

S1165 A4

Landscaping and vegetation

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1 Purpose

The purpose of this standard is to define the requirements for landscape management and vegetation control in the off-track area.

2 Scope

- 2.1 This standard applies to operational land that is part of the off-track system that is the responsibility of the LU Head of Track Engineering. The requirements for the access are defined in [S1157](#).
- 2.2 This standard defines the requirements for the management of these areas in respect of landscape design and vegetation control.

3 Requirements

3.1 General

- 3.1.1 Land within the LU operational boundary shall be managed such that a stable track environment is sustained and the erosion and slippage of adjacent land is prevented. Line-specific plans for management of vegetation shall be prepared and progress against them monitored and reported.
- 3.1.2 Landscape and vegetation management shall be designed and proactively managed to protect the safe operation of the railway, and to ensure compliance with legal and other obligations, e.g. Mayoral and TfL Management System. This will include consultation and collaboration with other departments as necessary, particularly the Professional Head for Earth Structures and the Network Operations and Resilience Team, which is responsible for the Network Strategy for Adhesion Management.
- 3.1.3 The design and ongoing management of landscape and vegetation shall provide, as far as reasonably practicable:
- clear lines of sight to signals;
 - stability and drainage of embankments and cutting slopes, and minimisation of ground settlement/ heave as a result of seasonal water demand from vegetation;
 - minimisation of damage to structures and maintenance of effective drainage systems^{*};
 - minimisation of leaf fall onto the track[⊗];
 - minimisation of the risk of tree fall;
 - ability to carry out visual inspection of condition of cuttings and embankments as required by S1054;
 - minimisation of future maintenance;
 - resilience of the track environment during periods of adverse weather or natural effects, e.g. snow, high winds, excessive rainfall, summer branch drop;
 - fire breaks, commensurate with fire risk^f;
 - clearances for Railway operational uses, (including presence of lighting, any requirement for CCTV sight lines etc.);

- access routes, including walkways within 1m of fencelines and cable runs;
- protection of services or utility runs;
- a 1.5m-wide strip around bridges and other civil structures, including drainage assets, kept clear of trees and shrubs, and prevention of encroachment on fence lines and infrastructure, particularly cable runs;
- minimisation of the potential hazards to health and safety associated with the use of chemical weed killers;
- protection, stabilisation and enhancement of habitats;
- prevention of non-native and invasive species, including vegetation pests and diseases, implementation of robust bio-security processes, and ensure that trees are not from the list provided in Appendix 3 which are unsuitable for planting or retention on operational railway land;
- biodiversity and preference for locally-sourced native species, reflecting the local flora;
- safe conditions for, and ease of landscaping maintenance;
- minimisation of the detrimental effects of vegetation on neighbouring properties and infrastructure, e.g. subsidence, encroachment of foliage onto overhead cables and other railways, e.g. Network Rail [#];
- an acoustic and visual barrier for passengers and LU's neighbours;
- any pre-existing or other commitment for screening;
- LU corporate requirements for the environmental management of railway land;
- Support for preservation of trees of historical, cultural or ecological significance.

* Note: Guidance regarding minimum distances for planting, from structures and drainage systems, to avoid damage from future growth, is given in BS 5837.

⊗ Note: Reference should be made to S1189 Variable Adhesion Conditions - Requirements for the Implementation of ATO on any Open Section of the LU Network and the associated Guidance document G0189 Adhesion Management for Open Sections of the LU Network.

^f Note: Fire risk from grass and tree fires from both on-track sources and off-track sources, e.g. countryside and urban parks, must be considered.

[#] Note: Any work in the vicinity of Network Rail overhead line equipment must be carried out in conjunction with Network Rail, to ensure the safety of staff.

The management of landscaping and vegetation shall ensure that vegetation profiles comply with the envelopes shown in Attachment 2, and control the spread of invasive and hazardous species as mandated by legislation, (see Schedule 9 of the Wildlife & Countryside Act), e.g. Japanese Knotweed.

In addition to the above, the design of landscaping and vegetation shall consider the existing physical and environmental characteristics of the site, and the characteristics of neighbouring land uses.

3.2 Design

- 3.2.1 Landscaping schemes shall be designed to minimise future maintenance and detrimental effects on LU infrastructure, unless there is a need to satisfy specific requirements of the local environment. In particular they shall take account of the requirements in 3.1.3.
- 3.2.2 Top soiling, seeding, tree and shrub planting shall conform to the Department for Transport (DfT) specification for Highway Works Series 600 and 3000. Reference should be made to BS 4428 for guidance.
- 3.2.3 For the purposes of this standard, the ground between the track and the fence line shall be considered as comprising the zones shown in Attachments 1 and 2, which also specify where generic types of planting are permitted, with preferred species. Within each zone where trees are permitted, selection shall take account of:
- the tree's water-demand: this is a measure of the uptake of water from the soil into the tree;
 - the soil's shrink-swell potential: this is a measure of the soil's behaviour as its moisture level changes, in terms particularly of the effect on its volume and hence, potentially, on track geometry retention and earth structure stability;
 - minimisation of leaf fall onto the track.
- 3.2.4 Requirements for design and new planting are not universally and retrospectively applied to existing vegetation due to the need to maintain the stability of clay soils and the need to consider the established ecology on a whole-system/case by case/location by location basis.
- 3.2.5 No planting of trees or shrubs is permitted within 1.5m of civil engineering structures, including drainage assets. Attachment 2 shows that no planting is permitted within 1m of the cable run and only grasses and herbs are permitted within 1m of the fence line. Subject to the overriding requirements of Section 10.5 Attachment 2, the minimum planting distance of any tree from the nearest running rail shall be related to the tree's height at maturity, as follows:

Tree water demand	Soil shrink-swell potential	Minimum horizontal distance of tree trunk from nearest running rail as a factor of mature tree height	
		at grade	cutting or embankment
low	low	0.20	0.20
	medium	0.40	0.40
	high	0.50	0.50
medium	low	0.55	Do not plant
	medium	0.65	
	high	0.75	
high	low	1.05	
	medium	1.20	
	high	1.25	

- 3.2.6 Specialist professional advice shall be sought regarding the soil's shrink-swell potential. Attachment 3 gives water-demand and mature heights for a selection of trees; specialist advice shall be sought from an Arborist in respect of selection of species and the use of other species.
- 3.2.7 Site investigations shall be undertaken prior to the preparation of the design scheme in conformity with BS 4428. The investigations shall include, where appropriate, consultations with neighbours, the local authority and local conservation and amenity groups.
- 3.2.8 The following aspects of landscaping design shall conform to the Civil Engineer (LU)'s standards as shown:
- a) earth structure design and slope stabilisation: S1054, G0054A, G0054B and T0007;
 - b) drainage design and maintenance: S1052 and G0052.

3.3 Management and control of vegetation

3.3.1 Objectives

Vegetation shall be managed in accordance with the requirements in 3.1.3.

3.3.2 Inspection

- 3.3.2.1 Inspection of lineside vegetation in the course of track patrolling and off-track inspections shall conform to the requirements of S1158.

Note: Off-track inspections as defined in S1158 do not include assessment of the vegetation profile.

- 3.3.2.2 Inspections shall be undertaken by a person trained, qualified or demonstrably experienced to undertake the works and who has been trained to understand the inter-relationship of the landscape, trees and vegetation to the operational railway, particularly with regard to risk of leaf fall. The inspections shall be carried out in accordance with a defined process. A Vegetation Inspection shall include identification of dead, dying, diseased and/or unstable trees which are a potential hazard to safe operation of the railway, and those trees which have a propensity for leaf fall onto track which would affect adhesion. Trees which are potentially hazardous shall be evaluated by an Arborist.
- 3.3.2.3 The findings of Vegetation Inspections shall be recorded on the form shown in Attachment 4, or similar form carrying no less information. The findings shall be used to develop Maintenance programmes to control risk to the operational railway, in particular leaf-fall.
- 3.3.2.4 Additional inspections shall be carried out in response to reports from LU, Contractor's personnel, or third parties as soon as is reasonably practicable in accordance with the reported risk to the safe operation of the railway.
- 3.3.2.5 Photographs shall be taken during inspections to aid subsequent identification of locations, features or defects. Photographs should be archived to form a visual record of the changes in vegetation, as required by 3.3.6.

3.3.2.6 An assessment of the profile of the lineside vegetation against the standard vegetation envelopes shown in Attachment 2 shall be carried out at intervals not exceeding 5 years.

3.3.3 Maintenance

3.3.3.1 Maintenance activities shall be carried out in accordance with a management regime which;

- a) identifies risks to the safe operation of the railway, particularly with regard to signal sighting, stability of earth structures and minimisation of leaf fall onto the operational railway;
- b) achieves the objectives in 3.1.3 above;
- c) complies with the Line specific plan,
- d) promotes plant health by appropriate and proactive maintenance rather than reactive works;
- e) provides for the long-term removal of non-preferred species;
- f) complies with the requirements of the Wildlife and Countryside Act 1981, in particular Part 1: Wildlife, regarding the protection of birds during nesting season;
- g) complies with the Town and Country Planning Acts and Regulations in respect of Tree Preservation Orders (TPOs).

3.3.3.2 Conditions identified in the course of inspections which present a risk of encroachment of the vegetation envelope, loss of slope stability, loss of signal or signage sighting or vegetation-induced seasonal track movements shall be rectified as soon as practicable. Conditions identified which present a risk of leaf fall on the track shall be rectified before the leaf fall season.

3.3.3.3 The tree canopy shall be controlled such that it does not extend over the track. Deciduous trees shall be controlled such that their height does not exceed the distance from the trunk to the nearest rail minus two metres, multiplied by two. This can be expressed as:

Maximum height = 2 x (distance from tree to nearest rail in metres – 2 metres)

3.3.3.4 In order to minimise leaf fall and achieve compliance with the vegetation envelopes in Attachment 2, Maintenance activities shall include but not be limited to;

- a) felling and stump killing, where trees fulfil the conditions for work;
- b) pollarding, pruning, reshaping, crown reduction or other tree surgery;
- c) removal of non-preferred species, and saplings and small trees up to 8 metres in height.

Where felling is required, trees highlighted red and yellow on the list in Attachment 3 shall be prioritised. At locations where the risk of leaf fall onto the track is high and the above measures cannot be applied, other measures shall be implemented, e.g. installation of netting along the back of cable runs, or the planting of low growing bushes such as gorse to act as leaf traps.

Note: An uneven age-range of trees is beneficial to the requirements of the railway and biodiversity.

Note: Where work needs to be carried out on a tree with a TPO, the following shall be considered:-

Permission to carry out work on a TPO tree needs to be applied for around eight weeks in advance to the Local Planning Authority (LPA) for all work; TPOs can prevent the felling, lopping, topping, uprooting or otherwise wilful damaging of trees, although different TPOs have different degrees of protection;

Where the tree is dead, dying, or a health and safety risk and pruning is considered urgent, then permission should be sought a minimum of five days in advance;

Exceptions can be made to the need for permission in the case of emergency, but where practicable the LPA should be informed at least five days in advance and their agreement obtained in writing;

Assessment by an Arborist may aid the TPO-related application.

3.3.3.5 Removal of trees may need to be carried out progressively or in phases to ensure stability of earth structures. Trees referenced in Appendix 3 which are unsuitable for planting or retention on operational railway land should be subject to a phased ten-year removal plan. Where felling of more than 33% of trees would be required to comply with the vegetation envelopes this work shall not be implemented until The Professional Head for Earth Structures has been consulted. Where necessary, a risk-based felling program shall be implemented spread over a number of seasons to minimise the effect on earth structures. In deciding which trees to remove at a particular location, consideration shall be given to:

- a) the effect of the prevailing wind direction, (generally south-westerly in London), on the area likely to be affected by leaf fall;
- b) the effect on the stability and subsequent exposure of surrounding trees.

3.3.3.6 Unless a tree is unstable or causing slope instability, any proposals for its removal shall be based on the following factors, according to its location:

- a) trees within the cess and the cess strip shall be removed;
- b) cutting slopes beyond the cess strip: trees may be removed subject to an assessment of the affect of removal on slope stability;
- c) embankments and at-grade locations beyond the cess strip:
 - I. trees with low and moderate water-demand should not be removed;
 - II. trees with high water-demand should not be removed if the soil has a low shrink-swell potential;
 - III. trees with high water-demand should not be removed if the soil has a moderate or high shrink-swell potential, unless exceeding the height limit defined in clause 3.3.3.3 above..

Note: Guidance on minimizing vegetation-induced seasonal shrink-swell movement affecting the performance of the track and civil engineering assets is included in G0058.

- 3.3.3.7 Any tree on land within the LU operational boundary which is identified as potentially hazardous shall be removed as soon as is reasonably practicable in accordance with the risk to the safe operation of the railway. Where such trees are on neighbouring land, action shall be taken to notify the landowner and agree the necessary measures to eliminate the risk to LU assets and service.
- 3.3.3.8 When a tree is removed it should be felled to ground level and the roots treated with a suitable control agent that will permanently prevent regrowth. Where a killed stump is left in place the location shall be recorded and advised to the Professional Head for Earth Structures. Consideration should be given to removing the tree stump where this can be done safely, in particular where the stump could pose a risk to the operational railway. The area should be replanted in order to maintain cover and slope stability, in accordance with the vegetation envelopes shown in Attachment 2.
- 3.3.3.9 Where mechanical flails or mulchers are used to clear or maintain vegetation, all broken branches/woody stumps over 50mm in diameter and above ground level shall be tidied by saw in accordance with BS3998:2010.

3.3.4 Vegetation waste

Vegetation waste shall be disposed, of in order of preference, where fire risk and other restricting factors allow, by either:

- a) on-site disposal by the creation of habitat piles;
- b) wood-chipping, provided that the chips are dispersed and do not exceed 50mm in depth, and do not have a detrimental effect on the local ecology
- c) removal from site following the requirements of legislation;
- b) an on-site method recognising environmental, nuisance to neighbours, operational and safety constraints.

3.3.5 Chemical weed and tree control

Note: The application of herbicides to control grasses and other ruderal plants can be the most effective and economical method in certain areas. A risk assessment must be completed and method statement developed demonstrating adherence to legislation and legal guidance on the application of herbicides.

- 3.3.5.1 Weed killers shall have no adverse effect on the integrity or use of LU's assets. They shall be selected from EU/UK approved product register and be designed and selected for the specific requirement.
- 3.3.5.2 The use of weedkillers shall have no long-term adverse effects on the environment and shall have the capability to eradicate non-preferred vegetation whilst promoting preferred species.
- 3.3.5.3 The application of total translocated herbicides with residual effects shall be undertaken in accordance with the manufacturer's recommendations to achieve

maximum efficacy. Overspraying herbicides onto neighbouring land and other property shall be avoided. If there is a risk of this occurring then spraying shall be suspended.

3.3.5.4 Control of weeds in and around the following areas shall be via chemical weed control:

- a) cess areas, 4 feet, 6 feet and 10 feet and all areas within station grounds and depots;
- b) in and around cable runs, cable bridges, pipe runs, frames and structures, paved areas, walkways, logistics areas and other industrial non plant bearing areas;
- c) adjacent to built structures e.g. bridges, pile walls, signal and communication rooms;
- d) fences where the background is safe e.g. buildings, roads and pavements.

3.3.6 Plans and records

3.3.6.1 Line-specific plans for management and control of vegetation shall extend over a ten-year timeframe. The plan shall be reviewed and updated:

- a) Annually to confirm progress and identify shortfalls of work against plan, and;
- b) Every 5 years to provide long-term direction for management and control of vegetation.

Survey information shall be collected and maintained in manner compatible with all asset data management systems used, including GIS.

Attachment 5 gives a list of headings which the Line-specific plan shall cover. Annual plans shall be submitted to The Professional Head for Earth Structures.

3.3.6.2 Records of inspection and maintenance of lineside vegetation shall be retained for a minimum period of at least the greater of:

- a) 6 years;
- b) twice the interval between vegetation profile assessments (see clause 3.3.2.2).

4 Responsibilities

4.1 The Professional Head of Track Engineering is responsible for the technical content of this standard.

5 Supporting information

5.1 Safety considerations

The following safety aspects are relevant to the management and control of vegetation:

5.1.1 Risks to train service

- a) uncontrolled vegetation obstructing sight lines to signals, or vegetation detritus or overgrowth impairing the safe operation of the signalling system; these

- conditions will severely hamper the safe operation of trains and may lead to service disruption, injury to persons, collision, derailment and loss of assets;
- b) inadequate design or maintenance of landscaping may result in vegetation growth that is unsuitable for the site, causing, for example, leaf-fall problems leading to:-
- low rail adhesion with attendant risk of extended emergency braking distances, possibly leading to collision or derailment;
 - station overruns;
 - increased risk of wheel damage;
 - service delays;
 - trains being unavailable for service;
 - potential severe reduction in service that can be operated;
 - reputational and political repercussions;
 - potential refusal to operate the trains on the grounds of safety
- c) uncontrolled removal of vegetation having adverse effects on slope stability, leading to a slope failure and consequent risk of derailment;
- d) the roots of trees growing close to the track may weaken or damage its structure, and also cause damage to track drainage;
- e) adverse impacts on the operational railway from summer branch drop or wind throw from storm damage;
- f) vegetation on the line, including unstable trees on adjacent properties collapsing onto the line, causing operational problems, possibly leading to derailment from track instability, injury to persons and loss of assets;
- g) the potential for fire from dried vegetation, leading to disruption of services and damage to assets, (with potential sources of ignition from either railway activities or third party properties).

5.1.2 Risks to staff

- a) uncontrolled vegetation obscuring the view of staff working on the railway;
- b) vegetation such as brambles growing into or on the cess, walking routes or paths, and causing a tripping hazard that may result in persons falling on, or near to, the conductor rail;
- c) risk of slipping on unsurfaced temporary walkways or paths due to moss/algae growth, (particularly in shaded areas);
- d) the risks associated with storing, handling, applying and disposing of chemicals;
- e) the risks associated with the use of sharp implements and mechanical cutting tools such as chainsaws;
- f) the risks associated with pruning or removing trees and the danger of falling trees to LU or adjacent property;
- g) the risks from exposure to noise and hand-arm vibration syndrome, (HAVS), when using mechanical tools for an extended period;
- h) the risks in working adjacent to live conductors, in particular LU conductor rails and Network Rail overhead line equipment;
- i) training needs shall be assessed to ensure that personnel undertaking work receive appropriate training, instruction, information and equipment.

5.1.3 Risks to lineside security or to neighbouring properties

- a) inappropriate planting or trees whose size, location or branches may assist unauthorised entry and trespass on to the track, leading to asset damage and loss of service;
- b) trees which may adversely affect neighbouring properties or infrastructure, e.g. by damage from root spread or posing a risk of collapse, or by branches and foliage encroaching onto other railways.

5.2 Environmental considerations

The following environmental aspects are relevant to the management and control of vegetation:

- a) the lack of appropriate screening along operational boundaries may contribute to complaints about noise pollution during traffic hours and both noise and light pollution during engineering hours;
- b) lack of adequate warning about vegetation works to stakeholders may contribute to complaints;
- c) in instances of extreme weather – e.g. high temperatures and rainfall - well maintained vegetation, provides shading and hence cooling for assets and improves water attenuation rates thereby reducing flood risk;
- d) following best practice guidance on the use of weedkillers will prevent inappropriate use causing damage to vegetation, habitats or water courses, and avoid complaints;

- e) following ecology guidance on Working at TFL will prevent adverse impacts on certain habitats or species through working at inappropriate times of the year, and breaches of legislation and consequential delays to work;
- f) the risks associated with emerging non-native invasive species, pest and disease and their impacts on assets and their maintenance regimes; and
- g) changes to herbicides and pesticides available on the market for vegetation and pest control may impact on maintenance regimes.

6 Person accountable for the document

Name	Job title
[REDACTED]	Head of Track Engineering

7 Definitions

Term	Definition	Source
Off-track system	All assets that are the responsibility of the LU Head of Track Engineering which are situated in that part of the permanent way that lies between a notional line 2m from any rail and the operational boundary of the railway, including operational boundary fencing.	Glossary

8 Abbreviations

Abbreviation	Definition
DfT	Department for Transport
LU	London Underground

9 Document history

Issue no.	Date	Changes	Author
A1	Oct 2007	Renumbered from 2-01302-430	[REDACTED]
A2	April 2010	Addition of guidance for planting taking account of trees' water demand and soils' shrink-swell characteristics. Other minor amendments. DRACCT ref 01279.	[REDACTED]
A3	August 2016	Incorporation of Written Notices 01184 and 01190. Addition of action for unstable trees on neighbouring land, and other minor changes to clarify standard. Renumbered from 1-165. DRACCT ref 04523.	[REDACTED]
A4	July 2017	Increased requirements related to control of leaf fall, and to emphasise the need to proactively control the vegetation envelope in response to the initial findings of the FIR 'Piccadilly Line service disruption due to flatted wheels 2016'. DRACCT ref 05469.	[REDACTED]

10 References

10.1 British Standards

Document no.	Title or URL
BS 4428	1989 Code of Practice for general landscape operations (excluding hard surfaces)
BS 5837	Trees in relation to construction. Recommendations

10.2 LU company documents

Document no.	Title or URL
S1052	Civil Engineering – Gravity Drainage Systems
S1054	Civil Engineering – Earth Structures
S1157	Track - Performance, Design and Configuration
S1158	Track - Inspection and Maintenance
S1622	Glossary of terms and abbreviations
S1189	Variable Adhesion Conditions - Requirements for the Implementation of ATO on any Open Section of the LU Network
T0007	Earth Structures Materials and Workmanship
G0052	Civil Engineering – Gravity Drainage Systems
G0054A	Civil Engineering – Earth Structures
G0054B	Earth Structures – Guide for Slope Stability Analysis
G0058	Civil Engineering – Technical Advice Notes
G0189	Adhesion Management for Open Sections of the LU Network
TE-HBS-0005	Track Handbook 5 – Managing the track environment
St37	CAD Standard

10.3 Other

Document no.	Title or URL
Building near trees, Chapter 4.2	National House Building handbook
DfT, Series 600 clauses	Manual of contract documents for highway works Vol. 1 Specification for highway works
N/A	Mayor's Transport Strategy
NR/L2/TRK/5201	Network Rail standard – Management of lineside vegetation
N/A	Working at TfL - Managing environmental impacts when working
N/A	LU Biodiversity Action Plan

11 Attachments

11.1 Attachment 1: Planting zones, vegetation types and species

Zone	3	4	5
Area	Cess strip	Inner verge	Outer verge
Width	1 – 2m	5m	varies
At grade (Fig 1)	Native grasses and wildflowers	Native grasses and wildflowers, shrubs and mixed small trees Preferred species: Blackthorn, Dogwood, Guelder Rose, Hawthorn, Hazel, Holly, Spindle, Wild Service, Yew	Native grasses and wildflowers, shrubs, medium and large trees Preferred species: Alder, Birch, Crab Apple, Bird Cherry, Wild Cherry, Holly, Field Maple, Common Oak, Rowan, Whitebeam, Yew
Cutting (Fig 2)			
Embankment (Fig 3)	Nil	Non-preferred species: Ash, Aspen, Beech, Hornbeam, Horse and Sweet Chestnut, Lime, Poplar, Sycamore	
Notes: <ol style="list-style-type: none"> In this table, species are shown as “preferred” and “non-preferred” on the basis of their ongoing maintenance requirements. Preferred species are those that are easier to maintain and pose less risk to the operational railway by being slower growing and growing less high (so posing less risk of falling onto the track), while providing additional biodiversity benefits when, compared with the non-preferred species. The planting of certain species is prohibited under Schedule 9 of the Wildlife & Countryside Act, to which reference should be made for the current prohibitions. As shown on Figures 1, 2 and 3: <ul style="list-style-type: none"> Zones 1 (Track) and 2 (Cess) are to have no planting; In Zone 6 (Fence strip) the metre width adjacent to the fence is to have no planting and the remainder is to have only grasses and wildflowers mix. 			

11.2 Attachment 2: Vegetation envelopes

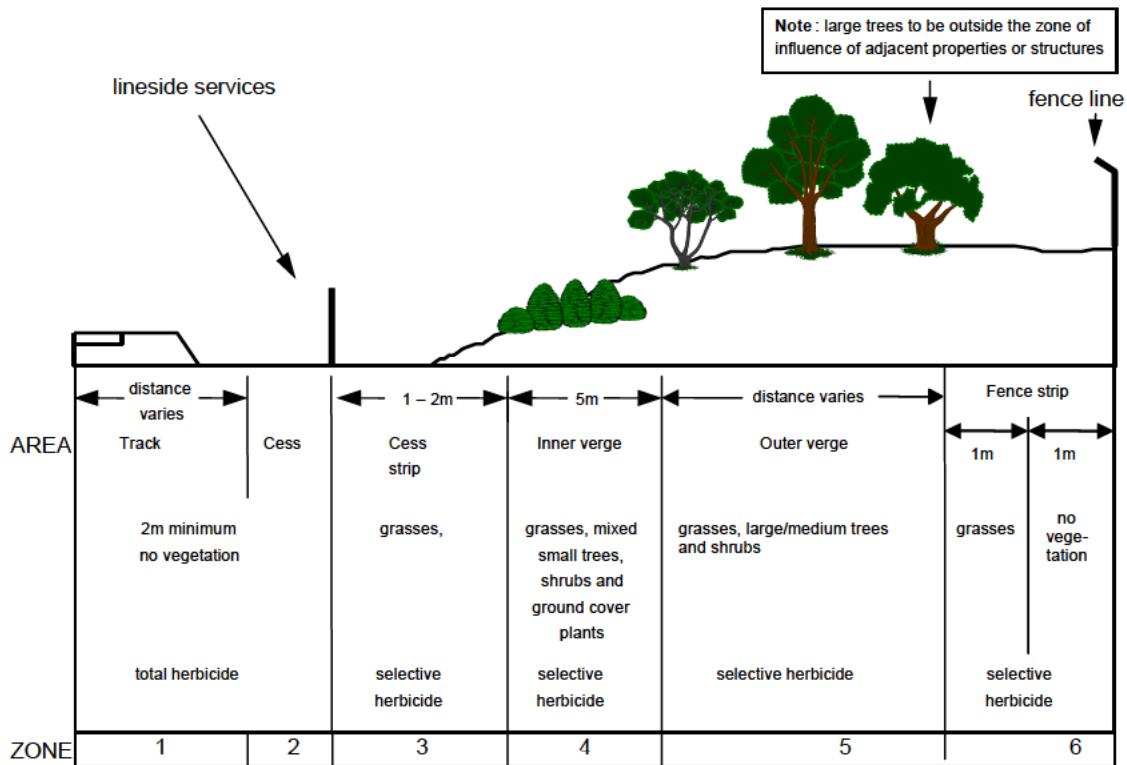


Figure 1 - Land at grade between track and operational boundary

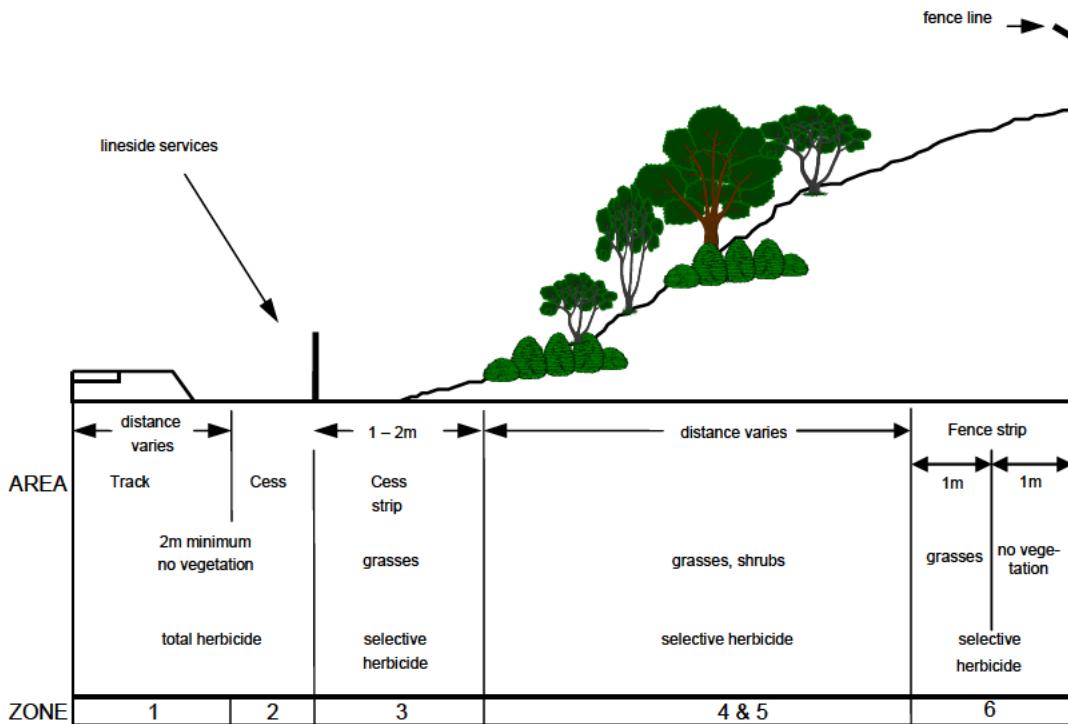


Figure 2 - Land in cutting between track and operational boundary fence

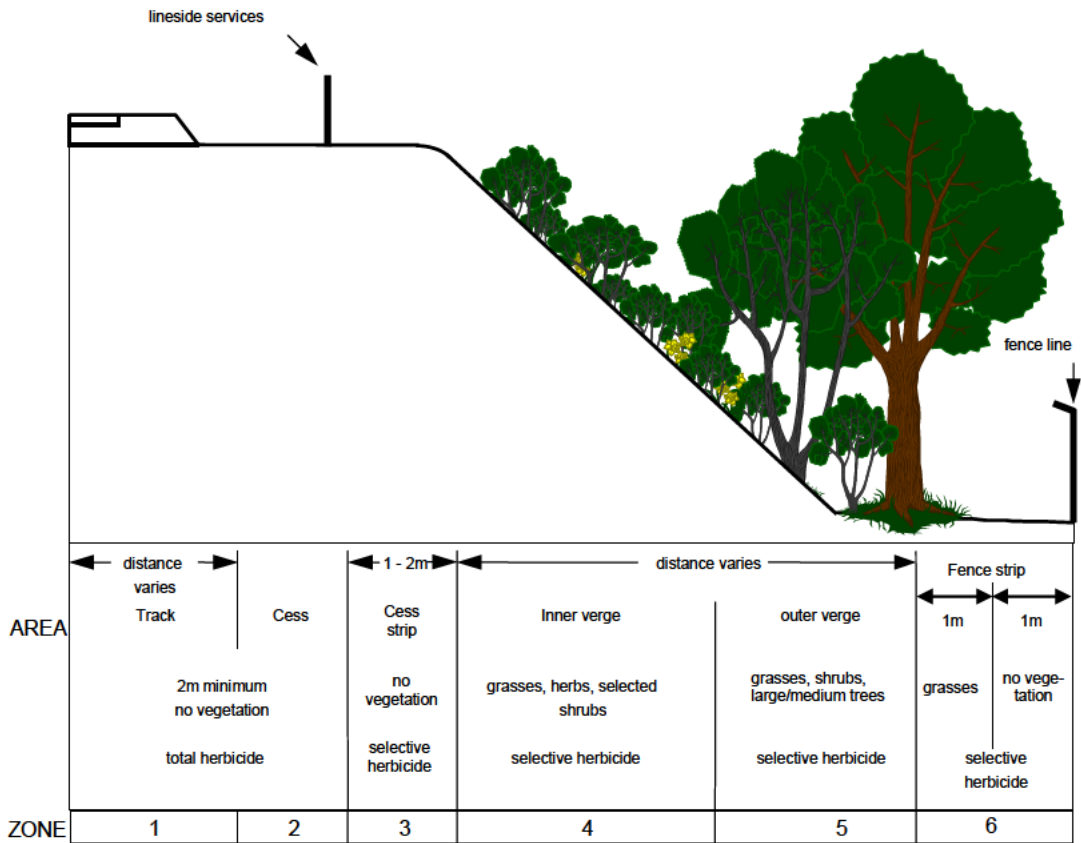


Figure 3 - Steep land adjacent to and on slopes of embankments

11.3 Attachment 3: Tree water-demand and mature heights

This table gives details for trees which may be found on LU land. When selecting species for new planting, Attachment 1 must be consulted.

Trees highlighted **red** below are unsuitable for planting or retention on operational railway land and should be subject to a phased ten-year removal plan.


Trees highlighted **yellow** should not be planted on the operational railway but can be allowed to remain provided their retention is subject to an appropriate risk assessment, and that their retention will not adversely affect the operation of the railway.

Trees highlighted **green** are suitable to be planted and as native and/or naturalised are to be encouraged, provided that they comply with the requirements of the table in Clause 3.2.5 of this standard, and do not have an adverse effect on the operational railway.

Species (listed alphabetically)	Mature height (m)	Species (listed alphabetically)	Mature height (m)
Broad-leaved trees with high water demand			
Elm, English	24	Oak, Turkey	24
Elm, Wheatley	22	Poplar, Hybrid Black	28
Elm, Wych	18	Poplar, Lombardy	25
Eucalyptus	18	Poplar, White	15
Hawthorn	10	Willow, Crack	24
Oak, English	20	Willow, Weeping	16
Oak, Holm	16	Willow, White	24
Oak, Red	24		
Broad-leaved trees with moderate water demand			
Acacia, False	18	Chestnut, Sweet	24
Alder	18	Lime	22
Apple	10	Maple, Japanese	8
Ash	23	Maple, Norway	18
Bay Laurel	10	Mountain Ash	11
Beech	20	Pear	12
Blackthorn	8	Plane	26
Cherry, Japanese	9	Plum	10
Cherry, Laurel	9	Sycamore	22
Cherry, Orchard	12	Tree of Heaven	20
Cherry, Wild	17	Walnut	18
Chestnut, Horse	20	Whitebeam	12
Broad-leaved trees with low water demand			
Birch	14	Hornbeam	17
Elder	10	Laburnum	12
Fig	8	Magnolia	9
Hazel	8	Mulberry	9
Holly	12	Tulip tree	20
Honey Locust	14		
Coniferous trees with high water demand			
Cypress, Lawson's	18	Cypress, Monterey	20
Cypress, Leyland	20		
Coniferous trees with moderate water demand			
Cedar	20	Pine	20
Douglas Fir	20	Spruce	18
Larch	20	Wellingtonia	30
Monkey Puzzle	18	Yew	12

11.4 Attachment 4: Inspection form

Example of a vegetation inspection report.

Vegetation Inspection Report					
I certify that I have carried out an inspection of all the vegetation listed below					
Inspection (one side of track only)					
Recorded by	_____			Date	_____
Signature	_____			Time	_____
From station	_____	To station	_____		
BRS code	_____	Line type	_____		
Line owner	_____	Line direction	_____		
Chainage from	_____	Chainage to	_____		
Item	Required condition	Y	N	Comments	
		(tick box)			
Vegetation profile	Conforms to vegetation envelope				
Track and cess	Free of vegetation				
Vegetation	<ul style="list-style-type: none"> • healthy, disease free, no ivy growth • broken branches or structural defects • satisfactory rooting characteristics • satisfactory windage 				
Slope stability	<ul style="list-style-type: none"> • cess heave • potential slip surfaces 				
Drains and ditches	<ul style="list-style-type: none"> • free of vegetation debris • free of root intrusion 				
Lines of sight	Clear, not obscured by overhanging vegetation				
Leaf fall	Potential leaf fall onto track <ul style="list-style-type: none"> • Vegetation overhanging track (partially or fully) • Vulnerability to leaves being blown in from nearby trees • Cutting • At grade • Embankment • Gradient • Leaf traps/netting/fences Note the Line orientation e.g. N/S, E/W				
Fire risk	Free of windfalls, dead vegetation, dry cut grasses etc.				
Rubbish	clear of all rubbish and detritus				
Wildlife intrusion	signs of excessive intrusion such as rabbit burrows				
Boundary fence strip	<ul style="list-style-type: none"> • clear of vegetation • conforms to vegetation envelope 				

Printed copies of this document are uncontrolled.

11.5 Attachment 5: Line-specific plans

Line-specific plans for management of vegetation shall include the following:

- Signal equipment type and interface with landscape, tree and vegetation management
- Rolling stock type and traction technology in use, including wheel/rail adhesion level required to support maximum traction and braking rates
- Statutory and non-statutory obligations that affect maintenance.
- High risk areas (areas known to have or documented to impede operational railway e.g. deep cuttings through woodland – with 1-5 risk score)
- Management plans:
- ▲ Vegetation management plan, including adverse species removal
 - Invasive and injurious species management plan
 - Adverse weather event management plan
 - Leaf fall management plan
 - Third party trees management
- Ecology surveys required – Plan for the surveys, the recording and return of ecology survey information and any ecological improvements made
- Areas under specific concession e.g. veteran trees, coppicing.
- Annual key performance indicators relating to:
 - trees felled and stump killed,
 - previously pollarded/reduced trees felled and stump killed,
 - previously coppiced trees felled and stump killed,
 - reactive maintenance faults raised (total) and 5 year trend,
 - adverse, invasive and injurious species removed,
 - wheel flats (between 1 September and 31 December,
 - third party trees removed via engagement appropriate to circumstances.
- ▲ Waste removed off-site and to end disposal e.g. recycling