

SHEFFIELD HIGHWAYS MAINTENANCE PFI

Process		Contract		Mandatory Generic	Process 1
Title	Five Year Tree Management Strategy			Contract Specific	
				Guidance	

Five Year Tree Management Strategy

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Record of Revisions

As part of the management review, the Service Provider shall review the Five Year Tree Management Strategy at periods not exceeding one (1) year, and shall update accordingly. The frequency of revision will be determined by the importance and number of changes accumulated since the previous revision. The Service Provider shall note reviews, including nil returns, in the table below.

Date	Topic of Change	Section/s Changed	Review No.	Agreed (Highways Manager)	Approved (Operations Director)

The Grounds Maintenance Manager shall incorporate amendments and comments into the Annual Tree Maintenance Plan, where appropriate, and reissue under a new revision number.

Register of Controlled Copies

The Service Provider shall retain copy number one (1) in a marked-up condition, showing changes and alterations between revisions. Unrestricted access to this document is available to Sheffield Highways Maintenance PFI staff via the network, with a hard copy (controlled) held at the Olive Grove Depot and the Ecclesfield Depot.

Copy No.	Holder	Company/ Organisation	Location	Review and date first issued to holder
			Olive Grove Depot	
			Ecclesfield Depot	

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Introduction

Over the next 20-50 years there are likely to be major changes in the stock of large trees within Sheffield. Mature trees dominate areas of the city, and as they die or are felled, their loss will cause a decline within the cityscape.

It is therefore essential to re-evaluate the entire strategy concerning the future management of Sheffield's tree stock, and create a framework through which the Service Provider can protect and enhance Highway Trees for future generations.

The benefits of creating a tree strategy to manage Highway Trees include:

- Acknowledging Sheffield's historic legacy of tree coverage, and development of past commitments to provide a valued environmental amenity for the future
- Providing a reliable assessment of the current condition of the city's trees, with guidance towards a sustainable programme of maintenance
- Adopting a proactive approach to tree management, with a long-term strategy that will guide management towards a more holistic view of environmental concerns
- Ensuring that the tree stock is monitored with due regard for future health and safety implications, and for the management to satisfy its statutory requirements in this area
- Providing professional management of Highway Trees, setting guidelines and standards of excellence throughout the city
- Highlighting the present levels of tree cover in relation to national averages and recommendations, maintaining tree numbers where appropriate and improving tree-stock (where possible) with species suitable to their location
- Assessing the strategy's relationship with the policies and strategies of other departments and environmental groups, thereby creating a holistic approach to the management of trees and the environment
- Considering best value frameworks, and assessing alternative management strategies and procedures in accordance with best value
- Providing a policy framework to encourage community involvement and partnership working (eg with South Yorkshire Forest), to promote the value of trees within the local community
- Developing an education programme to promote the awareness of the benefits and value of trees to local children and residents.

This Five Year Tree Management Strategy will alter the present management of the Highway Tree stock significantly so that the Service Provider can realise these benefits. The Service Provider shall take a long-term approach to develop a substantial and valuable amenity over the next 25-50 years.

The strategy will require that the Service Provider view the Highway Tree stock from several different perspectives; with the requirements of the stock and management prescriptions being different within several areas of control. Trees can no longer be considered in general terms, but must also be viewed in light of the various roles they perform, and the differing stresses and difficulties they must endure. This strategy formalises the Service Provider's general commitment to the Highway Tree stock as a complete entity, and reinforces that it is a valuable legacy to be protected for future generations.

The Service Provider has produced this strategy in accordance with PR 6.34 of the Contract. The strategy contains Project Network Part information, with details of inventory number,

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location and condition. Below the Service Provider details how it will deliver the strategy to comply with the Contract obligations, and to achieve the Performance Requirements of the Output Specification.

Commencing in the first Contract Year, the Service Provider shall, under the guidance of the Arboricultural Technical Manager, begin a three (3) yearly visual Tree Condition Survey to capture relevant inventory data required to aid in the development of the following year's strategy, which the Service Provider shall submit to the Authority by 1 December of each Contract Year (PR 6.34). (See Appendix B Sample Tree Condition Survey.)

The Service Provider shall record the following information for each Highway Tree surveyed:

- Site location
- Species
- Estimated height and spread
- Age class
- Overall condition
- Additional features relevant to the site (eg buildings, access points, use)
- Recommendations regarding the necessary tree work
- Prioritisation of the various tree Works.

The Service Provider shall give Highway Trees a general condition rating in relation to their physiological and structural condition, based on Table 1.

Good health and form	Full, healthy canopy but with the possible inclusion of some suppressed branches or physical damage. A Highway Tree which requires little or no remedial Works, and is anticipated to be retained for over ten (10) years.
Reasonable health and form	Slightly reduced leaf cover, minor deadwood content or isolated major deadwood. A Highway Tree which requires minor remedial Works to remove defects and/or improve the form so that it may be anticipated to be retained for over five (5) years.
Poor health and form	Sparse overall leaf cover or extensive deadwood. A Highway Tree: showing a significant number or range of defects; and/or requiring considerable remedial Works to aid its retention; and/or where retention is not anticipated beyond five (5) years.
In advanced decline	Large proportion of deadwood within the crown. A Highway Tree with a significant proportion of defects and/or which requires considerable Works to aid its retention. Such Highway Trees may be retained, depending on location, as veteran specimens to retain valuable habitat. They will, often, require substantial Works to preserve their structural integrity, and to ensure they pose no increased threat to the health and safety of those in their vicinity.

Table 1: Highway Tree Condition Rating

The Tree Condition Survey will record the current condition of individual Highway Trees, and identify structural defects. Either the Arboricultural Technical Manager or Tree Supervisor (Inspector) shall collect the visual Tree Condition Survey details using a Personal Digital Assistant (PDA) that displays the following Data fields.

Tree Ref.	GPS	Location	Species	Age	Height (m)	Dia. (cm)	Life Exp.	Condition	Characteristics	Prescription	Cat.	Time (hrs)	Justification
T0001													

This operation will allow for the capture of a GPS location for each Highway Tree and Highway Tree Cluster.

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After undertaking the Tree Condition Survey, the Arboricultural Technical Manager or Tree Supervisor (Inspector) shall make recommendations identifying any Works that are required, and shall assign these a priority rating based on Table 2. The Arboricultural Technical Manager or Tree Supervisor (Inspector) shall input these recommendations into their PDA.

Immediate	Works in this category relate to Highway Trees at risk of imminent structural failure – the result of any such failure being, more likely than not, significant harm or damage. The Service Provider shall categorise these as Category 1 Defects.
6 Months	These Works should be carried out within six (6) Months of identification. Works in this category should include Works that are necessary for the safety of the Highway, eg Crown Raising to clear the road (refer to MS 6.5 Tree Maintenance). These Works may also relate to good arboricultural practice; however, the focus of the Tree Condition Survey is safety of the Highway and its users.
1 year	These Works should be carried out within one (1) year of identification. Works in this category should include those necessary for the safe use of the Highway or adjacent properties, eg where it is anticipated that further tree growth may cause an issue before the next cycle of inspections. These Works may also relate to good arboricultural practice, eg formative pruning or preventative clearance of a Highway, Footway or associated infrastructure. Due to potential financial constraints, the Service Provider anticipates that it may not always be possible to complete these Works within the year.
1 year +	Highway Trees without any major defect or perceived adverse effect on either users of the Project Network or adjacent properties. These Works shall form a part of the Five Year Tree Management Plan and are not deemed to be required within the current or following year. However, these Works shall form the basis of the Service Provider's future re-profiling of the Highway Tree inventory across the Project Network to ensure a healthy and viable future Asset.

Table 2: Criteria for Prioritising Highway Tree Works

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Arboricultural Work

Works identified following the Tree Condition Survey shall comply with the specification in Table 3 – based on the current industry standards for tree works BS3998 (Appendix F). Primary examples of Works requiring identification are where considerable resource is required, and where there is potential for dispute regarding the Service Provider's proposed solution.

When undertaking the Tree Condition Survey, the Arboricultural Technical Manager or Tree Supervisor (Inspector) shall take photographs to illustrate the problem and indicate the extent of any Works required.

Task	Operation	Specification
Tree maintenance	Epicormic Growth	Remove unwanted growth from Highway Tree stem or trunk up to six (6) m at least once per annum (depending on species), particularly where it conflicts with the Footway or Highway.
Tree maintenance	General pruning	Remove deadwood and crossing, diseased or reverted branches. Remove branches obstructing effective illumination of Footways and Carriageways. Prune branches to clear buildings and encroachment over Third Party property.
Tree maintenance	Ivy removal	Sever any climbing plant on the Highway Tree, and remove if detrimental to the Highway Tree.
Tree maintenance	Crown Cleaning	Remove external, diseased wood and deadwood over twenty (20) mm length. Remove all previous pruning stubs and those resulting from accidental damage – unless for ecological reasons and in a relatively safe location.
Tree maintenance	Dead wood removal	Remove dead, diseased, broken branches and stubs; and remove severely decayed wood.
Tree maintenance	Crown Balance	Remove a portion of the crown, specified by reference, sketch plan or compass point. When pruning, leave a natural crown form typical for that species/variety.
Tree maintenance	Crown Raising	Remove lower branches to maintain dynamic envelope giving: <ul style="list-style-type: none"> • 2.5m clearance over Footways • 5.2m clearance over Carriageways • Two (2) m clearance around buildings and structures.
Tree maintenance	Crown Reduction	Cut back to a viable pruning point any side branch and/or secondary shoots to a flowing line without stumps. Reduce height and spread of a Highway Tree's canopy by removing up to twenty (20) % of live growth on the outer parts of the canopy – leaving an even and balanced crown form typical of species.
Tree maintenance	Crown Thinning	Remove a percentage of branches within a crown up to a maximum of thirty (30) % to leave a well-spaced and balanced branch structure.
Tree maintenance	Pests and Diseases	Manage Pests and Diseases identified through the Tree Condition Survey or other means.
Young tree maintenance	Weed control, watering and checking of stakes, ties and any guards	Control weeds in accordance with MS 6.6 Weed Control. Maintain stakes and guard following inspection by Tree Supervisor (Inspector). Water new planting as instructed by Tree Supervisor (Inspector) following prolonged dry weather.

Table 3: Main Highway Tree Works, Operations and Specification

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Reactive Maintenance

Through implementation of the management strategy and appropriate allocation of resources, and in addition to Routine Maintenance, the Grounds Maintenance Manager shall delegate management of the Highway Tree population to the Arboricultural Technical Manager. The Arboricultural Technical Manager shall organise Reactive Maintenance where required to:

- Prevent Highway Tree damage and nuisance
- Prevent damage to the Project Network and any Third Party Structures
- Manage Highway Tree faults (Category 1 Defect response).

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Category 1 Defects – Urgent Highway Tree Faults

When undertaking the Tree Condition Survey, the Arboricultural Technical Manager or Tree Supervisor (Inspector) shall identify urgent Highway Tree faults that require immediate attention, for example:

- Failed Highway Trees or branches
- Hanging branches
- Severely decayed section of the Highway Tree.

The Arboricultural Technical Manager or Tree Supervisor (Inspector) shall record these as Category 1 Defects and report them to the Service Provider's Operational Control Room (OCR), and to an appropriate and available Arboricultural Team.

The approved Annual Tree Management Programme will serve as the basis of the annual planned programme of Works for Highway Trees. However, throughout the year, it is likely that the Tree Supervisor (Inspector) will be required to react to events and other stakeholder requests to undertake Highway Tree Works where there is a nuisance or risk to users of the Project Network. The Tree Supervisor (Inspector) shall assess all reactive Works, and seek approval from the Arboricultural Technical Manager (if deemed necessary) before authorising any Works – unless there is an immediate threat to the Project Network, or the safety and health of its users or infrastructure. The Grounds Maintenance Manager (or the Arboricultural Technical Manager) shall be responsible for communicating information and the Service Provider's solution to the Authority for their approval, should this be required. The Service Provider shall classify such an event as a Category 1 Defect.

Where the Arboricultural Technical Manager or Tree Supervisor (Inspector) identifies and reports a Category 1 Defect to the OCR, the Service Provider shall apply the following process:

- The OCR shall create a Works order, via the Service Provider's Management Information System (MIS), containing a unique reference number to identify the fault, track progress and enable the Works order to be closed out
- The OCR shall instruct the nearest Service Provider Incident Support Unit (ISU) to attend site
- The ISU shall remove branches or small diameter Highway Trees from the Project Network. The ISU shall make the site safe before closing the Works order via their PDAs, and updating the MIS through the OCR. If the size of the Highway Tree or the nature of Works involved is outside the capabilities of the ISU, it shall make the site safe, establish the appropriate traffic management and remain on site.
- The ISU shall advise the OCR of additional support required from the Arboricultural Operatives to clear the reported fault
- During normal working hours, the OCR shall contact the Tree Supervisor (Inspector) who shall deploy the nearest available Arboricultural Team to ensure a prompt response. Out of hours, the OCR shall contact the Service Provider's on-call Arboricultural Team.
- The out-of-hours Arboricultural Team shall attend the site to undertake the necessary Works and remedy the fault. The Arboricultural Team will be equipped to undertake all tasks necessary.
- On completion, the Arboricultural Team shall confirm with the OCR that the Works are complete (via their PDAs)

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- If the fault requires the removal of a Highway Tree from the Project Network, the Arboricultural Operatives shall inform the Arboricultural Technical Manager or Tree Supervisor (Inspector) to ensure the Authority is informed as soon as reasonably practicable. The Service Provider shall update the Highway Tree inventory (stored as part of the MIS) to ensure the Service Provider plants a replacement Highway Tree during the following planting season.
- In cases of predicted Adverse Weather Events, the Service Provider shall place additional Arboricultural Teams on standby.

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Tree Maintenance

Arboricultural Staff

Arboricultural Teams shall deliver the Highway Tree management and maintenance Service. Each Arboricultural Team will have an appointed team leader responsible for the safe, efficient, day-to-day management and reporting of Works undertaken. The Service Provider shall divide Arboricultural Teams into two (2) categories, as outlined below.

1. Routine Works Teams

Routine Works teams shall be responsible for maintaining young Highway Trees to ensure:

- Successful establishment
- Removal of Epicormic Growth
- Crown Raising up to four (4) metres.

Routine Works teams shall attend Category 1 Defects where aerial working is not necessary. Grounds Maintenance Operatives shall support the Routine Works teams during the winter; and shall undertake 'on-the-ground' type work (eg maintenance of young trees, pole pruning, and removal of Epicormic Growth).

2. Aerial Works Teams

Aerial Works teams shall be responsible for the maintenance of all Highway Trees on the Project Network which fall outside of the operational range of the Routine Works teams, eg working at height (normally above five (5) metres). Aerial Works teams shall attend Category 1 Defects that require aerial working (with rope and harness) and/or the use of Mobile Elevated Work Platform (MEWPs).

Arboricultural Vehicles and Plant

Specialist Vehicles

The Arboricultural Teams shall use 7.5t crew cab vehicles with:

- Separated tool chest for safe storage and transportation of equipment
- Large capacity tipping chip body for waste removal
- Tow hitch.

This will allow the crew to travel to site in one vehicle, with all required equipment for efficient service delivery.

Chainsaws

The Service Provider shall ensure that all chainsaws supplied are of low vibration specification to reduce exposure of Arboricultural Operatives to hand arm vibration syndrome (HAVS). The Service Provider shall also issue Arboricultural Operatives with a range of saws (eg top handle, conventional and pole).

Table 4 provides an overview of the core resources required to deliver the Highway Tree management and maintenance Service. These resources will operate from the Service Provider's Olive Grove Depot. Staff will comprise a workforce directly employed by the Service Provider, supported by resources drawn from the Service Provider's supply chain – in the event of potential programme slippage or following an Adverse Weather Event.

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Resources		Quantity
Staff		
Arboricultural Operatives		18 (27 CIP)
Vehicles		
7.5t arboricultural truck		6
MEWP (21m)		1
Light commercials (car-derived vans)		3
Plant		
Chainsaws (various)		25
Brushwood chippers		6
Stump grinder		1
Back-pack blowers		6

Table 4: Staff, Vehicles and Plant Resources Required to Effectively and Safely Deliver the Highway Tree Management and Maintenance Service

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Service Delivery Statement

The Tree Supervisor (Inspector), reporting to the Arboricultural Technical Manager, will be responsible for the day-to-day management of the Annual Tree Management Programme.

The Tree Supervisor (Inspector) shall allocate appropriately experienced and competent resources to deliver the required tasks in accordance with good arboricultural practice and within the Safe Systems of Work approved in the Annual Tree Management Programme. The Tree Supervisor (Inspector) shall be responsible for ensuring that all Highway Tree management and maintenance Service staff receive appropriate Personal Protective Equipment (PPE) for the task, and that all vehicles and plant are maintained in good order. All Arboricultural Teams shall be required to undertake daily maintenance, keeping accurate records of all equipment used, and reporting any defects.

All Works to be undertaken shall be subject to prior approval through the Service Provider's Annual Tree Management Programme. Arboricultural Teams will receive instructions of all tasks through the generation of Works orders via the MIS. These Works orders will provide the Arboricultural Operatives with a unique reference number for each task, and detailed instructions of the task to be performed.

The Service Provider shall also furnish the Arboricultural Team with associated plans and programmes for the establishment of the correct Safe System of Work to implement on site. The Service Provider shall issue Works orders, and any other associated documentation, to each Arboricultural Team via their PDAs. The Service Provider shall provide other documentation as appropriate, which may include:

- Third Party consents received from the Authority if the Highway Tree is located outside the Project Network
- Site-specific risk assessments
- Agreed method of working for those tasks requiring completion within shared road space.

Through a review and check process undertaken with the Arboricultural team leaders, the Tree Supervisor (Inspector) shall ensure all information provided is correct and within appropriate safety parameters.

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Routine Maintenance for Highway Trees

Table 5 provides an overview of how the Service Provider shall undertake Routine Maintenance for Highway Trees.

Task	Who	How	When
Epicormic Growth	Arboricultural Operatives	Routine Works team shall remove Epicormic Growth up to four (4) m on the main stem using pruners to ensure compliance with good practice. Service Provider shall avoid chainsaw use.	The Service Provider shall undertake a planned annual cut during August and September. However, depending on species and growth rates, selected species or areas shall receive an additional early summer cut (June).
Young Highway Tree maintenance	Arboricultural Operatives	Plan visits to undertake: <ul style="list-style-type: none"> • Routine Maintenance • Watering • Weeding • Checking stakes, ties and any guards installed. 	Two (2) planned summer visits and a single winter visit, depending on Highway Tree age and condition.
Highway Tree Works	Arboricultural Operatives	Works delivered in accordance with instruction provided by Tree Supervisor (Inspector), in accordance with good arboricultural practice and agreed Safe System of Work.	In accordance with approved Annual Tree Management Programme.
Clean and tidy site	Arboricultural Operatives	All sites established and managed, promoting good housekeeping practice to protect Arboricultural Operatives, Project Network and public.	At all times.

Table 5: Routine Maintenance for Highway Trees: By Who, How and When

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a) Formative Pruning



Before



After

Involves the removal of weak and damaged stems to ensure strong branch structure and defined stem (as appropriate).

b) Crown Lifting



Before



After

Involves the removal of lower branches to a given height above ground level.

c) Crown Thinning



Before

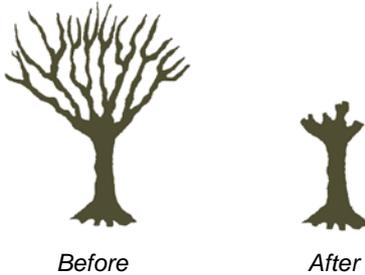


After

Involves the removal of a proportion of secondary and small live tissue to allow a balanced branch structure.

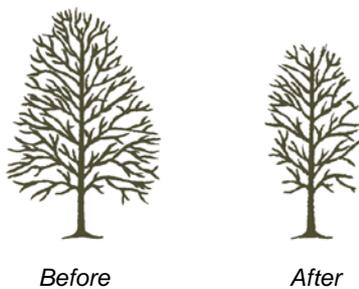
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d) Pollarding



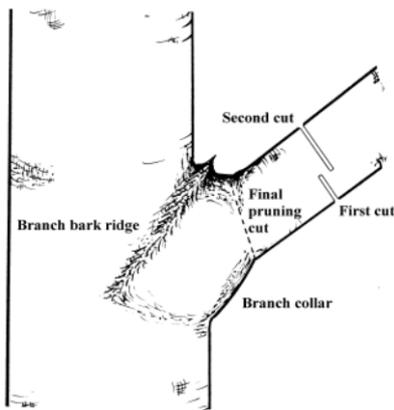
Traditional form of tree management involving removal of the entire tree crown to leave main stem and short lengths of branches. Can be adapted.

e) Crown Reducing and/or Reshaping



Involves the reduction in height or spread of the tree's canopy while preserving the natural shape of the tree (see pollarding).

f) Natural Target Pruning



Ensures optimum healing and repair. Cuts are made to live tissue, matching collar and branch bark ridge. Do not leave stubs. Phase the process on large branches (see diagram).

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Highway Tree Clusters

The Service Provider has assumed that the term 'Highway Tree Cluster' is a group of trees too small to be termed a copse and whose combined canopy could be considered to be merged, and not a single tree specimen. The Service Provider will manage such Highway Tree Clusters by:

- Assessing the margin trees for safety and integrity
- Assessing any access tracks and paths through the Highway Tree Cluster
- Monitoring those trees in the centre of the Highway Tree Cluster for integrity
- Felling any damaged, diseased, dying or dangerous trees
- Creating, over time, improved structural and species diversity through selective felling
- Considering some Highway Tree Clusters for removal and replacement within the Highway Tree Replacement Policy.

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Highway Tree Replacement Policy

The Service Provider shall maintain the Authority’s Highway Tree stock throughout the Term. The Service Provider shall achieve this:

- Using Data captured during the Tree Condition Survey and with the assistance of an accurate Data management system
- Felling and replanting Highway Trees in accordance with the objectives and programmes detailed in the Annual Tree Management Programme.

Although there are no unique requirements for Highway Tree maintenance during the Core Investment Period, the Service Provider anticipates felling and replanting some one thousand (1,000) Highway Trees each year across the Project Network.

The Service Provider shall manage the total number of Highway Trees across the Project Network on a Community Assembly Area basis (Table 6). This will ensure that each Community Assembly Area retains its current Highway Tree stock levels, with no detriment caused to the habitats or aesthetics of any area. The Service Provider shall manage this by implementing its Five Year Tree Management Strategy and Highway Tree Replacement Policy, which the Service Provider shall agree with the Authority.

The Service Provider shall propose the felling, stump grinding and replacement of an agreed number of Highway Trees across a wide range of species sizes and ages to reduce incidences of structural failures. And through replacement plantings, the Service Provider shall reinvigorate and re-profile the Highway Tree stock. This will provide an evenly ranged Highway Tree population of both structural and age diversity across the Project Network.

Community Assembly Area	1	2	3	4	5	6	7	Annual Planting Numbers
	South East	South	South West	Central	North	North East	East	
%age of Total	8%	15%	21%	14%	16%	17%	10%	
Year 1 -	140	377	44	10	157	46	15	789
Year 2 -	53	49	518	96	54	181	114	1065
Year 3 -	88	172	231	150	176	187	110	1114
Year 4 -	96	139	221	142	168	179	113	1058
Year 5 -	68	145	210	136	160	170	93	982
								5007
Year 6 -	67	122	179	116	136	144	86	850
Year 7 -	67	122	179	116	136	144	86	850
Year 8 -	59	108	158	102	120	127	76	750
Year 9 -	59	108	158	102	120	127	76	750
Year 10 -	59	108	158	102	120	127	76	750
Year 11 -	49	119	165	80	75	125	86	699
Year 12 -	49	119	165	80	75	125	86	699

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Community Assembly	1	2	3	4	5	6	7	Annual Planting Numbers
Area	South East	South	South West	Central	North	North East	East	
Year 13 -	45	112	155	74	67	116	81	650
Year 14 -	45	112	155	74	67	116	81	650
Year 15 -	41	105	144	67	59	108	76	600
Year 16 -	41	105	144	67	59	108	76	600
Year 17 -	41	105	144	67	59	108	76	600
Year 18 -	35	94	129	57	47	95	68	525
Year 19 -	40	69	104	72	82	90	68	525
Year 20 -	38	65	98	68	78	86	66	499
Year 21 -	38	65	98	68	78	86	66	499
Year 22 -	38	65	98	68	78	86	66	499
Year 23 -	38	70	108	63	83	86	51	499
Year 24 -	38	70	108	63	83	86	51	499
Year 25 -	38	70	108	63	83	86	51	499
								12492
TOTALS	1370	2795	3979	2103	2420	2939	1894	17500

Table 6: Service Provider's Highway Tree Replacement Plan

Following removal of Highway Trees from the Project Network, the Service Provider shall update the Highway Tree inventory to ensure that it is accurate at all times. Data captured shall include details of the species, age, location and the date of removal.

The Service Provider shall develop the Highway Tree Replacement Policy to ensure it maintains a complete inventory of Highway Trees, and identifies suitable replacements (based on suitability of species, size and location). Wherever possible, the Service Provider shall replace Highway Trees:

- As appropriate to location and the Annual Tree Management Programme
- Subject to Authority approval, and in accordance with the Authority's current policy.

The Service Provider shall recommend alternative species:

- If the Highway Tree removed is not included in the Appropriate Species List
- If space limitations indicate that a species with a less vigorous growth rate would be more suitable to:
 - Avoid damage to paved areas
 - Achieve a target crown size (in keeping with a particular location)
 - Reduce tree disease re-infection (where this risk exists).

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Tree Replacement Programme

Table 7 provides an overview of how the Service Provider will implement the Tree Replacement Programme.

Task	Who	How	When
Highway Tree felled	Arboricultural Operatives	Works delivered in accordance with instruction provided by Tree Supervisor (Inspector), in accordance with good arboricultural practice and agreed Safe System of Work.	In accordance with approved Annual Tree Management Programme, and following stakeholder liaison. Outside of bird nesting season, unless a visual Environmental Impact Assessment has been carried out.
Stump removed	Arboricultural Operatives	Following the removal of any Highway Tree on the Project Network, the Service Provider shall remove the remaining stump. The Tree Supervisor (Inspector) shall provide a permit to dig and service drawing to the Arboricultural Operatives. Arboricultural Operative shall remove stump using a stump grinder – with arisings used as backfill and excess removed from site.	Arboricultural Operatives shall remove stumps within ten (10) days of felling.
Reinstatement	Arboricultural Operatives Highway Maintenance Operatives	Grassed Areas Following stump removal, area shall be top-soiled and either turfed or reseeded depending on the nature of the verge: <ul style="list-style-type: none"> Herbage (A) Standard Grassed Area – turfed Herbage (B) Standard Grassed Area – reseeded Herbage (C) Standard Grassed Area – reseeded. Footways and Hard Surfaces The Tree Supervisor (Inspector) shall liaise with the Highway Maintenance Manager and organise for a Routine Maintenance team to attend site and carry out reinstatement of hard surface.	Following the removal of any stump the Arboricultural Operative shall sign and guard any depression in accordance with NRSWA, and ensure reinstatement within five (5) days.
Replacement Highway Tree planting	Tree Supervisor (Inspector) Arboricultural Operatives	Identify suitable planting location and species choice. Issue permit to dig with service drawings. Prior to commencement, Arboricultural Operatives to CAT scan site, excavate tree pit and plant Highway Tree as instructed in accordance with good plant handling techniques and good planting practice.	Planting undertaken between November and March.

Table 7: Tree Replacement Programme: By Who, How and When

Selection of Replacement Highway Trees

The Service Provider shall select replacement specimens giving consideration to:

- **Location** – any restrictions due to proximity to adjacent property and Highway infrastructure
- **Environmental factors and site conditions** – light and shade issues, water table conditions, and locations in the verge or hard surface with potentially restricted root development

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- **Species** – selecting those which will establish successfully, thrive and develop consistently, and resist known Pests and Diseases to ensure longevity
- **Native species** – resistant and adaptable to effects of potential climate change
- **Habitat** – promotion and creation of local wildlife habitats to meet objectives set out in the Five Year Tree Management Strategy.

The Service Provider shall determine the size of replacement Highway Trees selected by the location and species. In general, this will consist of heavy standards of between 14-16cm girth, which are less prone to damage and vandalism. The Service Provider shall plant woodland areas (where an immediate impact on the landscape is not beneficial or imperative to the overall street scene) with feathered whips, which the Service Provider shall guard as necessary.

Tree Planting Specification – Soft Ground

The Service Provider shall plant, where possible, new Highway Trees in locations using the tree planting specification outlined in Figure 1. The Service Provider shall forward any variations to this specification to the Authority for approval.

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				Guidance	

Tree Planting Specification

Suitable for planting bare rooted trees up to EH size. For installation in a soft landscaping project. Additional weld mesh component provides added protection

Package contains:

- Irrigation piping
- Holdfast belting and rubber block
- Stake
- 1.2m / 1.8m weldmesh and cable ties

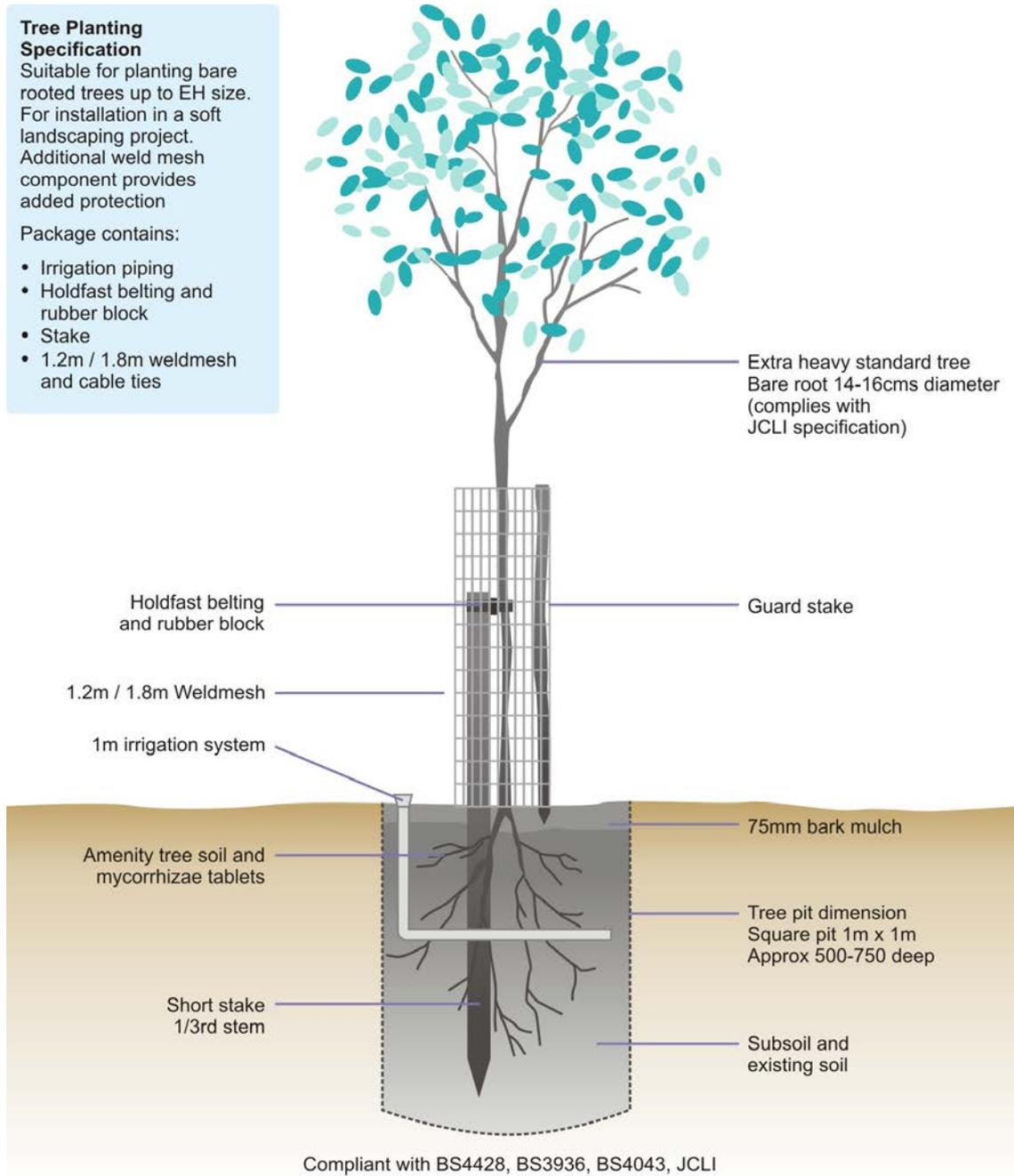


Figure 1: Tree Planting Specification – Soft Ground

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Unless otherwise specified, the Service Provider shall carry out the ground preparation in late summer/early autumn (wherever possible), immediately preceding the planting season. Exceptions to this will include where the Highway Tree is to be planted in a hard surface, or as part of a scheme.

Prior to planting, the Service Provider shall ensure that root systems are protected at all times, and cover and water the root systems to prevent drying out.

The Service Provider shall excavate a separate hole for each standard Highway Tree, and shall ensure that the tree pit is at least 75mm deeper than the full spread of the tree root system (without cutting or binding). The Service Provider shall remove all containers, bindings or netting from the Highway Tree before assessing pit size, and leave a gap of 100mm radially to allow adequate clearance between the root ends and the side of the pit.

The Service Provider shall ensure that tree pits for advanced stock are at least 250mm deeper and 500mm wider than the root stock. Tree pits for semi-matured stock will be 250mm deeper and 600mm wider than the root stock. Tree pits will be square in shape.

The Service Provider shall set aside top soil excavated from the pit for re-use, and shall remove excavated sub-soil for proper disposal, rather than mixing this with the top-soil.

The Service Provider shall break up the bottom of the pit to a depth of 150mm, and shall thoroughly incorporate approximately twelve (12) litres of moist compost. The Service Provider shall return the excavated top soil to the pit as part of the final operation.

The Service Provider shall use the support system specified by the Authorised Officer, and treat stakes with a preservative in accordance with BS 4072.

The Service Provider shall supply mulch to each Highway Tree planted, and lay at a minimum depth of 75mm over the total area of the tree pit. The Service Provider shall fit one (1) tree tie per stake, nail the tree tie to the stake, and adjust to prevent movement of the tree's root ball.

The Service Provider shall install a simple irrigation system that encompasses the root ball, and which includes a filling cap. The Service Provider shall apply approximately fifty (50) litres of water after planting, in such a manner as to prevent soil washing away.

If required, and where assessed by the Arboricultural Technical Manager, the Service Provider shall supply and install an approved underground root-guying system.

Tree Planting Specification – Hard Ground

For those Highway Trees requiring planting in hard surface areas, the Service Provider shall follow a similar specification to that outlined above for soft surface areas. However, if a totally hard surface, the area may require (following assessment) a modular planting box with underground support, and irrigation and drainage systems.

The Service Provider shall plant Highway Trees not requiring a modular planting box in pre-prepared pits filled with suitable planting compost – complete with a drainage and irrigation unit, and underground guying. The Service Provider shall top with porous resin bound gravel.

Process		Contract		Mandatory	Process 1
				Generic	
Title	Five Year Tree Management Strategy			Contract Specific	
				Guidance	

Tree Planting Specification

Suitable for planting bare rooted trees up to EH size. For installation in a hard surface landscaping project. Additional weld mesh component provides added protection

Package contains:

- Irrigation piping
- Holdfast belting and rubber block
- Stake
- 1.2m / 1.8m weldmesh and cable ties
- Resin bound gravel
- Modular system (optional)

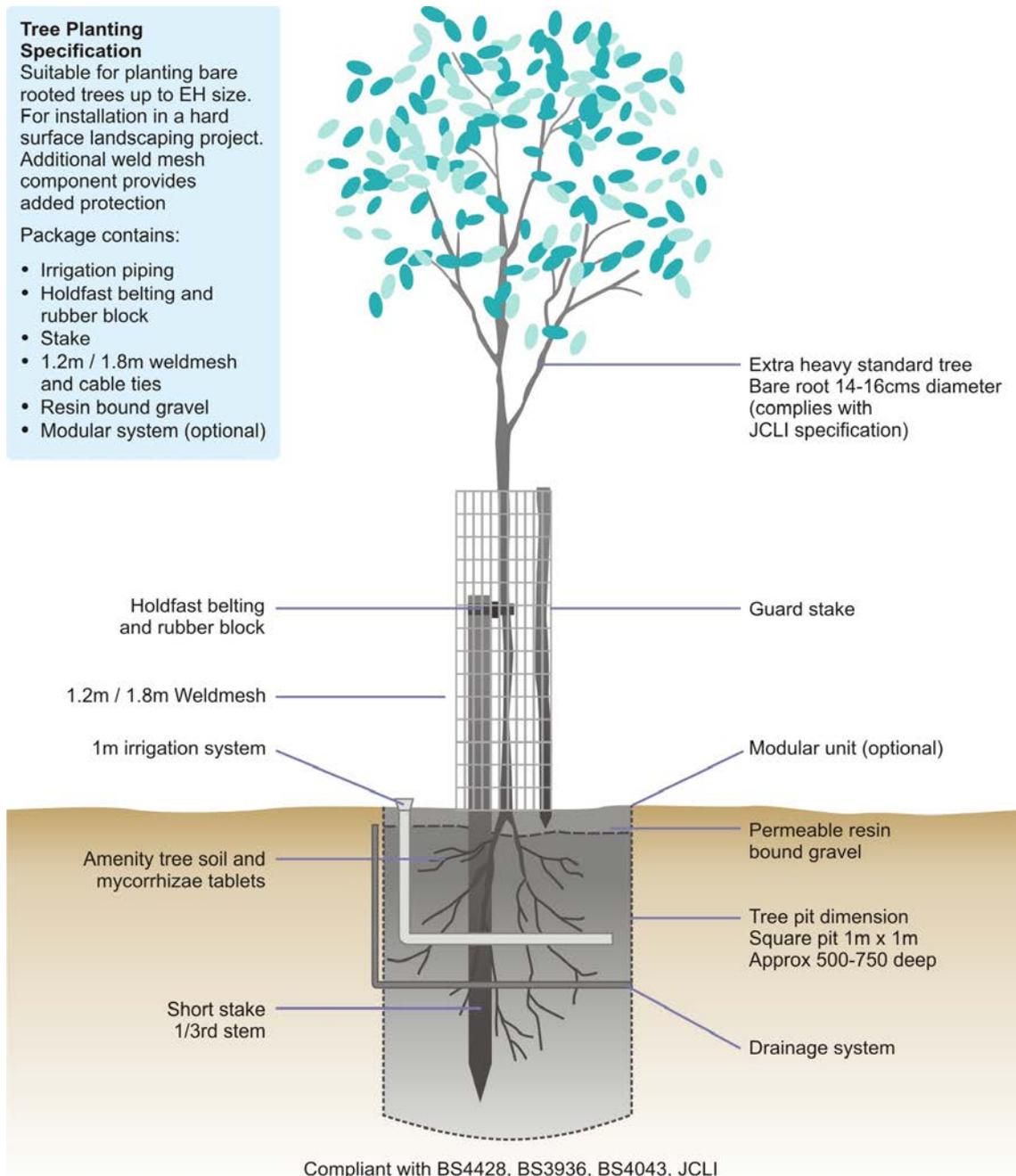


Figure 2: Tree Planting Specification – Hard Ground

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Process		Contract	Mandatory Generic	Process
Title	Five Year Tree Management Strategy		Contract Specific	1
			Guidance	

Impact of Other Works on Highway Trees

The Grounds Maintenance Manager – together with the Arboricultural Technical Manager, and in collaboration with the Service Provider's Programme Planners – shall, in accordance with **PA Clause 21**, liaise with all Third Parties who plan to carry out Works on, or adjacent to, the Project Network which may affect or be detrimental to the Highway Tree population. By attending all relevant meetings and forums, such as for Street Works coordination, the Grounds Maintenance Manager and Arboricultural Technical Manager shall present the Service Provider's programme and gain advanced knowledge of other programmes of Works and proposed Works. This will enable the Grounds Maintenance Manager and Arboricultural Technical Manager, assisted by the Tree Supervisor (Inspector), to:

- Review those programmes of Works and proposed Works, and any potential risk to Highway Trees
- Make any required changes to the Service Provider's Annual Tree Management Programme
- Undertake any necessary preparatory Works to minimise risk or disruption to the Project Network
- Undertake training and briefings for design and operational staff.

Site Supervision – Below Ground

At meetings and forums, the Arboricultural Technical Manager and Tree Supervisor (Inspector) shall brief and train the Service Provider's design and operational teams on issues relating to trees. This is likely to include the risks to mature tree health from Works in close proximity to trees (see Figure 3) and include details relating to:

- BS 5837:2005 – Trees in relation to construction
- NJUG 10 – NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.

The Arboricultural Team shall provide suitably qualified staff to supervise major Works adjacent to Highway Trees; and shall ensure that operational staff take particular care when excavating or working within the tree canopy (ie the precautionary zone). The Arboricultural Team shall advise operational staff regarding the required post excavation maintenance (eg materials for backfilling of trench, tree irrigation and mulching).



Figure 3: Example of Damage Caused to Mature Tree by Utility Operations

Above Ground Impact on Highway Trees

The Arboricultural Team shall liaise with the Lighting Team regarding the design of new lighting locations, and the likely impact of proposed Lighting Columns on existing Highway Trees (eg where mature Highway Trees are in a key location and the lighting designers require installation of new Lighting Columns within the tree canopy). The Service Provider shall also consider the potential damage to tree roots when installing new Lighting Columns. In this situation a member of the Arboricultural Team shall negotiate with a Lighting Team representative and agree a suitable action, for example:

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- Remove and replace the Highway Tree
- Relocate the Lighting Column
- Prune the Highway Tree to allow new Lighting Column access. This is the least favoured option.

Before planting new Highway Trees adjacent to existing Lighting Columns, the Arboricultural Team shall discuss with the Street Lighting Design Team the location of the new Highway Trees in relation to the verge, and the proposed tree species to be planted. Knowing the species will allow the Street Lighting Design Team to determine whether the tree/s will require to have a reduced canopy, or will be fastigate in nature.

If the Service Provider positions a new Lighting Column near to a mature Highway Tree, the Service Provider shall give due consideration to biodiversity issues, eg bat habitats. To mitigate the impact of Street Lighting on bats, the Environmental and Ecological Advisor shall assess and inspect suspected bat roost sites and advise teams of the required strategy.

The Environmental and Ecological Advisor shall consult with local bat groups, which have trained bat surveyors and can advise on:

- Bat populations
- Bat habitats
- Any likely impacts
- Possible mitigation measures.

Generally, the Service Provider shall question the need to install new Street Lighting. Where permitted, as may be necessary for public safety, the Service Provider shall impose conditions to minimise the impact of the new Street Lighting on local bats. The Service Provider shall use a lighting design computer program to predict where light from Street Lighting will fall, and then use this information to determine the potential impact on local bats and plan appropriate mitigation measures.

Environmental Legislation

The Arboricultural Team shall take into consideration any Legislation that may impact on the protection of important species. This Legislation includes the Wildlife and Countryside Act 1981, and the Town and Country Planning Act 2000.

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Appendix A – Tree Maintenance Programme (Totley)

(See CD)

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Appendix B – Sample Tree Condition Survey

(See CD)

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Appendix C – Sample Highway Tree Replacement Survey

(See CD)

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Appendix D – Sample Tree Location Plan (B15) Trees Yr 1

(See CD)

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Appendix E – Highway Tree Cluster Inventory

(See CD)

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Appendix F – BS3998 2010 Extract

(See CD)

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Appendix G – Community Annual Investment Programmes

(See CD)

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Process		Contract		Mandatory Generic	Process 1
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