NATURE CONSERVATION AGENCY OF THE CZECH REPUBLIC

MENDELU Lesnická a dřevařská fakulta

Nature and Landscape Management Standards

ARBORIST STANDARDS	**PLANTING AND MANAGEMENT OF WOODY PLANT GROWTHS**	**SPPK A02 008:2023**
Series A		

Zakládání a péče o porosty dřevin

Gehölzbestände: Anbau und Pflege

This standard is intended as a definition of technical and work procedures used for planting and management of canopied woody plant growths outside the forest environment.
This standard is also applicable to woody plant growths with a defined specific function, such as watercourse alluvial growths, wind belts, growths serving adjustment of soil aquatic regime, erosion prevention afforestation, etc. This standard is not applicable to protective zones of technical infrastructure.

Sources:

Act no. 89/2012 Coll., the Civil Code, as amended.
Act no. 114/1992 Coll. on Nature and Landscape Protection, as amended.
Act no. 183/2006 Coll. on Spatial Planning and Building Rules (Building Act), as amended
Act no. 13/1997 Coll. on Roads, as amended
Act no. 20/1987 Coll. on State Heritage Management, as amended
Act no. 254/2001 Coll. on Waters and on amendment of certain acts (Waters Act), as amended

Decree no. 139/2004 Coll., laying down details on down details of transfer of seeds and seedlings of forest tree species, registration of origin of reproduction material and details of renewal of forest stands and afforestation of land declared land intended for performance of forest functions
Decree no. 189/2013 Coll. on tree protection and felling permission, as amended.
Decree no. 395/1992 Coll., executing some provisions of Czech National Council Act no. 114/1992 Coll. on Nature and Landscape Protection, as amended

Government Regulation no. 339/2017 Coll., on detailed requirements on work and work procedure organisation methods in forest work and workplaces of similar nature.
Government Regulation no. 362/2005 Coll., on detailed requirements on occupational health and safety in workplaces with a risk of fall from a height or into a depth

ČSN 464902 (1984): Cultivates of ornamental plants. Common and basic regulations
ČSN 482115 (2012): Planting stock for forest woody plants.
ČSN 482116 (2015): Artificial forest regeneration and afforestation.
ČSN 482117 (2014): Site preparation for forest regeneration and afforestation.
ČSN 839001 (1999): Orchard and landscape management – Terminology, basic professional terms and definitions.
ČSN 83 9021 (2006): Landscaping vegetation techniques – Plants and their planting.
ČSN 839051 (2006): Landscaping vegetation techniques – Care of vegetation during development and maintenance in green areas.

Standard development:
Developed by the Faculty of Forestry and Wood Technology of the Mendel University in Brno for the NCA CR in 2014-2023.

External examiner:
Faculty of Horticulture and Landscape Engineering, Slovak Agricultural University in Nitra

Authorial collective:
Ing. Aleš Fišr, Ing. Václav Hurt, Ph.D., Ing. Tomáš Staněk, doc. Ing. Pavel Šimek, Ing. Brigita Neumannová

Documentation for the standard development is available in the NCA CR library.
Standard approved by:

RNDr. František Pelc
Director of NCA CR

Table of contents

1 Purpose and contents of the standard 3
1.1 Standard purpose 3
1.2 Qualifications of persons 3
1.3 Legal framework 4
2 Explanation and definition of terms 7
3 Classification of growths 9
3.1 General principles 9
3.2 Growth condition assessment 9
3.3 List of growths 9
3.4 Dendrological survey 10
3.5 Follow-up and specialised surveys 12
3.6 Work list (tree list) 13
4 Growth planting and regeneration 14
4.1 General principles 14
4.2 Growth planting and regeneration methods 14
5 Growth management 16
5.1 Finishing and development management 16
5.2 Growth inspection and maintenance management 16
5.3 Growth felling 17
6 Techniques 18
Annex 1 Growth silvicultural condition – description of levels 21
Annex 2 Description of woody plant growth development stages 22
Annex 3 Growth outlook – description of stages 24
Annex 4 Determination of woody plant growth dendrological potential 25
Annex 5 Example growth dendrological survey tables 26
Annex 6 Example table with list of woody plants to be removed 27
Annex 7 List of Arborist Standards developed 28

1 Purpose and contents of the standard

1.1 Standard purpose

1.1.1 The standard defines methodological procedures for assessment of plant growths outside the forest and the scope and techniques for subsequent cultivation interventions to prevent unpermitted intervention in non-forest plants (see Section 7 of Act no. 114/1992 Coll., and Section 2 of Decree no. 189/2013 Coll.). The standard also specifies growth planting and regeneration principles.

1.1.2 The standard is also applicable to woody plant growths with a defined specific function, such as watercourse alluvial growths, wind belts, growths serving adjustment of soil aquatic regime, erosion prevention afforestation, etc., and cannot be applied to protective zones of technical infrastructure. The procedures hereunder are applied in accordance with their specific functions.

1.1.3 Concerning nature-based growths in open country, management is not always desirable/necessary, with the exception of interventions necessary for traffic safety.

1.1.4 The standard provisions follow upon other Nature and Landscape Management Standards, notably A series – Arborist Standards.

1.1.5 Concerning growths forming part of the territorial system of ecological stability (TSES), the following series C standards (TSES and landscape-forming elements) have to be observed:

- SPPK C02 001 Implementation of TSES biocentres and biocorridors,
- SPPK C02 002 Establishment of landscape-forming and interaction elements,
- SPPK C02 004 Management of TSES components, including landscape-forming and interaction elements.

1.2 Qualifications of persons

1.2.1 Woody plant growth inspection is carried out by persons authorized by their owner or manager.

1.2.2 Comprehensive woody plant growth condition assessment is interdisciplinary and involves analysis of a wide range of factors. It is an expert activity that has to be done by qualified persons, who may be:

- court experts pursuant to Act no. 254/2019 Coll., on Experts, Expert Offices and Expert Institutes, with specializations involving assessment of tree condition or a similar specialization, or
- graduates from study programmes and specialisations of faculties of forestry, horticulture, scientific, environmental, etc., where tree and woody plant growth assessment issues are taught, or
- holders of a national or international proof of expert knowledge in the area.

1.2.4 The recommended qualification for persons carrying out modification of woody plant habitat conditions and interventions in woody plant growths not considered work at height is successful completion of a horticultural or forestry vocational school or higher education in the discipline, or other national or international proof of expert knowledge in horticulture, garden and landscape architecture, forestry or arboriculture.

1.2.4 The recommended qualification for persons carrying out dangerous felling and other work at height in woody plant growths is completed secondary education in the discipline or other national or international proof of expert knowledge in arboriculture, and qualification of safe movement in tree crowns using climbing equipment or lifting work platforms.

1.3 Legal framework

1.3.1 **Act no. 114/1992 Coll.**, on Nature and Landscape Protection, as amended, defines protection of non-forest woody plants from damage and destruction (Section 7, Para. 1), lays down the obligation for owners to manage woody plants (Section 7, Para. 2), defines permitting of tree felling (Section 8) and ordering substitute planting for felled woody plants (Section 9). Felling of woody plants requires a permit from a nature protection authority, unless specified otherwise herein. Besides, the Act defines protection of heritage trees and specially protected tree species.

1.3.2 Concerning management of growths (felling for silvicultural reasons), the Act specifies the possibility to fell trees when thinning growths purposely or regenerating growths under notification. Felling for these reasons has to be reported in writing no less than 15 days in advance to the nature protection authority, which may suspend, restrict or prohibit it if it contravenes plant protection requirements.

1.3.3 The Act (Section 5, Para. 4 and 5; Section 16, Para. 1, item f); Section 26, Para. 1, item d); Section 29, item e); Section 34, Para. 1, item d) also regulates deliberate spreading of introduced plant species and hybrids in the landscape as well as deliberate spreading of introduced plant species in specially protected nature areas (national parks, protected landscape areas, national nature reserves, nature reserves).

1.3.4 Section 5, Para. 3 of the Act specifies the obligation, when doing agricultural, forestry and construction work, during water management modifications and in transport and energy industry, to always proceed so as to prevent excessive death of plants and injury or death of animals or destruction of their biotopes, which can be prevented with technically available and economically feasible means.

1.3.5 **Decree no. 189/2013 Coll.**, on tree protection and felling permission, as amended, specifies requirements for permission to woody plant felling, including definition of a canopied woody plant growth as a growth in which the aboveground parts of the plants touch, grow through or overlap one another, while the trunk circumference of the individual woody plants measured at 130 cm above ground does not exceed 80 cm; if any of the woody plants in the growth exceeds said dimensions, it is always treated as an individual plant (except in growth regeneration or deliberate thinning). The Decree specifies that permission is not required for woody plants with a

trunk circumference up to 80 cm measured at 130 cm above ground, for canopied woody plant growths (if the total area of canopied woody plant growth to be felled does not exceed 40 m^2), for energy and Christmas tree plantations (typically single-species, grown for fast and high production of young trees or woody matter and with a production cycle between harvests up to 10 years), and for fruit woody plants growing on plots in built-up areas registered in the Cadastre as gardens or built-up areas and courtyards.

In connection with felling of canopied growths, it must be noted that if multiple canopied growths are felled together, their combined area has to be considered – in other words, all the area of the individual canopied woody plant growths has to be added and only their sum is to be compared with the set limit of 40 m².[1] Thus, permission is required for felling woody plants if the plan concerns several smaller areas of canopied growth that only exceed the set limit of 40 m² in their total sum. The purpose is to protect canopied growths from the inadmissible "salami-slicing tactics", where gradual felling of smaller growths not requiring a permit may result in a total destruction of a larger growth.

If in doubt whether a specific case of felling woody plants is subject to permission or not, please turn to the applicable nature protection authority with a request for preliminary information.[2] Nature protection authorities are required to inform the applicant whether their plan needs a permit or other action, and the criteria used by the nature protection authority in assessing the application.

1.3.6 **Act no. 13/1997 Coll.** on Roads (Section 33) defines requirements for planting of trees and shrubs along roads in terms of viewing conditions and the condition of road vegetation on auxiliary road land and other suitable land forming part of a motorway, public road or local road in terms of safety of use of the road and ability of road maintenance or management of adjacent land (Section 15).

1.3.7 **Pruning of trees and shrubs** in non-forest environments can generally be performed by the owner or another authorised person without prior permission or notification of a nature protection authority to the extent and using a technique that does not result in unpermitted intervention in non-forest trees (see Section 7, Para. 1 of Act no. 114/1992 Coll. and Section 2 of Decree no. 189/2013 Coll.[3]).

1.3.8 An exception from 1.3.7 comprises trees and shrubs with a special protection regime pursuant to Act no. 114/1992 Coll., notably:

- registered as memorial trees (Section 46),
- plants that are biotopes for other organisms, in the category of endangered species, seriously or critically endangered species

[1] JELINKOVA, J. Zákon o ochraně přírody a krajiny. Praktický komentář. Praha: Wolters Kluwer ČR, 2021, p. 73

[2] Section 90, Para. 24 of Act no. 114/1992 Coll., on Nature and Landscape Protection, as amended, in conjunction with Section 139 of Act no. 500/2004 Coll., the Rules of Administrative Procedure, as amended.

[3] (1) Unpermitted interventions in trees and shrubs in contravention of requirements for their protection include interventions causing damage or destruction to trees and shrubs which lead to substantial or permanent reduction in their ecological or social functions or cause their immediate or subsequent death.

(2) An intervention pursuant to Paragraph 1 is not unpermitted if done for the purpose of retention or improvement of a function of a tree or shrub, as part of management of a specially protected plant or animal species, or done in accordance with the management plan of a specially protected area.

(Section 48 et seq.),

- specially protected species of wild trees – European yew (*Taxus baccata),* Bohemian mountain ash (*Sorbus bohemica*), Sudeten mountain ash (*Sorbus sudetica*), dwarf juniper (*Juniperus communis subsp. alpina*), European cornel (*Cornus mas*), downy oak (*Quercus pubescens*)
  (Section 49),
- trees and shrubs where the intervention could result in damage or destruction of nests and eggs of wild birds or their death or significant upsetting (particularly during nesting), unless the nature protection authority has specified a different procedure (Section 5b, Para. 1),
- trees and shrubs that are part of a prominent landscape feature (PLF)
  (Section 4, Para. 2).

In such cases, plant treatment requires adequate administrative action of the applicable nature protection authority.

1.3.9 Interventions in woody plants, particularly their felling, must not be in contravention of basic and detailed protection conditions of SPA.

1.3.10 Woody plants on Natura 2000 sites do not enjoy a specific protection regime. However, interventions in woody plants (particularly felling) must not have a negative impact on the subject of protection.

1.3.11 If an intervention in a growth can reduce or alter the landscape character (by reducing its aesthetic and natural value), the intervention cannot be carried out unless the applicable nature protection authority issues an approval pursuant to Section 12, Para. 2 of Act no. 114/1992 Coll. on Nature and Landscape Protection.

1.3.12 **Pursuant to Act no. 20/1987 Coll.** of the Czech National Council on State Heritage Management, as amended, everyone has the obligation to act so as not to cause adverse change in the condition of cultural monuments or their settings and not to threaten the conservation and appropriate social utilization of cultural monuments (Section 9, Para. 3). Concerning pruning, felling or planting of woody plants in protected heritage sites or zones that comprise cultural monuments, national cultural monuments, heritage reserves, heritage zones or are within the buffer zone of an immovable cultural monument, heritage reserve or heritage zone, the owner is required to obtain a binding position statement from a heritage management authority beforehand (Section 14, Para. 1). Pursuant to Section 14, Para. 7, the owner or designer shall also discuss the project or preliminary design documentation concerning modifications to woody plants with a professional state heritage management organization (i.e., NPÚ) in the course of its development.

2 Explanation and definition of terms

2.1 **Dendrological potential** is a summary characteristic expressing stability and outlook for the assessed growth. It must be assessed in the context of all the assessed attributes of the growth or defined growth group, in direct connection with its primary and additional functions, if any.

2.2 **Landscape architecture object (greenery object)** is an autonomously functional unit that is the result of creative activity based on principles applied in landscape architecture. Systemic management is the basic precondition for landscape architecture object sustainability. A number of functional types is recognized depending on the prevalent function of an object (e.g., garden, park, transport greenery, etc.).

2.3 **Growth regeneration** is a set of silvicultural measures aimed at creating a new growth on the site of an original growth, either artificially (planting) or naturally (making use of generative or vegetative processes). The purpose of growth regeneration is long-term maintenance of a growth of the same character on a specific site as the previous growth.

2.4 **Silvicultural objective** defines and describes growth properties that a growth is to achieve over a set time period with respect to its site conditions and function. The silvicultural objective is set in accordance with the composition plan, which is typically defined in project documentation developed for the greenery object in question. If no such documentation exists, the function of the growth has to be described in the silvicultural objective description.

2.5 **Woody plant growth** is a set of woody plants (shrubs, trees or their combination) comprising a compact unit of an areal character with specific conditions (such as microclimate, largely continuous canopy, relations among individuals and growth levels), in which the woody plants affect each other significantly and typically compete with each other, and which requires deliberate thinning or experiences spontaneous reduction in the number of individuals.[4] A typical example of such a growth is a canopied woody plant growth pursuant to Section 1, item a) of Decree no. 189/2013 Coll.[5], or an intensively cultivated canopied orchard.

2.6 **Composed woody plant growth** fully meets the above definition of a woody plant growth (2.4). The properties of a composed growth are deliberately formulated based on human philosophical, aesthetic or artistic motives and developed in the spirit of the ideal composition of the whole landscape architecture object.

2.7 **Growth group** is a set of individuals (trees, shrubs or their combination) that is homogeneous in one or more of the following attributes: silvicultural condition, species composition, growth structure, composition.

2.8 **Group of trees/woody plants** is a set of trees typically with a simple spatial

[4] See MoE Newsletter, Year XXXII, Vol. 3, April 2022, p. 3

[5] A canopied woody plant growth refers to such a woody plant growth in which the aboveground parts of the plants touch, grow through or overlap one another, while the trunk circumference of the individual woody plants measured at 130 cm above ground does not exceed 80 cm; if any of the woody plants in the growth exceeds said dimensions, it is always treated as an individual plant.

structure. Individuals forming the growth edges typically produce a larger crown area of vegetation elements than individuals inside the group. Said characteristics define this vegetation element as opposed to a woody plant growth. Depending on the representation of taxa involved in the spatial structure of the vegetation element, we further distinguish deciduous, coniferous and mixed canopied groups of trees. Depending on the canopy, we distinguish canopied and loose groups of trees. If a group of tree includes a shrub storey, it is referred to as a group of trees with shrub undergrowth. A group of trees/woody plants in which the aboveground parts of the plants touch, grow through or overlap one another, while the trunk circumference of the individual woody plants measured at 130 cm above ground does not exceed 80 cm, is considered a canopied growth in terms of felling permission (Section 1, item a) of Decree no. 189/2013 Coll.).

2.9 **Line of trees** is a linear arrangement of trees (see Section 1, item c) of Decree no. 189/2013 Coll.)[6] defined by a single function and the same composition objective. Line of trees are typically distinguished based on the silvicultural form into shaped and free-growing. The spatial arrangement produces a number of characteristic types, differing in the number of sides (primarily street lines) and rows.

2.10 **Work list** is a listing of trees designed for removal.

2.11 **Diameter at breast height** is the thickness (diameter) of a tree at a height of 1.3 m above ground level. It is measured perpendicular to the trunk axis.

2.12 **Deliberate thinning** is done using positive or negative selection, whereby the number of individuals is reduced during the growth period by removing undesirable individuals with the objective to improve the growth stability and ensure its long-term existence, always taking into consideration the specific required function of the growth.

2.13 **Growth planting** is a set of jobs and measures necessary for subsequent development of a new growth.

6A line of trees refers to a continuous line of at least ten trees with regular spacing; if a tree is missing in any section of a continuous line of at least ten trees, that section too is considered a part of the line of trees; trees growing in orchards, nurseries or energy or Christmas tree plantations are not considered lines of trees.

3 Classification of growths

3.1 General principles

3.1.1 A growth **cannot** refer to a line of trees or other groups of woody plants which do not generate specific conditions typical of a growth (see 2.5); thus, interventions in such vegetation elements also comprise management of individual woody plants.

3.1.2 It is advisable to divide more extensive growths and growth compounds by function, natural boundaries or process needs into several sub-growths.

3.1.3 Within the boundaries of a growth, lower-level units can be defined, known as **growth groups** (see 2.6) as its sub-components.

3.1.4 In the case of small-scale or homogeneous growths, a growth may comprise a single growth group.

3.1.5 The format of transferred data is defined by (legal) regulations in force; if no relevant regulations exist, it is defined by agreement between the client and the contractor.

3.2 Growth condition assessment

3.2.1 Along with individually assessed trees, woody plant growths belong to the basic greenery areas pursuant to SPPK A01 001 Tree assessment and are clearly identified with a code reference.

3.2.2 Growth assessment may proceed in two steps (levels of detail):

- **list of growths,**
- **dendrological survey**.

3.2.3 As needed, dendrological survey is followed by other **specialized surveys** and assessments (see 3.5).

3.3 List of growths

3.3.1 Includes basic identification data on each growth:

- **location** of the growth specifying its area size[7] – plotted using a polygon, which typically follows the outer (perimeter) lines of perpendicular projections of the crowns of woody plants included in the growth;
- **identification** with a serial number,
- **surface area** of the growth;
- **description and function** of the growth in the spatial structure – detailed information, including significance of the growth in terms of historical development of the site/object, composition, information important in terms of growth delineation and subdivision;

[7] General requirements for precision and the coordinate system used shall comply with SPPK A01 001 Tree condition assessment.

- **division** of the growth into growth groups, marked with a letter following the growth number;
- definition of **type** of growth group: tree and shrub/climber growth, tree growth, shrub and/or climber growth.

3.4 Dendrological survey

3.4.1 Each dendrological survey comprises a drawing (graphic) and a text part. Besides the basic information from the list of growths (see 3.3), it includes more detailed **characteristics of each growth group**.

3.4.2 It employs the field survey/investigation method, involving identification of required attribute values. In justified cases, educated estimate can be used.

3.4.3 It is advisable to designate important trees or trees requiring an individual approach for other reasons separately from the growth and assess them individually (see SPPK A01 001 Tree assessment).

3.4.4 In the case of felling (unless part of regeneration or deliberate thinning), all trees with a trunk circumference over 80 cm measured 130 cm above ground have to be assessed individually as well (Section 1, item a) of Decree no. 189/2013 Coll.). Felling of such trees required a permit from a nature protection authority.

3.4.5 Woody plants that are a part of a line of trees are not considered a part of a canopied woody plant growth.

3.4.6 **Growth group characteristics** are developed depending on the growth group type. The basic growth group types are as follows:

A - tree and shrub growth, including individual shrubs,
B - pure tree growth,
C - pure shrub and/or climber growth.

3.4.7 Characteristics of growth groups comprising purely **trees or trees and shrubs/climbers** (types A and B) include the identification of:

- **surface area**;
- **development stage** (see 3.4.9);
- **taxonomic composition** with a numeric or percentage representation of different taxa;
- **size categories** (see 3.4.10);
- **outlook** for the growth group (3.4.11).

3.4.8 Characteristics of growth groups comprising purely **shrubs and/or climbers** (type C) include the identification of:

- **surface area**;
- **shrub cover rate** expressed as a percentage share in the total surface area of the growth group;
- **taxonomic composition** with a numeric or percentage representation of different taxa;
- **size categories** specifying the percentage share of each category:
  1 – low shrubs (species attaining a height approximately up to 1 m in adulthood),
  2 – medium and tall shrubs (species attaining a height over 1 m

in adulthood),
3 – climbers;

- **silvicultural condition**, evaluated on a scale and accompanied with comments as necessary (see Annex 1 for detailed description of each category):
  a – absolutely satisfactory,
  b – satisfactory,
  c – unsatisfactory.

The form of specification of measures is governed by the Table in Annex 5.

3.4.9 **Development stage** is determined for each growth group by classifying it into one of the following categories (see Annex 2 for detailed description of each category):

1 - **young growth** includes the stages of culture, self-seeding/self-growth, thicket and young pole wood. This development stage involves primarily protective and pruning interventions.
2 - **middle-aged growth** includes the stages of pole wood and beginning trunk wood, i.e., trees with a diameter at breast height of 7-25 cm (i.e., trunk circumference up to 80 cm at 130 cm above ground).
3 - **adolescent and adult growth** is a development stage when individuals with a diameter at breast height above 25 cm (i.e., trunk circumference over 80 cm at 130 cm above ground) begin to dominate the growth.
4 - **age and spatially differentiated growth** is a growth with significant growth differentiation, stratification and presence of multiple development stages, including growths of high biological value (senescent).

3.4.10 Growth groups can be further divided into **size categories**, defined by the dominant set of thickness classes. For each category, the number of percentage share of individuals as well as height of the representative of the category (average).
Scale:

1 - diameter at breast height 0-10 cm,
2 - diameter at breast height 11-25 cm,
3 - diameter at breast height 26-50 cm,
4 - diameter at breast 51 cm and more.

Besides, shrub and climber growths are placed in size category 1. The number of individuals or their percentage share can be replaced with a surface area figure in size category 1.

3.4.11 For each size category, its **outlook** is specified in terms of vitality and health condition, by classifying it into one of the following categories (see Annex 3 for detailed description of each category):

a - long-term outlook,
b - short-term outlook,
c - no outlook.

It is advisable to accompany this evaluation with a verbal description.

The same evaluation method is used for assessment of the growth group as a whole.

3.4.12 For age and spatially differentiated growths (3.4.9), the **presence of growth stories** is specified based on the table below (H = height of the top growth storey). Taxonomic composition, size category (3.4.10) and outlook (3.4.11) are then determined for each growth storey.

1	**N**	**overstorey**	Trees whose crown make up a part of the main growth storey bulk, yet the top of the crown significantly surpasses the top height of the main growth storey.
2	**H**	**top growth storey**	Trees whose height makes up the dominant part of the main growth storey bulk (principal component of the main growth storey).
3	**1/2H-H**		Trees that significantly surpass one half of the growth height, but do not reach the top height of the main growth storey (individuals that grow into or recede from the main growth storey).
4	**1/3H-1/2H**	**middle growth storey**	Trees reaching approximately one half of the main growth storey height level (middle growth individuals).
5	**up to 1/ 3H**	**lower growth storey**	Trees reaching no more than one third of the main growth storey height level.
6	**K + Na**		Shrubs and trees of advance growth age.

3.4.13 For age and spatially differentiated growths (3.4.9), it is additionally advisable to assess the dendrological potential of the growth (see Annex 4).

3.4.14 For composed growths or growths important in terms of heritage management, it is advisable to follow the Methodology for Woody Plant Growth Assessment for Heritage Management Purposes certified by the Ministry of Culture of the CR.[8]

3.4.15 Based on a dendrological survey or other additional surveys as necessary (see 3.5), **silvicultural measures** (interventions) are proposed for each size category as per specified techniques (see 6.1). The proposal is always based on the silvicultural objective (see 2.4).

3.5 Follow-up and specialised surveys

3.5.1 Other types of surveys can be carried out as, notably:

- growth dendrological potential assessment,
- growth importance assessment for composition of landscape architecture objects,
- phytopathological survey,
- basic biological survey (including presence of specially protected

[8] Pavel BORUSÍK, Jiří MARTINEK and Pavel ŠIMEK. Metodika hodnocení porostů dřevin pro potřeby památkové péče. Certifikovaná metodika. Lednice: Mendel University in Brno, 2020.

species and endangered species as per Red Books),
- growth biological value determination,
- growth valuation, etc.

3.6 Work list (tree list)

3.6.1 A work list (tree list), including a drawing annex, is an integral component of each assignment for proposed silvicultural interventions.

3.6.2 In the case of removal of a growth in the young growth development stage (see 3.4.9) or canopied shrub or climber growths, the listing of individual woody plants (number) can be replaced with a definition of the surface area of the felled area, specifying the shares of different taxa.

3.6.3 Marking of trees designed for felling can be done simultaneously with making the work list, ideally using two marks: one on the trunk at approximately the breast height and another on the trunk base (on the remaining stump).

3.6.4 The work list must contain the following information (see Annex 6):
- membership in a specific growth and growth group,
- taxon,
- number of trees in each thickness class (except 3.4.10),
- height of a thickness class representative,
- specification of collection method (see 3.6.5),
- specification of felling difficulty (see 3.6.6).

3.6.5 Felled tree wood is left in the growth or cleared using an appropriate **collection method**:
- manual,
- gravity-assisted,
- animal means – horse teams,
- machinery (slinging, e.g., using winches or cableways),
- without slinging (e.g., carried on a collection tractor or tractor and trailer),
- combined or other methods.

3.6.6 **Felling difficulty specification** (coefficient) takes into account:
- growth accessibility,
- ground shape and gradient[9],
- presence of obstacles (dense undergrowth, fencing, building structures, etc.).

Determined based on the following scale:

a – low difficulty
b – medium difficulty
c – high difficulty

3.6.7 The work list contents (see 3.6.4) can be regarded as valid (up-to-date) for no more than 2 years.

[9] **Ground gradient scale:** flat – up to 1:5, gentle slope 1:5-1:2, steep slope 1:2 – 1:1, extreme slope over 1:1).

4 Growth planting and regeneration

4.1 General principles

4.1.1 Growth planting proceeds based on a defined plan (project documentation as the case may be).

4.1.2 The method (technique) for growth planting/regeneration is selected based on an assessment of site and natural conditions and with respect to the character, manner and intensity of use of the site.

4.1.3 Deliberate spreading of introduced species and hybrids into the landscape is only possible with a permit from the nature protection authority (Section 5, Para. 4 and 5 of Act no. 114/1992 Coll.). Preference shall be given to woody plants with a planting stock certificate (Section 8 of Act no. 149/2003 Coll.).

4.1.4 Invasive taxa or taxa with a invasion potential for the given site must not be used in open landscape.

4.1.5 Sowing or planting artificially cultivated specially protected plant species outside cultures[10] and built-up areas of municipalities is only possible with approval of the nature protection authority (Section 54, Para. 3 of Act no. 114/1992 Coll.).

4.1.6 When selecting taxa for areas in peripheral sections of built-up areas (transition into open landscape) and nature-based areas, the species composition of natural growths and the overall character of the landscape have to be considered. It is advisable to use species corresponding to the natural woody plant composition in the region (including rarer species), as well as woody plant species traditionally used in the area. With a view to maintaining natural genetic variability, it is also advisable to use local (regional) planting stock sources and avoid using cultivars.

4.2 Growth planting and regeneration methods

4.2.1 Growth planting/regeneration typically makes use of various types of nursery plants and planting stock as per ČSN 464902 and ČSN 482115.

4.2.2 If the situation and site character allow, other/alternative establishment or regeneration methods can be used (woody cuttings, natural regeneration by seeding, sowing, root and stump shoots, wattling, etc.), including their combinations with planting (4.2.3).

4.2.3 **Woody plant growth establishment/regeneration by planting** can proceed in the orcharding (horticultural) or forestry way (technique) and their combinations (including with 4.2.2) depending on requirements on the growth function and character.

4.2.4 Planting of shrubs in the orcharding way proceeds in compliance with SPPK A02 003 Planting and pruning of shrubs.

4.2.5 Planting of trees in the orcharding way proceeds in compliance with SPPK

[10] The term “cultivated in cultures” refers to plants deliberately planted, purposely grown by people for utility or decoration and not left up to spontaneous development without human intervention or influence. These are notably plants grown in gardens, parks, fields and cemeteries (see MoE Newsletter no. 3/2000, Communication of Analysis Committee Secretariat on Interpretation of Legal Regulations Accepted by the Analysis Committee of the Minister of the Environment no. 9/2000).

A02 001 Planting of trees.

4.2.6 The forestry method of growth establishment/regeneration can proceed according to SPPK D02 005 Measures to improve forest stand structure or ČSN 482116 and ČSN 482117.

4.2.7 Establishment and regeneration of growths lining roads proceeds in compliance with SPPK A02 010 Care of woody plants along public transport infrastructure.

4.2.8 Establishment/regeneration of composed growths (particularly in garden architecture monuments) proceeds in compliance with the Methodology for Woody Plant Growth Silvicultural Measure Design for Heritage Management Purposes certified by the Ministry of Culture of the CR.[11]

[11] BORUSÍK, Pavel, Pavel BULÍŘ and Pavel ŠIMEK. *Metodika návrhu pěstebních opatření u porostů dřevin pro potřeby památkové péče.* Lednice: Mendel University in Brno, 2021. Nmets-Methodologies approved by applicable authority. Regulation no. 240. 8 March 2022.

5 Growth management

5.1 Finishing and development management

5.1.1 **Finishing management** proceeds after growth establishment until work handover and acceptance by the client. Finishing management includes all jobs necessary to achieve a condition of the established growth that will enable its further development in follow-up management.

5.1.2 Finishing management is followed by development management, serving achievement of functional condition of the growth; it gradually transitions into maintenance management.

5.1.3 Finishing and development management always complies with the respective establishment method (see Chapter 4) and the set silvicultural objective. It proceeds in accordance with applicable Nature and Landscape Management Standards[12] and ČSN 83 9021 and ČSN 83 9051.

5.2 Growth inspection and maintenance management

5.2.1 Maintenance management serves maintenance of functional growth condition; it is implemented using a system of silvicultural measures as per specified techniques (see Chapter 6).

5.2.2 The proposed silvicultural measures are based on a dendrological survey and on the silvicultural objective, and are specified for each size category separately.

5.2.4 Individuals recommended for removal are marked during development of the list of woody plants to be removed (3.6).

5.2.5 Silvicultural measures proposed specifically for shrub growths are specified in SPPK A02 003 Planting and pruning of shrubs.

5.2.6 When implementing silvicultural measures, it is always necessary to consider the ecological function of the growth on the site (biotope, short-term refugium, etc.). It is not always desirable to remove all damaged, dead woody plants and accumulated dead and decaying biomass. However, traffic safety has to be ensured, including implementation of a periodic inspection system.

5.2.7 Inspections of non-forest growths should be made in a mode analogous to inspections of individually assessed trees (see SPPK A01 001 Tree assessment). The contents and outcomes of inspections complies with the specific aspects of the approach to woody plant growths (see 3.2-3.4).

5.2.8 Management and regeneration of composed woody plant growths within landscape architecture objects always has to choose a technique for silvicultural interventions and measures so as not to fundamentally disrupt the desirable functions and relationships (see 6.10). In specific situations, it is possible to follow the Methodology for Woody Plant Growth Silvicultural Measure Design for Heritage Management Purposes certified by the Ministry

[12] SPPK A02 001 Planting of trees, SPPK A02 002 Pruning of trees, SPPK A02 003 Planting and pruning of shrubs and climbers, SPPK D02 005 Measures to improve forest stand structure.

of Culture of the CR.[9]

5.3 Growth felling

5.3.1 Felling within woody plant growths proceeds in compliance with SPPK A02 005 Tree felling.

5.3.2 Felling (techniques P-KK and P-KS) excludes removal or treatment of stumps.

5.3.3 Clearing of areas after felling proceeds in accordance with SPPK A02 005 Tree felling.

6 Techniques

The techniques of silvicultural measures (interventions) for woody plant growths are as follows:

Code	Technique
P-OP	Growth regeneration using root or stump shoots
P-RV	Deliberate pruning of trees
P-RB	Safety pruning of trees
P-RLPV	Local reduction to ensure free traffic clearance
P-PN	Thinning with negative selection
P-PP	Thinning with positive selection
P-RTZP	Pruning of hedges and tree walls
P-KK	Complete growth felling
P-KS	Felling of dead and seriously damaged woody plants
P-PK	Composition thinning
P-K	Pruning of shrubs

6.1 **Growth regeneration using root or stump shoots (P-OP)** is based on the ability of certain taxa to produce stump shoots (e.g., the genera *Carpinus, Alnus, Fraxinus, Quercus, Tilia*) or root shoots (e.g., *Populus alba, Populus tremula,* the genus *Ulmus*).

6.2 **Deliberate pruning of trees (P-RV)** proceeds according to SPPK A02 002 Pruning of trees, technique Deliberate pruning of trees (S-RV).

6.2.1 The mandatory parameter specified in a remark on the intervention is the number of trees on which the deliberate pruning is done (unless obvious from the growth characteristic).

6.3 **Safety pruning (P-RB)** is done **on trees** with increased value of the fall target and follows SPPK A02 002 Pruning of trees, technique Safety pruning (S-RB).

6.3.1 It is done on trees that are part of a group or growth and adjoin a place with increased value of the fall target (typically roads, parking areas, playgrounds, buildings, etc.).

6.3.2 The mandatory parameter specified in a remark on the intervention is the number of trees on which the intervention is done.

6.4 **Local reduction to ensure free traffic clearance (P-RLPV)** follows SPPK A02 002 Pruning of trees, technique Free crown clearance adjustment (S-RLPV).

6.4.1 It may alternatively involve complete increase to the traffic clearance of all trees in the growth or only individuals growing at the periphery facing the area requiring the free traffic clearance (typically roads, parking areas, etc.). The specification is noted in the remark on the intervention.

6.4.2 The mandatory parameter specified in a remark on the intervention is the number of trees on which the pruning is done (unless obvious from the growth characteristic).

6.5 **Thinning with negative selection (P-PN)** involves selective felling of trees in order to eliminate undesirable individuals from the growth.

6.5.1 Undesirable trees are removed primarily based on the following criteria:

- species composition (trees do not conform to required species composition),
- dead and significantly dying trees,
- trees significantly infested with pests and diseases,
- seriously damaged trees,
- trees with a deformed crown, alternatively with pressure forks developing in primary branching.

6.5.2 The intervention does not cause significant thinning of the growth. It must not result in the removal of more than:

- 20% of individuals in size category 4,
- 40% of individuals in other size categories.

Failing that, the intervention is growth felling or partial growth felling, and must follow 5.3.

6.6 **Thinning with positive selection (P-PP)** involves relieving target individuals within a group.

6.6.1 The intervention removes trees that compete with or otherwise inappropriately affect target individuals.

6.6.2 The intervention does not cause significant thinning of the growth. It must not result in the removal of more than:

- 30% of individuals in size category 4,
- 50% of individuals in other size categories.

Failing that, the intervention is growth felling or partial growth felling, and must follow 5.3.

6.7 **Pruning of hedges and tree walls (P-RTZP)** follows SPPK A02 002 Pruning of trees, technique Pruning of hedges and tree walls (S-RTZP).

6.8 **Complete growth felling (P-KK)** involves complete removal of all woody plants in the growth or group (see 5.3).

6.9 **Felling of dead and seriously damaged woody plants (P-KS)** involves selective removal of dead, significantly dying and fundamentally damaged woody plants from the growth. It is proposed particularly in order to improve traffic safety.

6.10 **Composition thinning (P-PK)** is a specific version of thinning that is implemented in garden and landscape architecture objects. It is aimed at achieving a composition plan in growths.

6.10.1 It involves a combination of positive and negative selection.

6.10.2 Positive selection removes trees that compete with or otherwise inappropriately affect target individuals. Besides, it involves removal of trees in direct contradiction of the composition plan.

6.10.3 Negative selection removes trees primarily in terms of health (trees with significant mechanical damage, dead, dying, infested with pests, etc.), taxonomically inappropriate trees, and trees inappropriately thickening the growth structure.

6.11. **Pruning of shrubs (P-K)** proceeds using techniques specified in SPPK A02 003 Planting and pruning of shrubs. The intensity and choice of measures is based on the silvicultural condition of the shrubs with respect to the growth

situation.

Annex 1 Growth silvicultural condition – description of levels

Classification level		Silvicultural condition description
1	Absolutely satisfactory	Silvicultural condition is suitable, fully usable. The set of individuals comprising the internal structure of the growth is fully silviculturally usable in the context of performing, stabilization or development of the function of the growth within which the growth group is defined.
2	Satisfactory	Silvicultural condition is disrupted, but conditionally usable. A subgroup of individuals is in a worse silvicultural condition in contravention of the function of the growth within which the growth group is defined. The internal structure of the growth is disrupted or endangered, but the situation can still be stabilized or improved by implementing a set of silvicultural measures.
3	Unsatisfactory	Silvicultural condition is inappropriate, unusable. A significant part of individuals is in a worse silvicultural condition in contravention of the function of the growth within which the growth group is defined (meaning the individuals are silviculturally unusable). The internal structure of the growth is irreversibly endangered. The situation can be stabilized temporarily at best, by means other than direct regeneration or reconstruction.

Annex 2 Description of woody plant growth development stages

Development stage	Specification	Description
Young growth	Culture	The youngest growth age level (relates mostly to forest-type growths in dense plantings or sowings) from artificial establishment to crown canopy formation. The species composition and planting distances derive from the species composition and quantity of planting stock used. This age level comprises an unsecured growth.
	self-seeding	The youngest growth stage, from germination of seeds shed by a parent growth to crown canopy formation. The species composition and planting distances derive from the species composition of the parent growth and the quantity of seedlings. This age level comprises an unsecured growth.
	self-growth	Secured canopied growth formed from self-seeding at the stage of beginning spatial differentiation of the crown layer.
	thicket	Secured growth formed from a culture or self-growth during formation of canopy from individuals' crowns, accompanied by beginning spatial differentiation of the crown layer. Individual young trees' crowns are already grown together but still deeply branched. Dynamic dying of individual trees occurs.
	young pole wood	Age level following from thicket stage, characterized by significant competition pressure in the crown level along with differentiation of young trees' trunks and crowns. Trunk thickness 1 m above ground is below 7 cm. Lower parts of crowns die off, branches fall off and individual trees die dynamically.

Development stage	Specification	Description
Middle-aged growth	pole wood	Growth age level following from young pole wood. This stage is characterized by dynamic height increments, whereby trees' trunks grow longer and thicker. Trunk thickness 1 m above ground is 7-13 cm. Lower parts of crowns comprise dead branches. The growth appears uniform, characterized by low spatial differentiation.
	beginning trunk wood	Growth age level following from pole wood, characterized by continuing dynamic height increments, whereby the bottom of the living crown rises significantly. This age level involves continued significant height and spatial differentiation, whereby stories form naturally within the growth (overstorey, main storey and understorey can be distinguished). Most of the trunks have diameter at breast height up to 25 cm (i.e., trunk circumference up to 80 cm at 1 m above ground).
Adolescent and adult growth	trunk wood	This age level involves a significant deceleration of the height increments, but thickness increments continue. The bottom height of the living crown is stabilized for trees in the main storey and overstorey. Continuing differentiation (disproportion) between the growth storeys, along with increasing spatial differences.
Senescent growth		This age level involves a complete inhibition of height increase and significant deceleration of thickness increase. Tree crowns become thinner naturally and individual trees die spontaneously. This process leads to gradual thinning of the growth, followed by its disintegration.
Age and spatially differentiated growth		Growth with significant growth differentiation, stratification and presence of multiple development stages, including growths of high biological value (senescent).

Annex 3 Growth outlook – description of stages

a - long-term outlook
Growth suitable to its site and sustainable for decades.

b - short-term outlook (temporary outlook)
Growth temporarily sustainable on its site or in a condition where long-term outlook cannot be expected.

c - no outlook
Growth inappropriate on its site or with very short expected period of retention.

Annex 4 Determination of woody plant growth dendrological potential

Dendrological potential is evaluated using a three-point classification scale according to the table below.

Classification level		Description of dendrological potential
1	**High**	**Growths of high compositional value** located in the spatial arrangement structure matching the target functions – growths of mid-term to long-term stability, in good health condition with a dominant share of species composition appropriate to the site. The maximum permissible share of trees not meeting these criteria is such that it does not reach a threshold above which the required internal structure of the growth would be disrupted.
2	**Medium**	**Growths of high to medium compositional value with disrupted spatial arrangement structure**, permitting only temporary performance of the target functions – growths of mid-term to short-term stability, in a health condition that permits extending its stability by implementing stabilization silvicultural measures; a necessary precondition is that the tree inventory contains enough individuals in silviculturally fully usable condition with a dominant share of adequate species composition. The growth contains such a share of trees in a worse condition that is causing disruption to the internal spatial structure of the growth. The maximum permissible share of such trees is such that it does not reach a threshold above which the essential existence of the growth is endangered.
3	**Low**	**Growths of medium to low compositional value with disrupted spatial arrangement structure**, not permitting even temporary performance of the target functions – growths in early stages of disintegration or already disintegrated, in a health condition not permitting even temporary stabilization by implementing silvicultural measures and has to be regenerated; if the tree inventory contains a share of individuals in a silviculturally usable condition with a dominant share of species composition appropriate to the site, such individuals can be used in the growth regeneration process. The growth contains such a share of trees in a worse condition that is causing disintegration to the internal spatial structure of the growth. The share of such trees exceeds the threshold above which the essential existence of the growth is endangered.

Annex 5 Example growth dendrological survey tables, including proposal for silvicultural measures

For growth group types A (trees) and B (trees and shrubs and/or climbers):

Base site name:														
growth number	growth group	area (m^2)	growth developmental stage	presence of levels (only for developmental stage 4)	taxon	presence (pcs/%)	size category	individuals per area		prospect	cultivation measures			remark
											technique	urgency	repetition	
							1a		pc					
							1b		m^2					
							2		pc					
							3		pc					
							4		pc					
							1a		pc					
							1b		m^2					
							2		pc					
							3		pc					
							4		pc					
							1a		pc					
							1b		m^2					
							2		pc					
							3		pc					
							4		pc					

For growth group type C (shrubs and/or climbers):

Base site name:												
growth number	growth group	area (m^2)	coverage (%)	size category	share in shrub area (%)	taxon	presence (%)	growth condition	cultivation measures			remark
									technique	urgency	repetition	
				1								
				2								
				3								
				1								
				2								
				3								

Annex 6 Example table with list of woody plants to be removed

Base site name:									
growth number	growth group	taxon	thickness class	individuals per area		thickness class representative height	biomass volume calculation (m^3)	collection method	felling difficulty
			area		m^2				
			0-10		pcs				
			11-20		pcs				
			21-30		pcs				
			31-40		pcs				
			41-50		pcs				
			51-60		pcs				
			61-70		pcs				
			71-80		pcs				
			81-90		pcs				
			area		m^2				
			0-10		pcs				
			11-20		pcs				
			21-30		pcs				
			31-40		pcs				
			41-50		pcs				
			51-60		pcs				
			61-70		pcs				
			71-80		pcs				
			81-90		pcs				
			area		m^2				
			0-10		pcs				
			11-20		pcs				
			21-30		pcs				
			31-40		pcs				
			41-50		pcs				
			51-60		pcs				
			61-70		pcs				
			71-80		pcs				
			81-90		pcs				

Annex 7 List of Nature and Landscape Management Standards (Arborist Standards) developed

01 Inspection, assessment, planning

01 001	Tree assessment
01 002	Protection of woody plants during development activities

02 Work procedures

02 001	Planting of trees
02 002	Pruning of trees
02 003	Planting and pruning of shrubs
02 004	Crown security systems (cabling / bracing)
02 005	Tree felling
02 006	Protection of trees against lightning strike
02 007	Alteration of tree and shrub habitats
02 008	Planting and management of woody plant growths
02 009	Special tree treatment
02 010	Care of woody plants along public transport infrastructures
02 011	Care of woody plants along utility lines

SPPK A02 008
aopk.gov.cz/platne-standardy
2023