



Streets Ahead

Five Year Tree Management Strategy

2012 - 2017

This Tree Management Strategy sets out Streets Ahead's approach to delivering the Tree Management Service. The Tree Management Strategy will be used to effectively undertake the Streets Ahead team's responsibilities under the Contract and deliver the Tree Management Service on the Project Network.

RECORD OF REVISIONS

This Tree Management Strategy will be reviewed at periods not exceeding one (1) year and shall be update accordingly. All reviews including nil returns will be recorded in the table below.

Date	Topic of change	Revision no.
Feb 2013	Authority comments and track changes	01
March 2013	Incorporation of changes and further development	02
May 2013	Incorporation of changes and further development	03
July 2013	Minor changes	04
Nov 2013	Annual submission	05
Nov 2014	Annual submission	06
Jan 2016	Annual submission	07

CONTENTS

1.0 INTRODUCTION

- 1.1 Strategic goals
- 1.2 Background
- 1.3 Street tree surveys

2.0 STREET TREE MAINTENANCE

- 2.1 Inspections
- 2.2 Planned Operational Activities
- 2.3 Reactive Operational Activities
- 2.4 Street Tree Treatments
- 2.5 Disease Control
- 2.6 Frequency of Data Collection
- 2.7 Data Storage

3.0 TREE REPLACEMENTS

- 3.1 6Ds Criteria
- 3.2 Engineering Solutions
- 3.3 Highway Constraints
- 3.4 Street Tree Species
- 3.5 Air Quality
- 3.6 Protected Species and Ecological Controls

4.0 COMMUNICATIONS

- 4.1 Residents
- 4.2 Council Website
- 4.3 Replacing Trees
- 4.4 Reactive Works

5.0 BRITISH STANDARDS AND LEGISLATION

1.0 INTRODUCTION

Strategic Goals

- Maximise potential canopy cover through species selection, good establishment and good arboricultural management.
- Establish a sustainable tree stock through improved planting design and appropriate management.
- Minimise future maintenance costs through species selection and appropriate management.
- Establish a resilient tree stock through species diversity and species selection.
- Maintain Sheffield's tree heritage by protecting and conserving where appropriate.
- Increase biodiversity through species selection and protection of habitats.
- Ensure a safe tree stock through good tree management and protection.
- Improve compatibility with environment through holistic highway design and management.
- Improve public relationship with highway trees through positive engagement and good management.
- Improve understanding of benefits of urban trees through communications and events.
- Improve function of highway trees through innovative design strategy.

1.2 Background

Streets Ahead is a 25 year partnership that seeks to upgrade Sheffield's roads, pavements, lighting and other highway assets during the first five years and then maintain the assets thereafter for the remainder of the contract term.

There are around 36,000 street trees in Sheffield. The highway is a harsh environment where trees can struggle to thrive and the lifespan of a street tree is significantly shorter than a park or woodland tree. This Tree Management

Strategy ('the Strategy') applies to the street trees located within the boundaries of the Sheffield highway network.

Our aim is to ensure the street tree population is maintained and improved throughout the contract term to create a legacy of a healthy, diverse tree stock in terms of age, profile and species, reducing the risk of monocultures whilst ensuring the safety of the highway user and adjacent properties. All tree removals and associated replacement proposals are subject to approval by Sheffield City Council.

1.3 Street Tree Surveys

A survey of the street tree population was undertaken in 2007 by an independent consultancy commissioned by Sheffield City Council. This survey identified that 75% of the city's street trees were assessed as being mature or over mature with the potential of a catastrophic decline in the health and safety of a number of street trees being highly likely if a sustainable programme of replacement was not undertaken.

It is of note that although 75% of the street tree stock is mature or over mature this does not mean that this percentage of trees will be replaced over the 25 year life span of the contract. All trees will be assessed on a rolling safety and condition survey programme described as best practice in the relevant British Standards documents such as BS3998 and BS5837.

The subsequent data gathered from the initial Streets Ahead asset survey in 2012 undertaken by an independent tree surveyor on behalf of Amey has been analysed to obtain a broad overview of the street tree stock with regard to age spread and species mix.

As further data is gathered from re-surveys then this analysis will be expanded to provide a more detailed picture of the current tree assets.

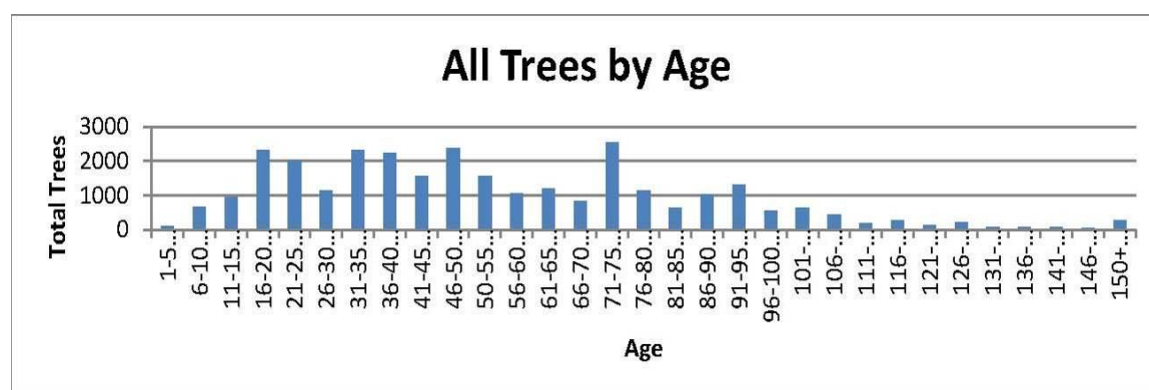


Table 1 – Age profile from the 2012 Street Tree Data

The age spread graph above shows a fairly even age range across the street tree stock with notable peaks coinciding with times of extensive urban housing development such as the post war period.

The majority of street tree species will require replacement after 70-80 years, so with an average of 1,000-1,500 trees in each five year age bracket then the projected replanting rate to maintain the current street tree numbers will be in the range of 200 to 400 trees per annum.

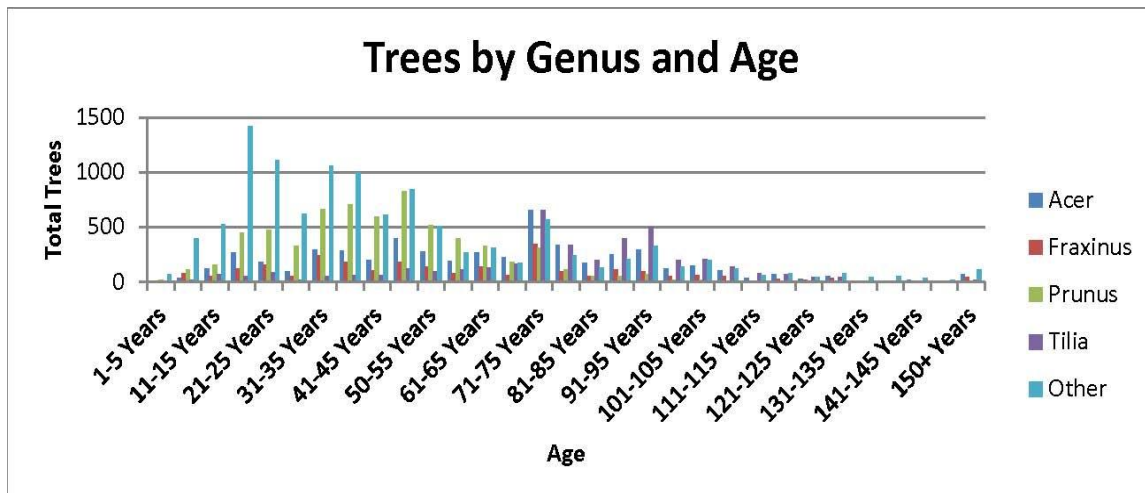


Table 2– Age and Genus profile from the 2012 Street Tree Data

The species mix graph above shows the four most significant genus of street tree in the current stock with all other genus of street tree incorporated together into the ‘other category’.

This graph clearly shows the pre-war popularity of larger species such as Ash, Lime and Sycamore and the later trend for planting the Cherry species in large numbers.

The recent peak in other more varied species is due to the increased availability of more appropriate hybrids and cultivars that have a proven tolerance of highway conditions.

2.0 STREET TREE MAINTENANCE

2.1 Inspections

The surveying of street trees will be undertaken by suitably trained and qualified inspectors, typically qualified to degree level and competencies as prescribed in BS3998 with proven industry experience.

Each inspector will only undertake surveys according to their level of experience and all inspectors will maintain Continued Professional Development through seminars, conferences and subscriptions to ensure their knowledge is up-to-date and they are aware of current and future threats to street tree health and best practice.

Where condition and threat assessments are being updated, this work will only be undertaken by inspectors with a recognised arboricultural qualification to a minimum of level three on the National Qualifications Framework.

2.2 Planned Operational Activities

Routine operational maintenance to street trees typically includes the removal of epicormic (lower trunk) growth on species such as Lime, which is carried out on a cyclical rolling programme, and will also include any works arising from our routine condition and safety inspection programme, such as dead wood removal and pruning.

Pruning or crown reduction will not be carried out on the grounds of shading, disruption to TV or satellite signal, nor for perceived “nuisance” such as nesting birds, seasonal fruit, leaf or blossom fall, all of which are part of the natural life cycle of a tree.

2.3 Reactive Operational Activities

Trees that are reported to us as dangerous or requiring treatment will be inspected and any necessary work carried out under the guidance of an arboriculturist.

Where street trees are identified as a hazard to the safe use of the highway and other tree management options are not appropriate then they will be removed and replaced as urgent priority works.

2.4 Street Tree Treatments

There are a number of ways that street trees can be maintained and kept in good health. Our approach to each is outlined below.

Pruning

All pruning work will be specified and undertaken to the standards set out in BS3998:2010 Recommendations for Tree Work. Industry Best Practice will be used where specific guidance is not available or where standards have

changed over a period of time. When specifying pruning works the impact on long-term tree health and sustainability will always be considered in conjunction with highway safety, social impacts and legal requirements.

Crown Lifting

Crown lifting will be undertaken primarily to maintain effective clearance over the highway for both vehicular traffic and pedestrians. This will normally involve pruning to between five metres and six metres over the carriageway and three metres over footways and pedestrian areas.

Where trees are too young to achieve these clearances on minor roads then consideration will be given to a reduced clearance. Where trees are located over shrub beds or open grass areas then the need for crown lifting will be assessed with regard to the species and access needs; grass cutting etc.

Crowns will normally be lifted to an equal height all round except where this may have a negative impact on tree health and canopy volume. Crown lifting operations will be undertaken on a regular basis throughout the life of the tree and at the earliest opportunity to minimise wound size and exposure to pathogens.

Crown Thinning

Crown thinning will only be considered where a genuine arboricultural need can be given and long-term benefits can be seen.

Crown Reduction

Crown reductions will be undertaken primarily to mitigate the risk of structural defects and weaknesses that may otherwise lead to street tree failure. The effect on each particular species of tree will be considered along with the long-term benefits and sustainability of management.

In the case of trees in decline, reductions may be specified to facilitate the safe management of the natural retrenchment process. Reductions may also be considered individually, or for a whole avenue, where minimum clearances to adjacent structures cannot be maintained by any other means. This may involve whole crown reduction or side reduction after careful consideration of both the effect on visual amenity, tree stability and tree health. The future maintainability and long-term benefits of such management regimes will always be considered before such work is specified.

Pollarding

As highlighted in the Forestry Commission publication 'Hazards from Trees', (2000) pollards can become excessively crowded and heavy if regular pollarding regimes are not maintained. Sadly, historical underinvestment in Sheffield's street tree stock prior to contract commencement in August 2012 has meant that there are a significant number of previously pollarded trees on the highway network which have been neglected owing to a lack of regular re-cutting of the pollards. Failure in pollards often involves the snapping of top-

heavy new branches, rather than splitting at the pollard point.

Crown removal in older trees (sometimes called topping, rather than pollarding) can also cause problems as the new branches are likely to fail either under excessive branch weight, or wind loading upon weakened unions.

Given the risk associated with managing trees with neglected historical pollards, pollarding will only be considered for use in Sheffield where no other management options are available. Generally, this will only be considered for mature London Planes and to a lesser extent Common Lime, where the main stem is within two metres of an adjacent building.

Pollards will be managed on a short-term cyclical programme of no more than 3 years to minimise the impact on tree health and ensure highway safety.

General Pruning

General pruning will be undertaken as a regular maintenance requirement for all mature trees to ensure they meet the minimum standards expected on the highway as defined both in legislation such as the Highways Act and also in national best practice such as BS 3998. This may include:

- Crown lifting
- Epicormic removal
- Crown cleaning
- Clearance of structures
- Clearance of highway assets
- Removal of attachments

Young Tree Maintenance

Young tree maintenance will be undertaken as a regular maintenance requirement for up to five years post planting. This will normally be undertaken on an annual basis to ensure good establishment and future structural integrity. This may include:

- Formative pruning
- Crown lifting
- Tie replacement/removal
- Stake replacement/removal
- Mulching
- Weed control

Epicormic Removal

Epicormic removal will be undertaken on an annual programme to prevent obstruction to the highway and the obscuring of sightlines. In general, the programme will include all Lime species adjacent to the highway or footway and certain other species such as Plane, Poplar and Horse chestnut where growth is identified. Trees in grass areas and shrub beds will be included in the annual maintenance programmes as the need arises.

2.5 Disease Control

Where replacement may be required to control outbreaks of disease and other pathogens then advice will be sought from industry and research bodies to ensure that the approach is consistent with current best practice and national strategies.

Where there is a significant threat to the health of the street tree stock, reports and plans will be produced and a joint approach will be discussed with Sheffield City Council and other local tree managers.

All nursery stock will be sourced from suppliers with suitable biological security procedures as defined by APHA (Animal and Plant Health Agency) with a commitment to maximising the supply of locally grown species from within England wherever possible for disease control purposes.

All stock will undergo a three tier inspection regime consisting of a point of selection inspection, pre-delivery inspection and pre-planting inspection. This will ensure the supply of healthy stock and minimise the possibility of diseases being spread to the wider tree population.

2.6 Frequency of Data Collection

The 2012 inventory survey undertaken across the entire street tree stock provided GIS data, inventory and measurement data, condition assessment and threat assessment for each individual highway tree asset.

For clusters of highway woodland and other highway owned land, separate asset models were created to reflect the unique management requirements of these areas and enable specific management plans to be developed. Once completed, the data was used to populate the first year's work programmes as well as informing future maintenance and replacement programmes.

Following this an annual resurvey of 25% of the street tree stock will be undertaken on a rolling cyclical programme where an update of condition and validation of the threat assessment will also be carried out.

The order of resurvey for each defined area is prioritised following the analysis of street tree condition data collected in the initial inventory survey. These detailed condition and threat assessments will be used to review and modify future maintenance and replacement programmes where necessary.

From year six onwards, once the street tree stock has been brought up to an improved standard, the resurvey cycle will move to an annual 20% resurvey within a five year cycle.

2.7 Data Storage

All survey data will be recorded using Confirm survey software on handheld devices. This will ensure that there is minimum possibility of data transfer loss, the data collected is compatible with the main database configuration and

accurate GIS data is available on site.

The following information was captured in the 2012 inventory survey:

- Coordinates, Site, Location and Species;
- Measurements. DBH, Height, Spread;
- Age Class & Condition Rating;
- Condition Assessment. 5 point assessment (Root, Stem, Scaffold, Canopy, Pathogen);
- Individual Tree Hazard Assessment. 3 point assessment (Target, Likelihood, Impact); and
- Tree work recommendations with priority.

A tree failure database will be developed to record all significant tree failures on the highway. The data gathered will be used to analyse trends and inform proactive management plans. Failure figures will also be used to measure the success of the risk management strategy and inform any necessary changes on an annual basis.

The following additional data will be captured on resurvey:

- Tree Valuation Assessment to BS 5837 (i.e. A, B, C, U);
- Site features;
- Special attributes. Historic, Heritage, Habitat etc.; and
- Photographs (where necessary), linked to the individual asset in the asset management system.

All data will be stored in the Confirm Asset Management system where dashboards will be available to monitor survey progress, risk profiles and work programme progress. Data will be analysed through reports to inform the future strategy for maintaining and improving the street tree stock.

The data collected and system configuration will be reviewed on an annual basis to ensure that the information available is in line with current best practice and changes in legislation.

3.0 TREE REPLACEMENTS

3.1 6Ds Criteria

The removal of street trees will only be considered as a last resort where there are no other reasonably practicable management options available to ensure safety or prevent damage to surrounding structures. Removals will only be specified by suitably qualified and experienced surveyors and where necessary additional decay detection equipment will be used to confirm any recommendations. All trees removed will be replaced on a one for one basis the following planting season (November to March).

To ensure that Sheffield's street tree stock is maintained for future generations and to easily communicate the reason a tree needs to be replaced the trees are categorised into the 6Ds criteria namely:

- Dangerous
- Dead
- Diseased
- Dying
- Damaging
- Discriminatory

Where a street tree meets one or more of the criteria a further assessment is carried out to decide whether the tree should be removed and replaced.

All of the trees that are identified as meeting one or more of the criteria are initially assessed by tree inspectors from Amey. This is then reviewed to decide whether a tree can remain in situ or needs to be recommended for replacement.

Factors in coming to a recommendation include the impact of a disease on the future health of a tree and whether sensitive engineering solutions can rectify damage to a footway or carriageway.

These recommendations will be forwarded to the Council who will verify this recommendation independently. Only once the independent assessment has taken place and formal approval given, will a notice be placed on a street tree indicating its removal and replacement.

Trees will not be removed because of:

- The construction or widening of driveways.
- Disruption to television or satellite signals.
- Perceived nuisances such as seasonal leaf, blossom or fruit fall, or nesting birds.
- Shading issues.

3.2 Engineering Solutions

As part of our commitment to only removing a street tree as a last resort, whenever a tree is found to be either damaging or discriminatory, we consider a list of engineering solutions to establish whether any of these can be employed to retain the tree in situ. Approval to implement any of these options must be sought from the Council.

These solutions may include:

Engineering Solutions

1. Installation of thinner profile kerbs.
2. Excavation of footways for physical root examination prior to an ultimate decision being made on removal.
3. Ramping / Re-profiling of footway levels over roots (within acceptable deviation levels).
4. Flexible paving/surfacing solution.
5. Removal of displaced kerbs leaving a gap in the channel.
6. Filling in of pavement cracks.

Alternative Solutions

7. Root pruning.
8. Root shaving.
9. Root barriers and root guidance panels.
10. Excavation beneath the roots damaging the footway.
11. Tree growth retardant.
12. Creation of larger tree pits around existing trees.
13. Heavy tree crown reduction/pollarding to stunt tree growth.
14. Retain dead, dying, dangerous and diseased trees for their habitat value.

Other solutions

15. Line markings on the carriageway to delineate where it is not safe to drive or park.
16. Building out kerb line into carriageway.
17. Footpath deviation around the tree.
18. Installation of a Geo-grid under the footway to reduce reflective cracking.
19. Reconstruction of the path using loose fill material rather than a sealed surface.
20. Reduce the road width and widen the footways as well as converting them to grass verges.
21. Close a road to traffic.
22. Change to contract specification to leave the footways as they are without carrying out any repairs and removing trip hazards.
23. Abandonment of the existing footway in favour of construction of a new footway elsewhere.
24. Permanent closure of footways to pedestrians. Dig up and replace as grass verges.

25. Seeking the views of residents about removal where that is considered by the Council to be the only option and getting the residents to sign a legal agreement regarding accepting liabilities.

Note that in order to implement any of the 'Other solutions' listed above, additional funding would be required. This is outside the scope of the Streets Ahead contract. Where site specific engineering solutions exist that are not listed above, bespoke retention options may be considered on a site by site basis taking into account the Council's statutory legal obligations, tree safety, condition, risk and threats and likely safe retainable lifespan of the tree or trees in question.

3.3 Highway Constraints

Specific locations for individual replacements will be chosen to minimise conflict with surrounding structures both above and below ground. Where possible, locations will be chosen that minimise negative impacts on adjacent properties and allow for future access requirements.

There are often instances where street trees cannot be replanted in the same location as the original tree once stood. For example, when statutory undertakers' equipment (gas and water pipes, electricity or fibre optic cables) is at a shallow depth within the footway this will prevent a new tree pit from being formed.

In these situations, trees will typically be relocated on the same road in order to ensure no reduction in street tree numbers along a particular street.

Where this is not practicable, priority will firstly be given to replanting within the same neighbourhood and then failing this, deferring to additional planting requests made by customers within the same area of the city as this provides the best possible chance that the new tree will be nurtured and protected by proactive and community minded residents. This may include the creation of new avenues or sections of tree planting where site conditions are favourable.

The street tree stock will be protected from accidental and wilful damage through monitoring and inspections. The protection of street trees and their root systems is important to establishing a healthy tree stock and ensuring development to maturity.

3.4 Street Tree Species

The primary species for planting in narrow verges and hard surfaced areas have been chosen following discussions with growers and review of older urban plantings.

Ensuring that a newly planted tree is able to thrive in its new location and therefore reach maturity is key to maximising environmental benefits such as carbon sequestration and pollution control. To this end, all species have been chosen with suitability and sustainability in mind and to minimise conflict with

both structures and people. The approved list of species is provided below:

Primary Species: Narrow Verges and Tree Pits

- *Acer campestre* 'Elegant'
- *Betula ermanii*
- *Corylus colurna*
- *Crataegus laevigata* 'Paul's Scarlet'
- *Ginkgo biloba*
- *Gleditsia triacanthos* 'Sunburst'
- *Liquidambar styraciflua* 'Worplesdon'
- *Malus* 'Rudolph'
- *Platanus x hispanica*
- *Prunus hillieri* 'Spire'
- *Pyrus calleryana* 'Chanticleer'
- *Sorbus x arnoldiana* 'Schouten'
- *Tilia cordata* 'Rancho'
- *Tilia* 'Winter Orange'
- *Tilia cordata x mongolica* 'Harvest Gold'
- *Sorbus intermedia* 'Brouwers'

Native Species: Wide Grass Verges where Root and Crown Development are not Restricted

- *Quercus robur*
- *Carpinus betulus*
- *Pinus sylvestris*
- *Taxus bacatta*
- *Fagus sylvatica*
- *Crataegus monogyna*
- *Betula pendula*
- *Acer campestre*

Arboretum/Specimen Species: As Native Species but in Prominent Position

- *Quercus cerris*
- *Liriodendron tulipifera*
- *Cedrus atlantica* 'Glauca'
- *Catalpa bignonioides*
- *Sequoiadendron giganteum*
- *Ulmus* 'New Horizon'
- *Parrotia persica*
- *Gymnocladus dioica*
- *Pterocarya fraxinifolia*

Where suitable grass areas are available adjacent to the highway and there is adequate soil volume for unrestricted root development and space for full crown development, then larger native and specimen species will be considered. The

planting of larger native species will improve the habitat value of the tree stock and in prominent positions specimen trees will benefit the local amenity.

3.5 Air Quality

As outlined above in section 3.4, best endeavours will always be made to choose replacement trees taking into account tolerance to the challenges of the highway environment, carbon sequestration properties as well as particulate pollution capture and other environmental benefits.

Despite only making up 1.8% of Sheffield's total tree stock, we recognise that highway and street trees have a contribution to make in terms of being the front line between vehicles and resident's properties for carbon and pollution capture.

A study by Tallis, Taylor, Sinnett and Freer-Smith (2010) into the contribution made by trees to the management of PM10 levels suggested that the current entirety of tree canopy cover (approx. 20%) in Greater London removed somewhere in the region of 0.7% and 1.4% of the total PM10. As such, even if 100% canopy cover was achieved, it can be extrapolated that this would clearly only capture a small amount of the total particulate pollution.

Given that such a small proportion of the overall PM10 is captured by even mature forest trees, we recognise that a holistic strategy is required in order to better manage air quality, and tree planting is just one strand of a significantly larger array of changes required to manage particulate pollution levels. This includes wide ranging behaviour change away from car use, as well as industrial regulation, all of which is detailed in the Council's Air Quality Action Plan which is available for download at: [Sheffield City Council - Air Quality Action Plan](#)

In addition to replacing all trees on at least a one for one basis, we will also ensure that historical gaps in avenues where trees were previously felled by the Council between 2007 and 2012 are filled with a replacement tree.

It is also of note that at contract commencement in August 2012, around 5% of the trees on the highway network (circa 1800) were known to be either dead, dangerous or dying, and as such, it may be inferred that they made relatively little contribution to air quality and PM10 capture when taken in comparison with a healthy specimen.

As newly planted trees mature, we expect an increased contribution in terms of capture of PM10, but again, as outlined in the London study, this needs to be taken in context of wider change which would make a significantly greater contribution to reduction in particulate pollution levels led by a change in behaviour in alignment with the Council's Air Quality Action Plan.

3.6 Protected Species and Ecological Controls

All activities in relation to street trees will be carried out a manner which shall not disturb nesting birds and other wildlife or protected species. This shall include ecological assessments of habitat potential, as well as physical examination using a variety of investigatory techniques such as endoscopic surveys in order to verify the presence or lack thereof of protected species.

As a further control measure, all arboricultural staff will also receive routine ecological awareness training and refreshers, such as bats and arboriculture in order to enable them to competently identify species and habitat potential whilst carrying out their daily duties.

No works will ever be allowed to proceed where protected species have been identified. A relationship has been established with both the Wildlife Trust and Natural England in order to help us to ensure that all operations are carried out in an ecologically sensitive manner with the appropriate licenses or permits to work where required.

4.0 COMMUNICATIONS

4.1 Residents

All planned tree replacement work and significant pruning work will be notified to councillors and residents prior to work commencing. Where street tree removal is planned a notice will be fixed to the tree two weeks before works commence to inform the wider community of the proposals.

4.2 Council Website

The Council website (www.sheffield.gov.uk) will include details of our approach in managing the city's street tree stock as well as the engineering solutions that are considered for each tree. Information will also be provided giving details about when pruning and maintenance will take place.

4.3 Replacing Street Trees

Once a street tree has been identified for replacement and all the necessary approvals have been received, a notice will be placed on the tree in question. This notice will give the public details of why the tree needs to be removed, when it is planned that the tree will be removed and also details of when it will be replaced. Contact details will be visible on the notices so that the public can contact us to gain further information about any specific tree.

4.4 Reactive Works

If a street tree is found to pose a danger to the highway then a notice will not be placed on this tree and as soon as is practically possible it will be removed from the highway.

5. BRITISH STANDARDS AND LEGISLATION

Street tree maintenance work will be carried out in compliance with the following standards and legislation (not an exhaustive list):

- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Works Regulations 1999
- The Provision and Use of Work Equipment Regulations 1998
- The Lifting Operations and Lifting Equipment Regulations (LOLER) 1998
- The Personal Protective Equipment Regulations 1992
- Manual Handling Operations Regulations 1992
- Work at Height Regulations (WaHR) 2005
- The Control of Substances Hazardous to Health Regulations 1994 (COSHH)
- Noise at Work Regulations (1989)
- Highways Act 1980
- Wildlife and Countryside Act 1981
- Environmental Protection Act 1990
- BS3998 2010 Tree Works
- BS5837 2005 Trees in Relation to Construction
- NJUG 10 Trees and Utilities
- The Guide to Good Climbing Practice (produced by Arboricultural Association)
- All relevant AFAG Guides (HSE issue)
- Defra and HSE – code of practice when using plant protection products
- Any relevant research or guidance notes issued by, and communicated through, industry-specific sources such as www.trees.org.uk (Arboricultural Association), www.hse.gov.uk/treework.