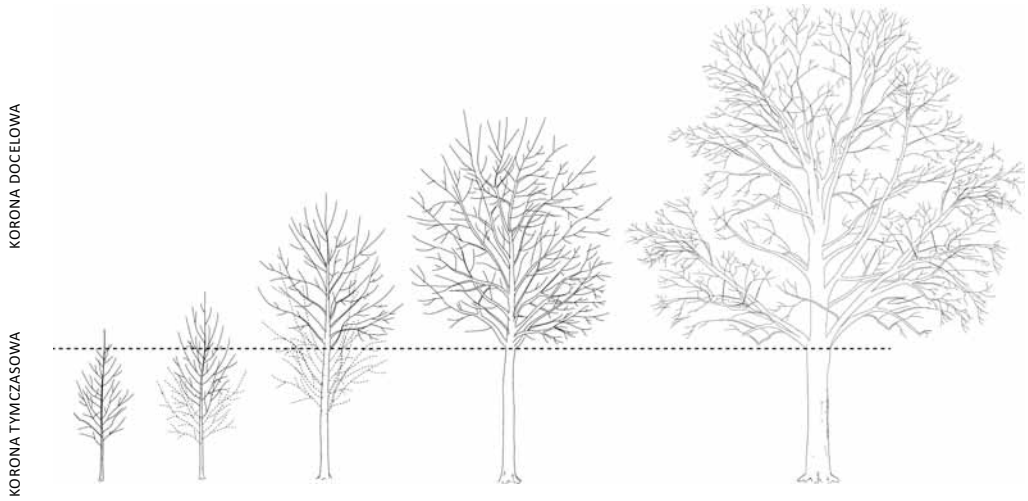
8.1.3. Apical cuts

These are made in the apical parts of crowns and are the only ones that provide for changes in height of a tree. It is typical for this kind of cut to reflect impaired stability and vitality. This type of measure almost always brings irreversible effects on crown structure, and indeed the functioning of the tree as a whole, hence the essential need to always consider alternative solutions. A reduction in the height of a tree should usually be something achieved in stages.

Such pruning may be practised on trees of the mature and damaged categories, with work in this part needing to form one aspect of a long-term plan of care over a tree. Once the measure has been carried out, the tree needs to be assessed at most 5 years on from the start of the activity. If the scope of the reduction can be limited through the application of other techniques (like mechanical support systems), then that needs to be considered. There should be no simultaneous (or briefly-separated) measures in the apical part in connection with the lower parts.zeniu z niższymi partiami.

8.1.4. Temporary and permanent crown

Where a tree species is required to have a branch-free trunk of appropriate height, a distinction is drawn between the temporary and permanent crowns. The temporary crown comprises branches growing out from the trunk to a height that will desirably be free of branches (up to the height of the base of the permanent crown).The permanent intended height of the crown base should take account of features of species and variety (which might for example have weeping branches).



The height of a road-lining tree[1] should be under:

- 4.70 m,where the road involved is a national-level road, be that a motorway, expressway or main road taking higher-speed traffic
- 4.60 m, where provincial or county-level (main or service) roads are involved
- 4.50 m, where local-level local or access roads are involved

The height of a tree lining a pavement or cycle track should be below 2.5m.

The dimensions of trees along tramlines[2] are as laid down by Polish Standards[3].

[1] The Regulation of the Minister of Transport and the Maritime Economy of 2nd March 1999 on the technical conditions to be met by public roads and their sites (i.e. The ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2016, item 124, as amended subsequently).

[2] In accordance with § 55, para. 2, point 3 of the Regulation of the Minister of Transport and the Maritime Economy of May 30th 2000 on technical conditions to be met by items of road engineering and on their siting (the ***Dziennik Ustaw*** Official Journal of Laws of the Republic of Poland of 2000, No. 63, item 735, as amended subsequently).

[3] Standard PN-K-92009 of 1998 relating to public transport, and entitled ***Komunikacja Miejska. Skrajnia Budowli. Wymagania*** – please note that this Standard was withdrawn on 15.10.2015 (and there are no others).

8.2. Categories of tree

The categories of tree connect closely with phase of development and state/status. Indications as to the relevant categories should be arrived at through tree ***inspections***, which is to say the procedure that should be launched prior to work of any kind involving a tree being carried out. A distinction is drawn between four main phases to a tree's development, i.e. young, maturing, mature and over-mature (this not forming part of the present Standard). However, there is further introduction here of the category of damaged tree.

8.2.1. Young trees

These are characterised by clear apical dominance, in a tree whose crown may be temporary in nature, where the maintenance of road verges emerges as crucial. The main aim of pruning is here the establishment and maintenance of a structure of the crown that is strong, healthy, and with a single leader (other than where it is natural for the given species or variety to have a crown with multiple main stems). Main tasks entail the systematic removal of branches from the temporary crown, as well as the instilling of an appropriate structure within what is regarded as the permanent (target) crown.

8.2.2. Maturing trees

These are characterised by clear apical dominance and have an established and permanent structure of main branches forming the "permanent" crown. The main goal of cuts is then to shape and maintain a strong and healthy structure of that crown with a single leader (other than where the given species or variety by definition has multiple leading stems). The main task is thus to reduce branches whose stability is impaired, as well as those likely to pose problems in future (thanks to competition between leaders, or poor branching; or else because they are likely to become runaway limbs).The task may also encompass cuts that improve upon ones done badly in the past.

8.2.3. Mature trees

These are characterised by a marked slowing-down of growth in height, as well as by declining apical dominance. The tree has thus achieved – or is close to achieving – its maximal crown dimensions (given its species, location and site-type).The goal of pruning in this case is to ensure that the tree can live out a life of appropriate length, while retaining stability and remaining acceptably safe from the point of view of its surroundings. It is in this phase of development that the value of a tree from the point of view of nature may increase greatly.

8.2.8. Damaged trees

This category takes in specimens whose functioning has been changed considerable my natural events and/or improper measures resorted to (for example with decapitation having taken place, damage to the roots, major change in habitat conditions, and so on). Given such circumstances, this status can be acquired by – and reported for – a tree at various different phases of development. Efforts need then to be made to ensure a desired degree of stability of the tree, with a view to its remaining ***in situ*** for as long as possible. The latter priority reflects the way in which such damaged trees may actually be of major natural value.

9. Pruning specifications

	Pruning of trees of different categories			
Cuts	**1 – Young**	**2 – Maturing**	**3 – Mature**	**4 – Damaged**
A – Structural	A1	A2	A3	A4
B – Lateral		B2	B3	B4
C – Apical			C3	C4

Specifications set out in detail the objective, methods, scope and timing of cuts that are to be made in respect of trees of given categories (phases of development and states/statuses), as well as the space in the crown that is in need of intervention.

Top pruning (8.1.3) is only allowed on mature trees and damaged trees (8.2.3, 8.2.4). Lateral cuts (8.1.2) may be made on all trees except young trees (8.2.2, 8.2.3, 8.2.4). Structural cuts (see 8.1.1) are permitted on all tree categories (8.2.1 to 8.2.4).

OBJECTIVE:
indicates the general purpose of the cuts for a given tree category and area.

PREFERRED PRUNING METHOD
shows which cutting method is indicated for a given specification. In detail, the cutting methods are described in chapter 7.2.

SCOPE:
determines what scope of work is acceptable in a given specification. The scope of pruning includes Live parts of the tree, branch and dead branches are not taken into account in determining the the pruning limit. The range of cuts is described in detail in chapter 6.5.

TYPES OF BRANCH REMOVED:
indicates the basic types of branches whose removal is justified in a given category.

CYCLICITY:
indicates whether a given treatment is a one-off or should be performed periodically (if so, in what time interval).

9.1. A1 – (formative pruning) structural pruning in young trees

OBJECTIVE:
The forming of a proper structure of the permanent crown with adaptation to the needs of a verge context.

PREFERRED PRUNING METHOD:
removal pruning, though reduction cuts are permissible in exceptional cases.

SCOPE:
the total cross-sectional area should not exceed 20% of the cross-sectional area of the trunk. In exceptional circumstances, this level of pruning may be increased to 40%. Effort should be made to ensure that 1:1 proportionality is maintained between trunk height and crown (with 2:1 and 1:2 also permitted).

TYPES OF BRANCH REMOVED:

- competing leaders
- the thickest branches of the temporary crown
- branches with included bark
- outgrowths from the trunk
- damaged or broken branches
- dry or dead branches

CYCLICITY:
Crown-forming should be carried out in a systematic way. The formative pruning should begin at most 3 years after planting, and be repeated every 2-5 years until reaching full permanent crown.

9.2. A2 – structural pruning in maturing trees

OBJECTIVE:
pruning within the permanent crown to shape and maintain a balance and stable structure that nevertheless adapts to features of the given species and variety.

PREFERRED PRUNING METHOD:
removal pruning, though with reduction pruning permissible in exceptional cases.

SCOPE:
the total cross-sectional area should not exceed 20% of the cross-sectional area of the trunk. In exceptional circumstances, this level of pruning may be increased to 30%.

TYPES OF BRANCH REMOVED:

- competing leaders
- branches with included bark
- outgrowths along the trunk
- damaged or broken branches
- dry and dead branches

CYCLICITY:
Crown-forming should be carried out in a systematic way. The formative pruning should begin at most 3 years after planting, and be repeated every 2-5 years until reaching full permanent crown..

9.3. A3 – structural pruning in mature trees

OBJECTIVE:
maintenance of a balanced, stable crown structure that takes features of the species and variety into account, while keeping risk in the vicinity of a tree down to an acceptable level.

PREFERRED PRUNING METHOD:
removal or reduction pruning, with intermediate pruning permissible in exceptional circumstances.

SCOPE:
total cross-sectional area removed should not exceed 10% of the cross-sectional area of the trunk. In exceptional circumstances, this level of pruning may be increased to 20%.

TYPES OF BRANCH REMOVED:

- branches that have become subject to mechanical weakening or other impairment (poor branching or else runaway, broken or damaged branches)
- outgrowth taking place in the inner parts of the crown should be LEFT IN PLACE
- dry and dead branches should be checked … and removed where stability is impaired (note that the feature will be associated with specific features of the species)

CYCLICITY:
An occasional form of pruning dependent on need (nevertheless, repeat intervals of 5–10 years would be typical).

9.4. A4 – structural pruning in damaged trees

OBJECTIVE:
maintenance of a balanced, stable crown structure that takes features of the species and variety into account, while keeping risk in the vicinity of a tree down to an acceptable level.

PREFERRED PRUNING METHOD:
removal, reduction or intermediate pruning.

SCOPE:
total cross-sectional area removed should not exceed 40% of the cross-sectional area of the trunk (removal of the whole tree should be considered where the achievement of the objective would entail removal of more than 50% of the crown).

TYPES OF BRANCH REMOVED:

- branches of the temporary crown
- branches weakened mechanically (with weak forking, runaway, broken or damaged)
- branches that are dry and dead – which should be monitored, and removed where stability is impaired (note: feature linked to specific features of the given species)

CYCLICITY:
pruning on a more *ad hoc* basis in line with need (nevertheless, repeat intervals of 5–10 years would be typical).

9.5. B2 – lateral pruning in maturing trees

OBJECTIVE:
maintenance of a balanced, stable crown structure through an increasing of stability (addressing asymmetry, unstable branches and runaway limbs), while limiting conflicts with infrastructure. Often carried out in association with A2.

PREFERRED PRUNING METHOD:
reduction pruning, though removal pruning should be applied where possible.

SCOPE:
the total cross-sectional area of cuts should not exceed 20% of the cross-sectional area of the trunk. In exceptional (justified) cases, the permitted scope may be as great as 30%.

TYPES OF BRANCH REMOVED:

- branches impaired or weakened mechanically (weakly forked, runaway, broken or damaged)
- branches whose presence provides for possible collisions with items of infrastructure
- branches in verge areas
- branches that are dry and dead

CYCLICITY:
pruning on a more *ad hoc* basis in line with need (nevertheless, repeat intervals of 5–10 years would be typical).

9.6. B3 – lateral pruning in mature trees

OBJECTIVE:
maintenance of a balanced and stable crown structure through improved stability (where there is asymmetry, unstable branches or runaway limbs), as well as limitation of possible conflicts with infrastructure. At this stage, elimination of problem branches can be limited, meaning that the intervention involved here often means reducing what is flawed.

PREFERRED PRUNING METHOD:
reduction or intermediate pruning, albeit with removal pruning rightly deployed where possible.

SCOPE:
the total cross-sectional area of cuts should not exceed 10% of the cross-sectional area of the trunk. In exceptional (justified) cases, the permitted scope may be as high as 20%.

TYPES OF BRANCH REMOVED:

- branches impaired or weakened mechanically (weakly forked, broken or damaged)
- branches whose presence provides for possible collisions with items of infrastructure
- branches in verge areas
- branches that are dry and dead

CYCLICITY:
pruning on a more ad hoc basis in line with need (nevertheless, repeat intervals of 5–10 years would be typical).

9.7. B4 – lateral pruning in damaged trees

OBJECTIVE:
maintenance of a balanced and stable crown structure through improved stability (in cases of asymmetry, unstable branches and runaway limbs), as well as minimisation and mitigation of possible conflicts with infrastructure.

PREFERRED PRUNING METHOD:
reduction, intermediate or removal pruning.

SCOPE:
the total cross-sectional area of cuts should not exceed 40% of the cross-sectional area of the trunk.

TYPES OF BRANCH REMOVED:

- branches that have been weakened mechanically (poorly forked, runaway or damaged)
- branches potentially in collision with items of infrastructure
- branches in verge areas
- branches that are dry and dead

CYCLICITY:
pruning on a more *ad hoc* basis in line with need (nevertheless, repeat intervals of 5–10 years would be typical).

9.8. C3 – apical pruning in mature trees

OBJECTIVE:
intervention of an exceptional type that must always link up with the need to restore the stability of a tree. It needs to be the subject of an appropriate justification (instrument-based diagnosis, SIA, WLA, *TreeCalc*). The measure should not be resorted to in connection with other kinds of pruning.

PREFERRED PRUNING METHOD:
reduction, intermediate or removal pruning.

SCOPE:
the total cross-sectional area of cuts should not exceed 30% of the cross-sectional area of the trunk.

TYPES OF BRANCH REMOVED:

- apical branches, whose removal or reduction is dictated by the need to lower the tree-crown.

CYCLICITY:
the pruning requires repeat intervention and assessment.

9.9. C4 – apical pruning in damaged trees

The main difference with respect to B4 is the possibility of the scope of the cut and size of the wound being increased, and the method to include any of the possible ones.

OBJECTIVE:

intervention of an exceptional nature that must always link up with the need to restore the stability of a tree. It needs to be the subject of an appropriate justification (instrument-based diagnosis, SIA , WLA , *TreeCalc*). The measure should not be resorted to in connection with other kinds of pruning.

PREFERRED PRUNING METHOD:

reduction, intermediate or removal pruning.

SCOPE:

the total cross-sectional area of cuts should not exceed 50% of the cross-sectional area of the trunk (removal of the whole tree should be considered where the achievement of the objective would entail removal of more than 50% of the crown).

TYPES OF BRANCH REMOVED:

- apical branches whose removal or truncation is dictated by the need to lower the tree crown.

CYCLICITY:
this kind of pruning is dependent on the intervention and assessment processes being renewed.

10. The mechanical supporting of trees

10.1. Designing system

A preliminary design project may be prepared by assessing a tree and recommending the safeguarding measures to be pursued. A final design should then be arrived at by a person proper for the particular kind of safeguarding supports that are to be installed, with account of course taken of the objective these are to serve, as well as the state the tree and its surroundings are in and the materials and technologies that are to be applied.

10.2. Documentation

The forms of supports and safeguards that are introduced will need to be noted down in the documentation for the given tree, along with recommendations as regards the checks on these needing to be carried out, as well as any further steps.

10.3. Ways of safeguarding trees

The measures taken to support and safeguard trees may be of a temporary or more-permanent nature, depending on the state the tree is in and the possibility that the situation will improve within 8–10 years.

It is permitted for given experts to arrive at their own solutions based around their own designs, on condition that the materials and technologies used ensure an appropriate level of safety in regard to the tree and its surroundings, with a guarantee extended and the objectives of resort to the given measures being met.

The designer of a solution should be able to offer proof of similar work having been done in the past, while innovative new work should make clear the effectiveness of the solution, as well as both theoretical and empirical justification for it.

10.3.1. Temporary safeguarding and other measures

These should be applied during the time the crown of a tree is being remodelled, or until such time as more permanent safeguarding of a tree can be engaged in, or steps taken to reduce its crown. In principle, such temporary safeguarding of a tree should not be proceeded with in the absence of a longer-term programme to raise the level of safety in the area of the given tree. This implies a need to avoid temporary measures being treated as a way of achieving some kind of more-permanent level of safety in the vicinity of a tree, first and foremost in the face of the high costs of the latter measures.

Examples of temporary ways of securing and safeguarding trees would involve flexible cabling in either belt or drilled form, as well as drilled-in non-flexible cables, props and scaffolding. In each case the task is to secure part or all of a tree against falling during the time in which the crown is being remodelled, or for as long as changes in the vicinity of a tree are awaited, or else an improvement in the state of the given tree, or other changes ensuring a reduction of the risk that a whole tree or part thereof will fall.

In principle, temporary forms of safeguard that are installed should involve systems or materials designed with the aim of their being used with trees. A preference should be shown for certified materials and systems suitably resistant to the action of UV radiation. The systems in question should be installed in line with the instructions provided by the producer or seller, with materials and technologies taking account of both the sizes of the elements being safeguarded and secured, and the resilience and durability of the system.

10.3.2. Permanent securing

This should be resorted to where there is no other possibility of improving the statics of the tree or safeguarding the surroundings against the threat of the whole tree – or part thereof – coming down, e.g. through breakage.

The permanent securing and/or safeguarding of trees can be achieved using props, the drilling or screwing of trunks or branches, and forms of scaffolding to hold up a tree or limb. Given the lack of standardisation of solutions, one-off designs from contractors will always be needed, and be accompanied by justifications as regards both materials and technologies applied.

Permanent measures resorted to will need to be checked upon, and subject to necessary exchange in line with the given design, as well as changes in the structure and state of the given tree. Measures taken may not hinder a tree's further development or disturb its physiological processes. Furthermore, installations should taken account of the given tree's habit and structure, and properties of the surrounding area, with a view to the consequences of the intervention for both the tree and its surroundings being minimised.

10.4. Checks on installations

Measures to secure or safeguard trees that involve installation work should be checked at least as often as the producer or implementer of a given system recommends.

Where guidelines are lacking, the principle recommended is for checks from ground level to be made each year, as augmented by checks at crown level (aerial inspection) every 2 years. Beyond that, checks should be made following each case of exceptional weather phenomena, in the face of which limbs or trunks have been made subject to additional loading; as well as following major changes in the structure of the given tree (such as following the breakage of part of the crown), or in the face of other phenomena and events exerting a significant influence on the state or status of a tree or its surroundings, along with safeguarding and supporting measures already resorted to.

Checks carried out should be documented in relation to the given tree, with conclusions arrived at being responded to in line with relevant recommendations.

10.5. Personnel engaged in safeguarding trees

The installation of certified systems to support, brace and cable trees – or otherwise secure them – should be a matter for those who have received training in the given system, as attested to by course diplomas.

Where installation is on the basis of the given expert's own design, this work should be done by that designer, or else by somebody under his/her supervision, on the basis of cooperation.

It is recommended that the knowledge and experience of certified tree surgeons and arborists be taken advantage of in this context, with these for example being European Tree Workers or Certified Arborists, or having other high-level qualifications confirmed by certification as regards further training in methods of safeguarding trees.

11. Tree care

To improve the conditions of the site at which a tree is growing (and often to allow for any growth at all – in the case of newly-planted trees in particular), it is necessary for appropriate care measures to be pursued.

11.1. Watering

In the case of newly-planted trees, watering is a measure of fundamental importance allowing for survival and then growth at the new site. Where it is older trees that are being watered, the justification for this has first to be established.

Excess water in the soil profile through watering taking place too frequently may have negative consequences for a tree. Where a site is one in which water remains for a long period, there will be a need to install a drainage system.

Watering will be essential where building work is carried out in the vicinity of trees (with a lowering of the water table, and/or loss of part of the root system), with the aim in this case being to ensure that the level of stress is minimised.

11.1.1. The main principles of watering

- The frequency and intensity of watering needs to be adjusted to weather conditions, soil type, soil humidity, time of the year, and genus and species of tree.
- A tree with the status of either newly-planted or with a reduced root system (in connection with building work or transfer) should be watered through a period of between 3 and 5 years, with the one-off dose (in the range 15÷40 l/m2) being established in such a way as to wet a layer down to between 20 and 40 cm (depending on the species). Surface watering does not favour plants,
- watering should be done steadily over a longer period, with a larger amount of water with longer periods between consecutive applications (every 7–14 days)
- watering should be done at night (e.g. by automatic sprinkling), in the morning, or in the late afternoon.

11.2. Mulching

The spreading of a layer of wood chips or composted bark, or a mixture of the two, to have a positive impact on both older and newly-planted trees. It is permitted to use other organic materials in mulching, not least peat and leaf litter.

This measure has a positive influence on a site surrounding a tree, given that it holds in moisture, lowers maximum soil temperatures, holds back the growth of weeds, intensifies the development of beneficial flora and fauna in the soil, increases root density and the activity of mycorrhizae, reduces soil compaction, and releases nutrient components into the soil.

The main principles of mulching:

- the soil beneath a tree should be prepared: cleared of organic debris, weeds, litter and rubble. It should also be moist.

- the mulch used (e.g. of bark or wood chips) should be composted, ground up to a fraction of 2-6 cm particle size, cleared of all litter and weeds, and free of pests and pathogens
- the layer should be of about 5 cm (maximum 10, so as not to limit access to air)
- mulch should not reach up to the trunk itself, and indeed the equivalent of 1 trunk diameter should separate the base of the trunk from chipped bark applied
- mulching should encompass the whole area of the root system, or as much of that as is possible
- where soil is very moist, the value of mulching has to be considered, as this may even have a negative influence on soil conditioning and lead to plant dieback.

11.3. Mycorrhizal inoculations

Close co-existence between trees and symbiotic fungi helps facilitate the process whereby planted trees adapt to their new locations, even as this is not recommended as a method by which cultivation of older trees may be improved.

The benefits accruing to trees in which mycorrhizal infection has occurred include an increased absorptive surface and greater extent of fine roots, protection against pathogens, accelerated root growth, more effective uptake of water and mineral nutrients, and reduced stress during times of drought.

Key principles of mycorrhization:

- Only use inoculations of mycorrhizae of local origin, and as designated for particular species of tree or shrub;
- This is essence denotes conferring the task upon a professional mycorrhizal laboratory.

12. Plants on trees

12.1. Vines and creepers

Creeping plants with aerial roots like ivy or creeping hydrangea do attach closely and directly to tree-trunks, but still never become parasitic, treating the tree as a host. There is of course an element of competition with the tree, given the limits on amount of water and nutrients present in a given area; but on the plus side creepers often cover the ground very effectively, in this way preventing soil from drying out and improving site conditions.

There are occasions on which luxuriant growth of some creeper or vine ensures that a crown of a tree becomes dominated and completely overgrown. Where this happens, radical pruning away of the creeper may become necessary, and virtually all specimens will prove able to tolerate even radical pruning-back very well.

There may be cases in which aesthetic considerations and care for the state of the creeper itself assume greater importance than interest in maintaining the tree. Equally, creepers that hold sway over a crown in full foliage may ensure that the photosynthesis engaged in by the tree is curbed, as will then be the development of stems located in more internal parts of the crown. This is an unfavourable situation for the tree (given the way that it for example hinders withdrawal of the crown), and that in turn mitigates in favour of such a creeper's growth being limited to places in which the negative impact on a tree's assimilatory capacity will be limited.

There is a tendency for creepers to be planted under dead trees or by stumps. This is a mainly positive practice, given the way biodiversity can be increased and assimilatory biomass reintroduced in some way where a tree has been lost. The aesthetic consequences are often also interesting. However, while the presence of such a plant most likely has no negative impact on the dead trunk (and will indeed tend to protect it from undesirable fluctuations in temperature and humidity), a likely effect will be the hindering of any by-eye assessment of the state the dead tree is in.

12.2. Mistletoe

This familiar hemiparasite uses modified roots called haustoria to penetrate the tissue of a tree and draw from it water containing mineral salts. This fact alone attests to its potential to cause harm.

The threat here may be played down where mistletoe is not present too abundantly. However, excessive spread needs to be responded to by way of intervention. This will often be done in the course of tending work, but may also involve a targeted removal procedure. Mistletoe becomes especially dangerous where the host tree is weakened or otherwise impaired.

12.2.1. Removing mistletoe

Mistletoe is most often removed together with the stems on which it is growing, with cuts made at a distance of between several and several tens of centimetres from the point of growth, in line with the age of the shrub, and analysing if all has been removed by reference to the presence or absence of visible haustoria in branch cross-sections.

Where the shrub has gone far in taking over a tree, the operation to remove mistletoe will need to be spread out over several years.

13. Construction and excavation work in the vicinity of trees

The statics of trees may be influenced by work done close to them that results in structural changes in soil (including as regards levels of aeration and humidity), work that leads to mechanical damage of crowns and trunks (including mechanical breakage of limbs, damage to the trunk, etc.) as well as the roots (e.g. when excavations are carried out). Serious damage (or even destruction) of trees may take place, with statics influenced – sometimes soon after the event, or sometimes only after a longer period of time. Principles for the protection of trees and for work in their vicinity are as presented in a separate study – see ***Standard - Protection of trees and other greenery in construction process***.