DEE AQUEDUCT CLEANSING WORKS
TREE SURVEY AND IMPLICATIONS ASSESSMENT
(Report Ref: TEP.3078.001)
September 2011

for
United Utilities
Lingley Mere Business Park
Lingley Green Avenue
Warrington
WA5 3LP

VERSION 1
DEE AQUEDUCT CLEANSING WORKS
TREE SURVEY AND IMPLICATIONS ASSESSMENT

CONTENTS

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 INTRODUCTION ........................................................................... 1</td>
<td></td>
</tr>
<tr>
<td>2.0 SITE DESCRIPTIONS AND PROPOSALS ........................................... 2</td>
<td></td>
</tr>
<tr>
<td>3.0 STATUTORY PROTECTION ................................................................ 2</td>
<td></td>
</tr>
<tr>
<td>4.0 TREE POPULATION AND OPERATION IMPLICATIONS ................................ 3</td>
<td></td>
</tr>
<tr>
<td>5.0 ARBORICULTURAL RECOMMENDATIONS ............................................. 6</td>
<td></td>
</tr>
<tr>
<td>6.0 SUMMARY ................................................................................... 8</td>
<td></td>
</tr>
</tbody>
</table>

APPENDICES

Appendix 1: Survey Methodology

DRAWINGS

Drawing 1: Cuerdley Booster Station- Tree Constraints Plan: D3078.001

Drawing 2: The Meads- Tree Constraints Plan: D3078.002

Drawing 3: Watkinson Way- Tree Constraints Plan: D3078.003

Drawing 4: Prescot Water Treatment Works- Tree Constraints Plan: D3078.004

Drawing 5: Tree Protection Fencing: TEP.HERAS.003A

<table>
<thead>
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<th>Checked:</th>
<th>Approved:</th>
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<tbody>
<tr>
<td>RT</td>
<td>RO</td>
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</tbody>
</table>
1.0 INTRODUCTION

1.1 TEP has been commissioned by United Utilities to conduct an arboricultural survey of four separate sites along the line of Dee Aqueduct. This report details the arboricultural implications of proposed maintenance work on these sites.

1.2 The survey was carried out in September 2011 by means of inspection from ground level by a qualified Arboricultural Consultant. Weather conditions during the survey were overcast.

1.3 Under BS 5837:2005 Trees in Relation to Construction - Recommendations the assessment of trees is made objectively. The tree categorisation method identifies the quality and value of the existing tree stock, allowing informed decisions to be made concerning tree retention and removal.

1.4 Information in this report is not meant to be interpreted rigidly and is presented in order to allow an informed judgement on tree retention and removal.

1.5 Ordnance Survey maps of the four sites were supplied by the client and used to record the position of existing trees and vegetation. Positions were approximated using measurements taken from fixed points of reference and overlaying aerial photographs. Where the age distribution and species mix of tree cover was relatively uniform, trees were plotted as groups.

1.6 A total of 4 individual trees and 9 tree groups were surveyed and mapped across the four sites. Tree and group positions and information schedules are presented on Drawings 1 to 4.

1.7 The nature of the soils on sites was not assessed during the survey.

1.8 This report provides the results of the survey and includes the following:

- A schedule of all trees located within, or in close proximity to, the sites (Drawings 1 to 4).
- An assessment, based on BS 5837:2005 Trees in Relation to Construction - Recommendations, of trees in terms of their potential value within any future development. On the basis of this tree quality assessment, trees have been categorised into one of four categories: A, B, C or R (see Appendix 1);
- Advice on the constraints imposed by the existing tree stock (Section 4);
- Advice on removal, retention and management of trees (Section 5);
- A Tree Constraints Plan for each of the four sites detailing BS 5837:2005 quality categories, canopy spreads, Root Protection Areas (RPAs) and areas of proposed operations (Drawings 1 to 4).
2.0 SITE DESCRIPTIONS AND PROPOSALS

Proposals

2.1 The proposed operations include the cleaning of the underground Dee Aqueduct. Above ground working areas are to be established around access points at four different sites along the line of the aqueduct.

Sites and Surroundings

2.2 Site One is located to the immediate south of Cuerdley Booster Station in Widnes. It comprises amenity grassland bordered by broadleaved trees and shrubs, beyond which lie residential properties to the east and west.

2.3 Site Two is located to the east of the residential street The Meads and to the south of Scholes Lane, St Helens. It lies within an amenity area containing recently established broadleaved woodland, grassland and a network of footpaths. High voltage power lines run through the site.

2.4 Site Three is situated between Watkinson Way (A568) and Mill Lane, Widnes. It comprises naturally regenerated scrub and broadleaved trees. A dismantled railway line (now a footpath) runs down the eastern border of the site.

2.5 Site Four is located within the grounds of Prescot Water Treatment Works in St Helens. A 3m high electric fence runs down the centre of the site, separating mixed woodland to the east and mowed grass to the west. Agricultural fields lie beyond the eastern boundary and a small tarmac road and buildings associated with the water works are found to the west.

3.0 STATUTORY PROTECTION

Tree Preservation Orders & Conservation Area Designations

3.1 Consultation with Halton Borough Council and St Helens Metropolitan Borough Council confirmed that at the time of survey there are no Tree Preservation Orders protecting trees within the four sites. The sites are not situated within Conservation Areas.

Protected Species

3.2 Mature trees often contain cavities, crevices and hollows that offer potential habitat for species such as bats and birds. Both are afforded protection under the Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), as well as under Schedule 2 of the Conservation (Natural Habitats) Regulations 1994 (as amended).

3.3 No trees on any of the four sites were found to have features that are suitable for bat roosting.
3.4 Should the presence of a bat roost be suspected whilst undertaking any works on trees and groups on site, operations must be halted until a licensed bat handler or ecologist can provide advice.

3.5 Nesting birds, their nests and eggs are protected under the *Wildlife and Countryside Act 1981* (as amended). It is an offence to intentionally or recklessly, damage or destroy nests and all tree work should ideally be undertaken outside the bird nesting season (March to September inclusive).

3.6 If this is not possible then a detailed inspection of each tree should be undertaken by a qualified ecologist immediately prior to the arboricultural works. Should an active nest be found (being built, containing eggs or chicks) then any work likely to affect the nest must be halted until the nest becomes inactive.

4.0 TREE POPULATION AND OPERATION IMPLICATIONS

4.1 Tree and group locations, canopy spreads, Root Protection Areas and areas of proposed operations are shown on Drawings 1 to 4. A schedule of all trees and tree groups in terms of species, condition, age management recommendations and *BS 5837:2005* quality categories is also provided on the drawings.

**Site One (Cuerdley Booster Station)**

4.2 Three tree groups (G1-G3) were identified on or within close proximity to the proposed operation area on this site. G1 is a young to middle aged plantation containing a mixture of broadleaved species (Norway maple, cherry, ash, field maple, hazel, blackthorn, birch and holly). The trees are generally in good health and the group attains value by offering screening for the residential properties beyond.

4.3 Formerly a continuous hedgerow, group G2 has recently had a gap of approximately one third is total length cut to facilitate access to and from the booster station to the north. It is characterised by dense shrub species (hawthorn, blackthorn, field rose, privet and willow species) of low arboricultural value.

4.4 Groups G3 lies along the western peripheries of the site and comprises dense birch, alder, field maple, cherry, hawthorn and willow species. As a group it is generally of low arboricultural value with some trees dead or dying back, however it does hold some value as a screening feature.

**Site Two (The Meads)**

4.5 Two individual trees (T1 and T2) and one tree group (G1) were identified on or within close proximity to the proposed operation area on this site. Trees T1 and T2 are both mature sycamore and are dominant trees, irreplaceable in the short to medium term. T1 is of lesser value than T2 owing to moderate fire damage and vandalism to its base. Both trees are nevertheless displaying reasonable form and vitality and should be given foremost consideration for retention and protection.
4.6 Group G1 is a section of the young to middle aged broadleaved plantation which extends beyond the immediate area. Minor branch and stem wounds have occurred due to vandalism, yet overall the group is in reasonable health. It’s young age class means that replacement should be achievable in the relatively short term through a suitable restocking program if the removal of sections of this group be unavoidable during operations.

Site Three (Watkinson Way)

4.7 One group of trees (G1) lies within the proposed operation area of this site. It is a section of a larger group of trees which run down the eastern side of Watkinson Way, from agricultural fields to the north to the boundary of a new housing development to the south. It comprises predominantly low value natural regeneration of willow species, alder, birch and hawthorn. A re-stocking program should suitably replace any trees within this group should their removal be necessary to facilitate operations.

Site Four (Prescot Water Treatment Works)

4.8 Two individual trees (T1 and T2) and three tree groups (G1-G3) were identified on or within close proximity to the operation area of this site.

4.9 Trees T1 (middle aged sycamore) lies separate from the main body of tree cover and is of low value being of poor, multi-stemmed form with included bark at stem unions and wire included within the stems. Tree T2 (middle aged sycamore) is situated on the eastern boundary of the site. Despite it having minor stem wounds and pruning stubs, it is a prominent, vigorous tree of moderate arbicultural value and should be considered for retention.

4.10 Groups G1-G4 comprise young to middle aged mixed conifer-broadleaved plantation and natural regeneration. In general the trees are vigorous and in reasonable health and include areas (G3) than have potential to develop into ecologically valuable nature woodland with suitable management. Young oak trees are found in the understorey of group G3, marking the early stages of the next phase of plant succession. The removal of trees within groups G1 to G4 should be followed by suitable mitigation planting (Section 5).

Tree Quality Categorisation

4.11 Table 1 lists the categorisation criteria as stipulated in the Cascade chart for tree quality assessment as laid out in BS 5837:2005.

4.12 Table 2 details which surveyed trees come under each tree quality category. The categories are the result of objective assessment.
Table 1: BS 5837:2005 Tree Quality Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Category A trees are of high value and include those that are particularly good examples of their species and/or those that are visually dominant within the landscape.</td>
</tr>
<tr>
<td>B</td>
<td>Category B trees are of moderate value and include those that do not qualify as Category A due to minor remedial defects and/or those that collectively form distinct landscape features, thereby attracting a higher rating than they might as individuals.</td>
</tr>
<tr>
<td>C</td>
<td>Category C trees are trees of low value and their retention should not unreasonably constrain development.</td>
</tr>
<tr>
<td>R</td>
<td>Category R trees are unsuitable for long-term retention and should ideally be removed prior to the commencement of construction unless otherwise advised.</td>
</tr>
</tbody>
</table>

Table 2 BS 5837:2005 Quality Categorisation for surveyed trees

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site One (Cuerdley Booster Station)</td>
<td>-</td>
<td>G1</td>
<td>G2, G3</td>
</tr>
<tr>
<td>Site Two (The Meads)</td>
<td>-</td>
<td>T1</td>
<td>T2, G1</td>
</tr>
<tr>
<td>Site Three (Watkinson Way)</td>
<td>-</td>
<td>-</td>
<td>G1</td>
</tr>
<tr>
<td>Site Four (Prescot WTW)</td>
<td>-</td>
<td>T2, G3</td>
<td>T1, G1, G2, G4</td>
</tr>
</tbody>
</table>

Below Ground Constraints: Root Protection Areas (RPA)

4.13 As per BS 5837:2005 the RPA is calculated using the trees diameter at 1.5m (refer to Drawings 1 to 4) and delineates a sufficient area necessary for ensuring enough root and the soil structure are protected to successfully retain trees subsequent to operations.

4.14 Tree roots spread two to five times the width of the crown. The majority of tree roots are found in the top 600 mm of soil and most of the fine roots that absorb water and nutrients are found in the top 100 mm.
4.15 The RPAs shown on Drawings 1 to 4 are at this stage illustrative, whereby the placement of protective fencing will be decided at a latter stage in a Tree Protection Plan to define a Construction Exclusion Zone (CEZ). Details of the recommended protective heras fencing are shown in Drawing 5.

4.16 The CEZ must be considered sacrosanct during site operations to ensure successful protection of retained trees. A detailed Arboricultural Method Statement (AMS) will be required where operations are to occur within the CEZ of any retained tree.

**Above Ground Constraints: Operational Stand-Off**

4.17 The Tree Constraints Plans (Drawings 1 to 4) shows the existing canopy spreads of all trees on site. The operational standoff should include the canopy of all retained trees to avoid direct mechanical damage during operations.

### 5.0 ARBORICULTURAL RECOMMENDATIONS

5.1 Table 3 details all arboricultural recommendations.

**Table 3 - Recommended Arboricultural Works**

<table>
<thead>
<tr>
<th>Site and Tree/Group Reference</th>
<th>Works Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuerdley Booster Station: G1</td>
<td>Selectively thin group by 15-20%. Target damaged, poorly formed or suppressed individuals and denser stands of birch</td>
</tr>
<tr>
<td>The Meads: G1</td>
<td>Selectively thin group by 15%. Target damaged, poorly formed or suppressed individuals. Establish climax species (oak)</td>
</tr>
<tr>
<td>Prescot WTW: T1</td>
<td>Remove bricks and rubble from around tree base</td>
</tr>
<tr>
<td>Prescot WTW: G3</td>
<td>Selectively thin group by 20%. Target damaged, poorly formed or suppressed individuals. Establish climax species (oak). Remove rubble and debris from around tree bases.</td>
</tr>
</tbody>
</table>

5.2 All trees on the site should be frequently inspected by a qualified arboriculturist.

5.3 All tree work should be carried by qualified arboricultural operatives working in accordance with BS 3998: 2010 Tree Work- Recommendations.
Mitigation Planting & Landscaping

5.4 Replacement tree planting will be required in the event trees are lost. Subsequent to works, restocking of the operation areas should be carried out where practicable. Furthermore, each site contains sufficient space outside boundary of the proposed operation areas to facilitate mitigation tree planting.

5.5 The choice of species should reflect those which are lost. Native trees (in accordance with National Vegetation Classifications) are recommended to be consistent with the vegetation of the area for the benefit of the local ecology, such as birch, alder, oak, willow, rowan, hawthorn, hazel and lime.

5.6 There is opportunity at the Prescot Water Treatment Works site to extend and enhance group G3 following the loss of any tree cover to facilitate operations. It is recommended that tree planting is carried out the north of the group up to the perimeter fence to compensate for any loss of tree cover.

Post Operation Management

5.7 Hazard recommendations are based on observations at the time of visit. Trees are dynamic living organisms whose structure is constantly changing; even those in good condition can suffer from damage or stress. Following operations, regular – annual or biennial – inspections of all retained trees should be undertaken by a qualified Arboricultural Consultant.
6.0 SUMMARY

6.1 Based on an objective assessment made in accordance with BS 5837:2005, there are 4 Category B tree features and 9 Category C tree features on or in close proximity to the four proposed operation areas. The tree categorisation method identifies the quality and value of the existing tree stock but it is not meant to be interpreted rigidly and is presented in order to form a balanced judgement on tree retention and removal.

6.2 The tree locations, their quality categories and Root Protection Areas are shown on Drawings 1 to 4 - Tree Constraints Plans.

6.3 The tree stock across the four sites ranges from individual mature trees of moderate value to low value natural regeneration.

6.4 There are no Tree Preservation Orders protecting trees within the four sites.

6.5 No trees on any of the four sites were found to have features that are suitable for bat roosting.

6.6 Root Protection Areas (RPA) will need to be defined as a Construction Exclusion Zone (CEZ) in a Tree Protection Plan as part of the operation planning process.

6.7 Replacement tree planting will be required as mitigation in the event of the loss of trees and associated habitats. The extent of mitigation planting required will be determined in agreement with the relevant local authority once operation methods have been finalised.
APPENDIX 1

SURVEY METHODOLOGY & GLOSSARY
APPENDIX 2: ARBORICULTURE SURVEY METHOD

Arboricultural surveys are conducted from ground level only. The nature of the soils on site is not assessed during the survey. The possibility of minor soil movement due to the root activity of the trees cannot be discounted; therefore, the advice of a structural engineer should be sought with regard to appropriate foundation depths.

Trees are dynamic living organisms with a constantly changing structure; even trees in good condition can suffer from damage or stress. Regular annual or bi-annual inspections by a qualified arboriculturalist can help to identify potential problems before they become acute.

The following features of each tree, group of trees or wood may have been recorded in the Arboricultural Data Sheets (Appendix One).

- **Species** The common name is given. The Latin name may also be given if further clarification is required.
- **Height** Top height of tree recorded in metres.
- **Stem Diameter** For single-stemmed trees the measurement is taken at 1.5 metres above ground level and recorded in millimetres.
  For multi-stemmed trees the measurement is taken directly above the root flare in millimetres.
  For tree groups the measurement is taken in the same way as with single-stemmed trees and is recorded in millimetres as a range from minimum to maximum diameters.
- **No. of Stems** A count of stems arising below a height of 1.5m.
- **Crown Spread** The N, S, E and W branch spreads are recorded in metres to provide a representative crown shape.
- **Height of Lowest Branch** Crown clearance above ground level recorded in metres.
- **Tree Age**
  - **Young** Trees that can reasonably be relocated or replaced like for like, without undue cost;
  - **Middle Age** Trees in the established growth stage of their life with the potential to continue increasing in size;
  - **Mature** Trees that have reached their ultimate size, given their location and surroundings;
  - **Veteran** A tree recognised by features of a biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.

- **Condition**
  An overall assessment of a tree’s physiological and structural state in which factors that may increase its susceptibility to the effects of development are taken into account.

- **Comments**
  A brief evaluation and description of the tree with comments on the form, vitality, health and any significant defects that may be present.

Trees are surveyed without reference to any proposed development. The implications of any development are discussed in the Arboricultural Implication Assessment.

- **Tree Quality Assessment**
  The tree quality assessment is based on Table 1 of BS 5837:2005 (See below). Four categories (A, B, C and R) are used to denote tree quality (A = High, B = Moderate, C = Low, R = Unsuitable for retention). Subcategories (1-3) denote the specific function value of the trees and the reasoning behind the assessment (the subcategories may be used in combination but do not accumulate collective weight).

**BS 5837 Root Protection Area (RPA)**

The Root Protection Area (RPA) is allocated to ensure that a sufficient area is left undisturbed during development to prevent direct and indirect damage to tree roots and the soil structure.

The RPA is calculated using a mathematical equation included in BS 5837:2005 (Table 2) and is based on a trees stem diameter. In some cases the RPA may need to be adapted to ensure survival based on criteria such as the tree’s condition, species and crown spread. Any alteration should be justifiable but is made at the arboriculturist’s discretion.

The surrounding RPA should remain undisturbed and be treated as a sacrosanct Construction Exclusion Zone (CEZ) until development completion and removal is approved by an arboriculturist.

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Revision D  
TEP, Genesis Centre, Birchwood Science Park, Warrington, WA3 7BH
APPENDIX 2: ARBORICULTURE SURVEY METHOD

Recommendations

Recommendations for arboricultural works, etc. are based on the current land use, and take into account the tree or group attributes without bias to the proposed development.

Estimated Remaining Contribution

An estimation of the trees useful life expectancy.

| Long       | > 40 years |
| Medium     | 20 – 40 years |
| Short      | 10 – 20 years |
| Very Short | < 10 years |

Table 1 — Cascade chart for tree quality assessment

<table>
<thead>
<tr>
<th>Category and definition</th>
<th>Criteria</th>
<th>Identification on plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management</td>
<td>* Trees that have a serious, irreparable, structural defect, such that their early loss is expected due to collapse, including those that will become unstable after removal of other B category trees (i.e. those for whatever reason, the loss of companion shelter cannot be mitigated by pruning)</td>
<td>DARK RED</td>
</tr>
<tr>
<td></td>
<td>* Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Trees infected with pathogens of significance to the health and/or safety of other trees nearby (e.g. Dutch elm disease), or very low quality trees suppressing adjacent trees of better quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOTES: Habitat reinstatement may be appropriate (e.g. R category tree used as a bat roost, installation of bat box in nearby tree)</td>
<td></td>
</tr>
</tbody>
</table>

| Category A              |          |                        |
| Those of high quality and value in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested) | Trees that are particularly good examples of their species, especially if rare or unusual, or essential components of groups, or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue) | LIGHT GREEN |

| Category B              |          |                        |
| Those of moderate quality and value in such a condition as to make a significant contribution (a minimum of 20 years is suggested) | Trees that might be included in the high category, but are downgraded because of impaired condition (e.g. presence of irreparable defects including unsympathetic past management and minor storm damage) | MID BLUE |

| Category C              |          |                        |
| Those of low quality and value currently in adequate condition to remain until new planting could be established (a minimum of 50 years is suggested), or young trees with a stem diameter below 100 mm | Trees not qualifying in higher categories | GREY |

<table>
<thead>
<tr>
<th>Criteria — Subcategories</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mainly arboricultural values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Mainly landscape values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Mainly cultural values, including conservation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

British Standards Institute 2005, p.6

NOTE: All young trees are assessed as category ‘C’ quality but this does not preclude their retention within a development; all retention and removal recommendations will be detailed within the Arboricultural Implications Assessment report.
DRAWING 1

CUERDLEY BOOSTER STATION- TREE CONSTRAINTS PLAN
DRAWING 2

THE MEADS- TREE CONSTRAINTS PLAN
DRAWING 3

WATKINSON WAY- TREE CONSTRAINTS PLAN
<table>
<thead>
<tr>
<th>Ref</th>
<th>Species</th>
<th>Height (m)</th>
<th>Stem Dia. (mm)</th>
<th>Maturity</th>
<th>Condition</th>
<th>Comments on form, condition, health and significant defects</th>
<th>BS8437 Tree Quality Assess</th>
<th>Radius of RPA guide circle (m)</th>
<th>Management Recommendations</th>
<th>Estimated Remaining Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Hawthorn, willow species, beech, maple, yew, oak, goat willow</td>
<td>to 9m</td>
<td>to 100</td>
<td>Young to Middle Age</td>
<td>Fair</td>
<td>Dense, slender woodland form. Some stem damage and minor branch failure. Majority multi-stemmed form. Screening from highway. Small section recently cleared.</td>
<td>C, 1.2</td>
<td>1m from canopy edge</td>
<td>Long</td>
<td><strong>KEY</strong></td>
</tr>
</tbody>
</table>

**Groups**

- **G1**
  - Hawthorn, willow species, beech, maple, yew, oak, goat willow
  - Height: to 9m
  - Diameter: to 100
  - Maturity: Young to Middle Age
  - Condition: Fair
  - Radius of RPA guide circle: 1m from canopy edge
  - Management Recommendations: Long

**Quality Values**

Based on BS8437:2003 Trees in Relation to Construction - Recommendations

- **G1** Groups of trees
- **Root Protection Area**
- **Area of proposed operations**

**Category C Groups**

Trees of low quality and value.
DRAWING 4

PRESCOT WATER TREATMENT WORKS - TREE CONSTRAINTS PLAN
DRAWING 5

RECOMMENDED TREE PROTECTIVE FENCING