
# ARBORICULTURAL IMPLICATIONS ASSESSMENT AND METHOD STATEMENT

PROPOSED DEVELOPMENT

AT

RACECOMMON QUARRY
MORTIMER ROAD
PENISTONE
SHEFFIELD

PM/03/08/09

## 4.0 ARBORICULTURAL IMPLICATIONS ASSESSMENT

4.1 The purpose of this report is to: -

a) Assess the implications, if any, the proposed development will have on the trees identified in the Tree Survey of 30th July 2009 carried out by Mulberry Tree Management.

b) Advise on arboricultural measures, which would be likely to mitigate any damage resulting from the proposed development

4.2 All background information from which this report is based has been taken from the initial survey, as stated in point 4.1 (a), by Mulberry Tree Management.

4.3 The limitations of this report are restricted to the persons, time, information made available and purpose for which this report has been prepared.

## 5.0 ASSESSMENT

5.1 The Site Layout Plan within Appendix Four identifies the trees to be retained/removed in relation to the proposed development.

5.2 In order to fully assess the impact of the proposals an Implications Table has been created, which gives details of the proximity of the associated works to the trees.

5.3 The below Implications Table details the Root Protection Area (RPA) in accordance with the British Standard 5837:2005 *Trees in relation to construction – Recommendations*. This is an area that should be left undisturbed in order to provide adequate rooting area for the retained trees.

5.3 This information can then be used in accordance with BS 5837:2005 to determine whether the development will have a detrimental impact on the health of each tree. Once this has been determined remedial measures can be detailed to reduce the impact the proposals will have on the trees.

5.4 Implications Table: -

| Tree No | Root Protection Area identified in Table 2 of BS 5837:2005 | Distance of Root Protection Area less 20% (m) as identified in BS 5837:2005 Section 5.2.4 (a) | Distance to any proposed construction or surfacing (m) | Can the Tree be Successfully Retained |
|---|---|---|---|---|
| T1 | 145.27m$^2$ = Circle with a radius of 6.80 metres | 5.4 | 4.0 | Yes (see 7.2) |
| T2 | 98.52m$^2$ = Circle with a radius of 5.60 metres | 4.5 | 4.5 | Yes (see 7.2) |
| T3 | 153.94m$^2$ = Circle with a radius of 7.00 metres | 5.6 | 12.0 | Yes |
| T4 | 50.27m$^2$ = Circle with a radius of 4.00 metres | 3.2 | 4.0 | Yes |
| T5 | Fell for development | | | |
| T6 | Fell for development | | | |

| Tree No | Root Protection Area identified in Table 2 of BS 5837:2005 | Distance of Root Protection Area less 20% (m) as identified in BS 5837:2005 Section 5.2.4 (a) | Distance to any proposed construction or surfacing (m) | Can the Tree be Successfully Retained |
|---|---|---|---|---|
| T7 | 78.54m$^2$ = Circle with a radius of 5.00 metres | 4.8 | 3.0 | Yes (see 7.2) |
| T8 - T27 | Fell for development | | | |
| W1 | 40.72m$^2$ av = Circle with a radius of 3.60 metres av | 2.9 | 5.0 (closest) | Yes |

## 6.0 IMPACT ASSESSMENT

6.1 To assess the implications of the proposed development each tree can be categorised in the following way: -

| | Trees to be Retained | | Trees to be removed | |
|---|---|---|---|---|
| | With No Impact | With detailed methodology | Due to Condition | Due to Development |
| Tree No. | T1, T2, T3, T4 & W1 | n/a | n/a | T5, T6 & T8 to T27 |

## 7.0 MITIGATING PROPOSALS

### 7.1 Tree Losses and Replacements

7.1.1 The loss of any tree is always regrettable although in this instance the majority of the trees to be lost are Goat Willow, which are all self seeded scrub trees that are not of significant visual benefit to their locality. For this reason they have been graded as C2 trees. The only better quality tree to be lost is T8 (Oak) although of reasonable condition is still not that visual due to Woodland on west boundary and scrub on north.

7.1.2 The site is well populated with trees mainly on the western boundary, which is a wooded strip (W1). However, there is plenty of scope for replacement planting on the eastern boundary, which is currently quite open.

7.1.3 Heavy Standards are to be recommended with a girth of 12-14cm measured at 1m, a clear stem of 1.75 to 2m and an overall height of at least 3.5m. Recommended species choice as follows:

Small Leaved Lime *(Tilia cordata)*
Whitebeam *(Sorbus aria)*
Rowan *(Sorbus aucuparia)*
Silver Birch *(Betula pendula)*
Wild Cherry (*Prunus avium*)
English Oak (*Quercus robur*)

### 7.2 New Access and Driveway

7.2.1 As shown above, the Implications Table identifies the potential impact that the proposed new access could have on the long term retention of T1, T2 & T7.

7.2.2 The proposed access is shown to be slightly within the RPA of T1 & T2. However, they are squat early-mature multi-stemmed trees, which have been measure at base with quite a large stem diameter considering their age. They are also situated in raised ground so it is considered that the development is far enough away not to significantly affect their root systems. Careful excavation as detailed in the Method Statement will ensure their retention.

7.2.3 The proposed new access comes close to T7. However, there is existing hard standing in this area already so it is considered that there will not be any significant impact on this tree due to development. However, some lower branches will need pruning.

## 7.3 Tree Protection/Fencing

7.3.1 In order to protect retained trees on site during development it is usual to specify fencing. Therefore, a clear tree works specification and details of all tree protective measures can be found in the following Arboricultural Method Statement (Section 9.0).

## 8.0 DISCUSSION

8.1 The majority of the root system, of a tree, is in the surface 600mm of the soil, extending radically for distances frequently in excess of the trees height. Beyond the main structural roots (close to the base of the trunk), the root system rapidly sub-divides into smaller diameter roots: off this main system, a mass of fine roots develops.

8.2 The shape of the main structural roots develops in response to the need for the tree to have physical stability. Beyond these major roots, root growth and development is influenced by the availability of water and nutrients. Unless conditions are uniform around the tree, which would be unusual, the extent of the root system will be very irregular and difficult to predict. It will not generally show the symmetry seen in the branch system.

8.3 The parts of the root system, which are active in water and nutrient uptake, are very fine, typically less than 0.5mm diameter. They are short lived, developing in response to the needs of the tree, with the majority dying each winter. It is *essential* that conditions in the soil remain conducive to the healthy growth of these fine roots so that the water and nutrients necessary for healthy tree growth can be absorbed.

8.4 All parts of the root system, but especially the fine roots, are vulnerable to damage. Once they are damaged, water and nutrient uptake will be restricted until new roots have regenerated. Vigorous young trees will be capable of rapid regeneration but over mature trees will respond slowly, *if at all*.

8.5 In order to live and grow, roots need oxygen from the soil. Respiration by the roots and other soil organisms depletes this oxygen and increases carbon dioxide levels in the soil; a correct balance of these gases is normally maintained by diffusion between the soil and the atmosphere. Anything, which disturbs this balance, will affect the condition of the root system.

8.6 The factors that most commonly affect this diffusion adversely, and therefore damage roots, are the following: -

a) Compaction of the ground, which reduces the space between soil particles. This is particularly important on clay soils. A single passage by heavy equipment on clay soils or storage of heavy materials can cause significant damage.
b) Changing soil levels, even for a few weeks.
c) Covering the root area with impervious surfaces.
d) A rise in the level of the water table. Roots can tolerate submersion for short periods. But a permanent rise will deplete the soil of oxygen.

8.7 Serious damage is often caused during preliminary site works by stripping the topsoil. For this reason, such works should be avoided until protective fencing has been erected.

8.8 Excavations in the rooting area can sever roots. As the majority of roots are in the surface 600mm, even shallow excavations can cause damage.

8.9 Excavations for foundations, landscaping or service trenches are usually sufficiently deep to sever most of the roots, and it should therefore be assumed that all parts of the root system beyond the excavation would no longer serve the tree.

8.10 Excavation or soil stripping which severe or damage the roots may impair the stability of the tree and make it dangerous.

## 9.0 METHOD STATEMENT

Before any form of development commences on the site the following works should be undertaken: -

### 9.1 Tree Works

| Tree No. | Proposed Works |
|---|---|
| T5, T6 & T8 to T27 | Fell |
| T7 & W1 | Crown lift over access road to gain a clear height of approximately 6m from ground level. |

**Recommended works should be carried out to the *British Standard Recommendations for Tree Work, BS 3998:1989***

### 9.2 Excavation in Root Protection Area's

9.2.1 The construction of the new access is within the Root Protective Area (RPA) of Tree no.'s T1 and T2. This is illustrated on the plan of Appendix Four. In those areas the following specification will be applied: ***Any excavations which have to be undertaken within the root protection area should be carried out carefully by hand and any roots encountered in those areas should be severed cleanly with a sharp tool avoiding ripping or snagging. Prior to backfilling any retained roots should be surrounded with sharp sand (builders sand should not be used because of its high salt content which is toxic to tree roots), or other loose granular fill, before soil or other material is replaced. This material should be free of contaminants and other foreign objects potentially injurious to tree roots.***

### 9.3 Protective Fencing

9.3.1 All fencing used on the site should fully comply with *BS 5837:2005 Trees in relation to construction - Recommendations*.

9.3.2 The fencing should be strong and suitable for local conditions. It should also take into account the degree of construction activity on the site.

9.3.3 In this circumstance the location for the protective fencing should be as shown on the Tree Protection Plan of Appendix Four and of the following specification:

**1.2m Chestnut Paling securely fastened to a ridged framework as outlined below.**

**Posts: 75-100 mm round top fence posts or 100 mm x 100mm fence posts 1.8m high at 2m spacing, securely driven in by 0.6m.**
**Top and Bottom Rails: 50 mm x 75 mm softwood nailed to the uprights.**
**Support Struts: 50 mm x 75 mm softwood nailed to the uprights at every third post and at each corner or change of direction.**

**Or**

**Herras type temporary fencing with the bases pinned to the ground securely.**

9.3.4 No storage of materials or any construction operations should occur within the fenced area. Additionally, when designing the site layout, account should be taken of the route/installation method of underground services/drains and, the route/construction method of new access roads/driveways in relation to the retained trees. It would be advisable to mark out the optimum position of the protective fencing on the ground prior to finalisation of any design proposal.

9.3.5 Notices should also be erected on the fencing stating 'Protected Area - No operations within fenced area'.

9.3.6 The positioning of the protective fencing is also very important and should be erected in the proposed location identified on the site plan of Appendix Three. Once the fence has been erected it should never be crossed and particular care should be taken not to store any materials or soil within the protected area.

## 9.4 Additional Precautions Outside Fenced Areas

9.4.1 Oil, bitumen, cement or other material likely to cause damage to the tree will not be stacked or discharged within 10m of the trees stem or within the protective area. Also materials in general will not be stacked or discharged within the exclusion zone.

9.4.2 Concrete mixing and washing will not be carried out within 10m of any retained trees.

9.4.3 Fires will not be lit beneath the foliage or in a position where the flames could extend to within 5m of the foliage, branches or trunk. If the fire is large then this may necessitate a distance of at least 20m.

9.4.4 Trees that are to be retained will not be used as anchorage for equipment.

9.4.5 Notice boards, telephone cables, or other services will not be4attached to any part of the retained tree.

9.4.6 Care should be taken when using cranes or other equipment near the canopy of the retained trees. Also any trees to be felled in proximity to the retained trees should be done so with particular care.

## 9.5 Services

9.5.1 Where possible all service trenches should be dug outside of the Root Protection Area.

9.5.2 Should this not be possible then the guidelines within 'NJUG 10' *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees* should be adopted, in particular Section 4.0, which is included within Appendix Three of this report.

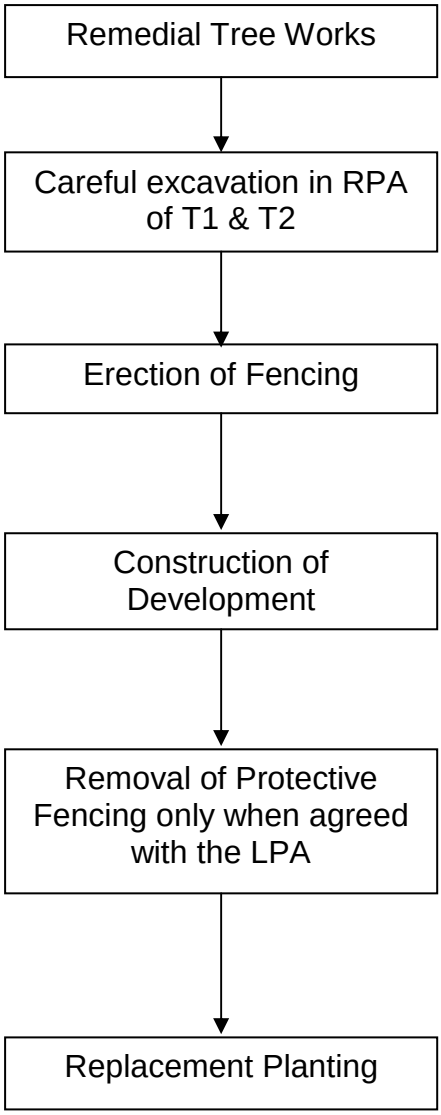
## 9.6 Replacement Planting

9.6.1 Replacement planting should be of standard stock of a size not less than 10 –12cm girth measured at 1 metre from base and planted in a pit 1000mm (w) x 1000mm (b) x 600mm (d) of the species and in location as illustrated on plan of Appendix Four.

9.6.2 Bare root stock shall be supported by a single stake and tie whilst root-balled stock shall have low double staking with a bar and tie.

9.6.3 A 0.5m radius of bark chip mulch shall be applied at a thickness of at least 50mm.

## 9.7 Summary of Methodology for the Protection of the Trees



# APPENDIX THREE

## NJUG 10
## Section 4.0

 Telecommunications Code (Schedule 2). Paragraph 19 of the Telecommunications Code enables operators to require the lopping of trees which overhang the street and obstruct or interfere with the working of their lines.

## 4. HOW TO AVOID DAMAGE TO TREES

This section gives general guidance on methods of work to minimise damage to trees. The local authority (or for privately owned trees, the owner or their agent), should be consulted at an early stage prior to the commencement of any works. This will reduce the potential for future conflict between trees and apparatus.

### 4.1 Below Ground

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any works, particularly if this involves excavating through the surface 600mm, where the majority of roots develop.

#### 4.1.1 **Fine Roots**

Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extremes of heat. It is therefore important to protect exposed roots where a trench is to be left open overnight where there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

#### 4.1.2 **Precautions**

The precautions referred to in this section are applicable to any excavations or other works occurring within the Prohibited or Precautionary Zones as illustrated in Figure 1 – ‘Tree Protection Zone’.

#### 4.1.3 **Realignment**

Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

The appropriate method of working within the Precautionary Zone should be determined in consultation with the local authority (or for privately owned trees the owner or their agent) and may depend on the following circumstances;

- the scope of the works (e.g. one-off repair or part of an extensive operation)
- degree of urgency (e.g. for restoration of supplies)
- knowledge of location of other apparatus
- soil conditions
- age, condition, quality and life expectancy of the tree

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage.

Acceptable techniques in order of preference are;

**a) Trenchless**
Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones.
In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

**b) Broken Trench - Hand-dug**
This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

**c) Continuous Trench - Hand-dug**

The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.

Hand digging within the Prohibited or Precautionary zones must be undertaken with great care requiring closer supervision than normal operations.

After careful removal of the hard surface material digging must proceed with hand tools. Clumps of roots less than 25mm in diameter (including fibrous roots) should be retained in situ without damage. Throughout the excavation works great care should be taken to protect the bark around the roots.

All roots greater than 25mm diameter should be preserved and worked around. These roots must not be severed without first consulting the owner of the tree or the local authority tree officer / arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

4.1.5 **Backfilling**

Any reinstatement of street works in the United Kingdom must comply with the relevant national legislation (see: **Volume 6 – 'Legislation and Bibliography'**). In England this relates to the requirements of the code of practice – 'Specification for the Reinstatement of Openings in Highways' approved under the New Roads and Street Works Act 1991. Without prejudice to the requirements relating to the specification of materials and the standards of workmanship, backfilling should be carefully carried out to avoid direct damage to roots and excessive compaction of the soil around them.

The backfill should, where possible, include the placement of an inert granular material mixed with top soil or sharp sand (not builder's sand) around the roots. This should allow the soil to be compacted for resurfacing without damage to the roots securing a local aerated zone enabling the root to survive in the longer term.

Backfilling outside the constructed highway limits should be carried out using the excavated soil. This should not be compacted but lightly "tamped" and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill.

4.1.6 **Additional Precautions near Trees**

Movement of heavy mechanical plant (excavators etc.) must not be undertaken within the Prohibited Zone and should be avoided within the Precautionary Zone, except on existing hard surfaces, in order to prevent unnecessary compaction of the soil. This is particularly important on soils with a high proportion of clay. Spoil or material must not be stored within the Prohibited Zone and should be avoided within the Precautionary Zone.

Where it is absolutely necessary to use mechanical plant within the Precautionary Zone care should be taken to avoid impact damage to the trunk and branches. A tree must not be used as an end-stop for paving slabs or other materials nor for security chaining of mechanical plant. If the trunk or branches of a tree are damaged in any way advice should be sought from the local authority tree officer / arboriculturist.

See TABLE 1 –'Prevention of Damage to Trees Below Ground' below for summary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.

# APPENDIX FOUR

## Tree Protection/ Proposed Layout Plan