



Midland Metro Birmingham Eastside Extension

Arboricultural Report
MMD-300207-BEE-DOC-0000-0001

May 2016

Centro

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Executive Summary

Mott MacDonald has been commissioned by Centro to carry out an arboricultural survey for the proposed extension of the Midland Metro from Bull Street to High Street Deritend Birmingham, UK. The Scheme is referred to as the Birmingham Eastside Extension (BEE).

The survey and associated report has been undertaken in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations*, which is intended to assist decision making with regard to the existing and proposed trees in the context of design, demolition and construction. This report also assesses the potential impact that the Scheme may have on the surveyed trees and includes a method statement for working close to trees to be retained.

This survey is not, nor should be taken to be, a full or thorough assessment of the health and safety of trees on or adjacent to the site. Therefore, it is recommended that detailed tree inspections are undertaken on a regular basis with the express purpose of complying with the land owner's duty of care and satisfying health and safety requirements.

There were 91 individual trees within the area surveyed for the proposed works. The following categories were assigned:

- Category A i.e. trees of high quality; 6 trees
- Category B i.e. trees of moderate quality; 42 trees
- Category C i.e. trees of low quality; 43 trees
- Category U i.e. trees for removal; 0 trees

The majority of these trees are young to semi mature street trees of moderate to low retention value. They add landscape and amenity value to a largely urban area but as individual trees they only have limited arboricultural value.

To enable the Scheme to progress 37 trees will require removal. These trees fall within the following categories:

- Category A i.e. trees of high quality; 0 trees
- Category B i.e. trees of moderate quality; 22 trees
- Category C i.e. trees of low quality; 15 trees

- Category U i.e. trees for removal; 0 trees

The majority of trees for removal are located in the parkland area at the corner of Park Street and Fazeley Street. The removals in this area will be limited to smaller, young and semi mature trees. This will not greatly affect the landscape or arboricultural value of the area. The larger mature Category A trees in this area should be retained and incorporated into the final design.

Protective barriers in accordance with BS5827:2012 have been specified in order to protect the remaining trees and their RPAs.

A desk study using the Birmingham City Council's interactive website confirmed no trees subject to a Tree Preservation Order (TPO) fall within the Scheme boundary. The proposed alignment is routed through the Warwick Bar Conservation Area (CA) and along the border of the Digbeth, Deritend and Bordesley High Streets CA. However it will not impact any trees associated with these two CAs.

1 Introduction

1.1 Background

Mott MacDonald (MM) is providing a range of services to Centro (West Midlands Passenger Transport Executive) for developing the Midland Metro rail extensions through Birmingham City Centre.

The Midland Metro Line 1 currently connects Wolverhampton City Centre to Birmingham City Centre via Wednesbury, Bilston, West Bromwich, Handsworth and the Jewellery Quarter, predominantly along a former railway alignment with 2km of street running tramway in Wolverhampton. A further 1.3km extension to the tramway is currently being constructed from Snow Hill to New Street Station which diverges from the existing route close to St Paul's tram stop running parallel to the existing route into Snow Hill Station. The Birmingham Eastside Extension will run from Bull Street to High Street Deritend via the Eastside City Park, which is the potential site for the High Speed Rail 2 terminus.

This arboricultural report was commissioned by Centro to support the Environmental Impact Assessment (EIA) for BEE. The report identifies the tree constraints associated with the proposed BEE and also highlights the trees for removal prior to construction works and trees that require barrier protection during the proposed works. A generic Arboricultural Method Statement is incorporated into this report stating the sequence of activities on site and the methods of protecting and working adjacent to retained trees to prevent damage to trees during the construction process.

1.2 Scope of Work and Tree Assessment Methodology

The tree survey was carried out by a qualified Mott MacDonald arboriculturalist on 29th April 2016 to assess the quality and value of the principal trees within or adjacent to the footprint of the proposed Scheme.

The survey was undertaken in accordance with the guidelines set out in '*BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations*'. The tree data contained within the Tree Survey Schedule (Appendix C) was recorded by visual survey from ground level and no invasive tree inspection measures were employed.

The survey process categorises the trees on site, selects those appropriate for retention, reviews the options for incorporating these trees within the developed landscape and provides a finalised methodology for tree protection during construction. The survey provides comment on the general quality of the trees but does not constitute a full or thorough assessment of the health and safety of trees on or adjacent to the site.

The full Tree Survey Schedule and categorisation of the trees in their existing context is stated in Appendix C. The Root Protection Area (RPA) calculations are provided in Appendix D.

In accordance with BS 5837:2012, the following information was recorded for each tree:

- Sequential reference number (to be recorded on the tree constraints plan).
- Species listed by common name, with key provided to scientific name.
- Life stage recorded as:

Table 1.1: Life stage categories

Abbreviation	Life Stage	Description
Y	Young	Trees aged less than 1st quarter of their life expectancy
SM	Semi Mature	Trees within 2nd quarter of their life expectancy
EM	Early mature	Trees within 3rd quarter of their life expectancy
M	Mature	Trees aged within final quarter of their life expectancy
OM	Over Mature	Over-mature - declining or moribund trees of low vigour
V	Veteran	Specimens exhibiting features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned

- Height (metres).
- Crown spread (metres), taken as a minimum at the four cardinal points, to derive an accurate representation of the crown (plotted on the tree constraints plans).
- Existing height (metres) above ground level of:
 - First significant branch; and,
 - Canopy.
- Stem diameter (millimetres) in accordance with Annex C of BS 5837:2012. The stem diameters of single stemmed trees were measured at 1.5 metres above ground level and multi-stemmed trees measured in accordance with Annex C.
- The Root Protection Area (RPA), calculated in accordance with Section 4.6 of BS 5837:2012. The two measurements provided are a 'Root Protection Radius (m)' (circle centred on the base of the stem) and an overall 'root protection area (m²)'.
- General observations, particularly of structural and/or physiological condition (e.g. the presence of any decay and physical defect), and/or preliminary management recommendations.
- Estimated remaining contribution, in years (<10, 10 +, 20+, 40+).
- Retention category recorded as A, B, C or U in accordance with Section 4.5 and Table 1 and Table 2 of BS 5837:2012 to be recorded on the tree survey plan (Appendix B). This gives an indication as to each tree's arboricultural, landscape and cultural value and significance as well as its' suitability for retention in the context of the proposed redevelopment of the site. The sub-categories [1 - Arboricultural values; 2 - Landscape values and 3 - Cultural values, including conservation] are included where considered necessary to clarify why a tree has been assigned to a particular retention category. These categorisation criteria are summarised below:

Table 1.2: Retention Categories

Category	Description
Category A	Trees of high quality and value whose retention is most desirable (suggested minimum contribution 40 years)
Category B	Trees of moderate quality and value whose retention is desirable if practicable (suggested minimum

Category	Description
	contribution 20 years)
Category C	Trees of low quality and value or limited long-term potential, which could be retained if not in conflict with development proposals or young trees with a stem diameter of less than 150 mm (suggested minimum contribution 10 years)
Category U	Trees requiring removal irrespective of any development proposals due to significant structural defects, irreversible decline or with a very short-term life expectancy of less than 10 years

1.3 Limitations of the Survey

The survey was undertaken utilising the design highlighted within drawings MMD-300207-C-DR-00-ARB-0006 to 0009 (see Appendix A.2). The trees identified fall within the extents of the Scheme that may be affected by the proposals.

This report is not, nor should be taken to be, a full or thorough assessment of the health and safety of trees on or adjacent to the site. It is recommended that a full tree survey should be undertaken on a regular basis to satisfy health and safety requirements.

Previous management and/or surveys in relation to the health and safety of trees on this site have not been taken into account as part of this report.

2 Tree Summary

2.1 Overview

There were 91 individual trees within the area surveyed between Bull Street and High Street Deritend Birmingham, UK. The majority of trees surveyed on site are Category B (moderate retention value) and Category C (low retention value) street trees of a young to semi mature age. These trees contribute to the amenity and landscape value of the largely urban environment but have only limited arboricultural value as individual trees.

Trees 1 to 16 are all street trees located along the sides of Bull Street, Dale End and Albert Street. These trees provide important amenity value to an area that is largely urban. Trees 1 to 4 are all young, newly planted common oak (*Quercus robur*) and hornbeam (*Carpinus betulus*). Trees 5 to 16 are a mixture of semi mature lime (*Tilia spp*), maple (*Acer spp*) and London plane (*Platanus x acerifolia*) which are trees of moderate retention value. Trees 11 and 12 have metal grills set around their lower trunk/basal area which will constrict the trees growth and damage the cambium if left in situ. The immediate removal of these grates is recommended. The roots associated with trees 6, 8 and 13 to 16 are lifting the paving and/or tarmac surfaces surrounding them.

Trees 17 to 36 are all recently planted London plane trees of either young or semi mature age class. These trees have been planted as part of the landscaping surrounding Moor Street Queensway and form long linear avenues that flank the road.

The greatest concentration of trees (37 to 65) within the survey area is located within the small area of parkland bordered by Park Street and Fazeley Street. This area contains the only Category A trees on site (38, 42, 43, 44, 47 and 48) which are early mature to mature London plane trees. These trees are extremely prominent within the landscape and are visible from all approaches to the area. Surrounding these category A trees are a variety of smaller semi mature species with ornamental value including cherries (*Prunus avium*, *Prunus padus* and *Prunus tai haku*), hawthorn (*Crataegus monogyna*), cardinal crab apple (*Malus hupehensis* "Cardinal"), Norway maple (*Acer platanoides*) and lime (*Tilia x europaea*). As a whole the area has high landscape value although the majority of trees have low arboricultural value (with the exception of the category A London plane trees).

Trees 67 to 88 are all young Scots pine (*Pinus sylvestris*) planted as part of the Eastside City Park landscape plan. Located in a long raised planter, these trees form a long linear feature within the park. These trees have minimal arboricultural value but are prominent as features in the newly landscaped area.

The remainder of the tram route is devoid of trees until the end of Deritend High Street where trees 89, 90 and 91 are located. These three trees are situated in the central reservation of Deritend High Street. Although they have value in the landscape (purely from being the only trees in the vicinity), the trees themselves have low arboricultural value and minimal amenity value.

The trees surveyed are generally of moderate quality and condition. However, it should be noted that this area of central Birmingham is very urban and has minimal green infrastructure and open spaces. Therefore, the few trees that do exist are of greater importance. Where possible these trees should be

incorporated into the design and protected as necessary especially the larger Category A trees. Where possible the landscape design surrounding the Eastside Extension should seek to identify opportunities for new tree planting, to increase and improve the amenity value of the area.

2.2 Summary of Tree Retention Categories

Of the 91 individual trees within the area surveyed, the following provides a summary of their quality and value as assessed in accordance with BS 5837:2012.

Tree Category	Description	Total Number surveyed
Category A	Trees or groups of high quality and value	6 individual tree
Category B	Trees or groups of moderate quality and value	42 individual tree
Category C	Trees or groups of low quality and value	43 individual trees
Category U	Trees or groups for removal due arboricultural reasons	0 individual trees

3 Implications for Proposal

3.1 Tree Protection Orders (TPOs) and Conservation Areas (CAs)

The primary measures which provide statutory protection to trees are Tree Preservation Orders (TPOs) and Conservation Area (CA) status. Where present, these measures determine that either notification to the Local Planning Authority (LPA) for CA designations or consent from the LPA for TPO designations is required for any works that may affect trees or tree groups.

A desk study using the Birmingham City Council's interactive website confirmed no trees subject to a TPO fall within the scheme's boundaries. However, a study of Birmingham City Council's online CA maps has confirmed that the BEE route will take it through the Warwick Bar CA and along the border of the Digbeth, Deritend and Bordesley High Streets CA. However, no trees are present where these CAs converge with the BEE route. The closest trees are 89, 90 and 91 (recommended for removal); they border the Digbeth, Deritend and Bordesley High Street CA but do not fall inside it (see Appendix F for CA details).

3.2 Protection of Root Protection Area

Working anywhere in the vicinity of trees is likely to cause some root damage due to the fact that in the order of 80% of the roots of any tree will occur within the upper 600mm of the soil. Roots will spread out for a considerable distance from a tree and may be encountered at a distance beyond the canopy spread of a tree. Where construction activities are proposed within the rooting zone of trees, the potential for significant damage exists.

Table 2 of BS 5837:2012 prescribes a methodology for the calculation of a RPA. The RPA represents the minimum area that should be retained undisturbed around a tree or trees for the avoidance of an unacceptable degree of root disturbance. The required RPA of a tree is calculated, and typically plotted as a circle (or where appropriate as a square of equivalent area) to determine constraints or the location of protective fencing. In certain circumstances the actual shape of this area may then be adjusted to take account of local topography or any existing site features that may serve as restrictions to 'normal' root development.

The RPA calculations are stated within Appendix E.

3.3 Risk to Trees from General Works Activities

Trees can be easily damaged by site works, with both the tree roots and the main structure of a tree susceptible to a range of impacts. Root damage can affect the anchorage and stability of the tree, as well as preventing or inhibiting the absorption of water and nutrients. Damage to the trunk and branches leaves the tree more exposed to disease and decay.

Any activities required as part of the proposed works that could affect the existing trees as described below, must be discussed and approved by a qualified Arboriculturalist prior to commencement:

Activities that can cause damage to tree roots include:

- Trenches;
- Alterations in soil level;
- Non-porous surfaces;
- Compaction of soil;
- Changes in soil hydrology;
- Root exposure;
- Soil pollution (i.e. oil spill, incorrect application of herbicide and/or other chemicals); and,
- Fires.

Activities that can cause damage to tree trunks and branches include:

- Pressure from materials stored against trunks;
- Physical impact from plant and equipment;
- Incorrect pruning;
- Exposure of bark or leaves to chemicals; and,
- Damage to bark from mowers and strimmers.

3.4 Protective Barriers: General

Access into the RPA should not be required during the works. Protective fences must ideally be constructed in accordance with BS 5837:2012 and be fit for the purpose of excluding any construction activity (refer to Appendix E). Any other fence/barrier used must be approved by the Arboriculturalist prior to installation.

All weather notices should be erected on the barrier with words such as:

“Tree Protection Area — Keep out”.

The following prohibitions shall apply within the area enclosed by the Tree Protection Barriers:

- No mechanical digging or scraping;
- No storage of plant, equipment or materials;
- No vehicular or plant access;
- No fire lighting within 10m of tree canopies;
- No handling, discharge or spillage of any chemical substance, including cement washings and vehicle washings within 10m;
- No action likely to cause localised water-logging;
- No alteration of ground levels;
- No construction of hard surfaces;
- No attachment of boards, hoarding, cables or notices or fencing to trees; and,
- No storage of excavated materials.

Special care is to be taken on sloping ground where spillages could run towards the trees. A collecting channel dug along the outer line of the protective fencing would be one method of avoiding such damage.

If excavators are to be used during construction, at no time is the excavating arm to encroach over the position of the tree protection barriers.

3.5 Precautions in Respect of Temporary Works

If temporary access is required to a RPA then access may only be gained after consultation with the Scheme Arboriculturalist and Local Planning Authority and following placement of materials such as concrete slabs, scaffold boards or geo-textile fabrics that will spread the weight of any load and prevent compaction to the soil.

3.6 Sequence of Activities

To ensure adequate protection for the trees the following order of activities will be followed:

- Undertake any tree surgery works (subject to such ownership and Local Planning Authority consents as may be appropriate);
- Erect tree protective fencing in accordance with attached plans and specifications;
- Inform Local Planning Authority Tree Officer that tree protective fence has been erected;
- Brief all site operatives, visitors and sub-contractors on the presence of tree protective fencing and the need to ensure that all operations remain wholly outside the protected areas as part of site induction procedures;
- Main site operations – construction phase; and,
- Removal of temporary protective fencing (once all site operations have ceased).

During the main site operations the following rules must be adhered to:

- Retain and maintain tree protective fencing as erected during the full duration of the construction building works;
- No works to take place on the “tree side” of the fence;
- Tree roots extending beyond the protective fencing exposed by excavation works are to be pruned properly using secateurs or a sharp saw;
- Exposed roots shall be covered by moist hessian until they are reburied using a good quality top soil or a top soil and sharp sand mix; and, No signs, notices, cables or other objects shall be fixed to any part of a retained tree.

3.7 Arboricultural Inspection

On completion of the development, an arboriculturalist must look for signs of intolerance to the change in conditions and/or any accidental damage to retained trees to identify the need for additional tree works to those originally specified at the beginning of the project.

3.8 Environmental Law

It should be noted that the Contractor will be responsible under the Wildlife and Countryside Act 1981 (as amended), and the Conservation of Habitat Regulations 2010 (as amended), and the Countryside Rights

of Way Act 2000, to take all reasonable action to identify the presence of protected species including nesting birds, bats, dormice and reptiles in the works area/surroundings, and comply fully with the law in relation to impacts associated with any instructed works.

3.9 Services

The installation of any services or ducting within the RPA of retained trees should be carried out following the guidelines in The National Joint Utilities Group, Issue 2 – 16 November 2007, Volume 4 – Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.

4 Recommendations

The construction works at this site must be undertaken in accordance with Tree Protection Plan MMD-300207-C-DR-00-ARB-0006 to 0009 (see Appendix A.2) and the guidance detailed below.

4.1 Proposed Actions for Individual Trees

The following sections detail specific recommended actions for trees affected by this Scheme, identifies trees requiring removal, barrier protection or pruning works prior and during proposed works.

Table 4.1: Summary of recommendation actions in relation to tree in the northern extent of the scheme area

Tree Ref	Species	TPO	CA	Retention Category	Recommended Actions
1	Common Hornbeam	No	No	C	Protect with Barrier Protection to BS5837:2012
2	Common Oak	No	No	C	Protect with Barrier Protection to BS5837:2012
3	Common Oak	No	No	C	Protect with Barrier Protection to BS5837:2012
4	Common Oak	No	No	C	Protect with Barrier Protection to BS5837:2012
5	Common Lime	No	No	B	Remove due to direct conflict with tram lines
6	Silver Maple	No	No	B	Remove due to direct conflict with tram lines
7	Cappadocian Maple	No	No	C	Protect with Barrier Protection to BS5837:2012
8	Norway Maple	No	No	B	Protect with Barrier Protection to BS5837:2012
9	Small Leaved Lime	No	No	B	Remove due to direct conflict with road realignment
10	Common Lime	No	No	B	Remove due to direct conflict with road realignment
11	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012 and removed grate at base of trunk
12	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012 and removed grate at base of trunk
13	London Plane	No	No	B	Remove due to direct conflict with bus stop
14	London Plane	No	No	B	Remove due to direct conflict with tram lines
15	London Plane	No	No	B	Remove due to direct conflict with pavement realignment
16	London Plane	No	No	B	Remove due to direct conflict with pavement realignment
17	London Plane	No	No	C	No action required
18	London Plane	No	No	C	No action required
19	London Plane	No	No	C	No action required
20	London Plane 'Pyramidalis'	No	No	B	No action required
21	London Plane 'Pyramidalis'	No	No	B	No action required
22	London Plane 'Pyramidalis'	No	No	B	No action required
23	London Plane 'Pyramidalis'	No	No	B	Protect with Barrier Protection to BS5837:2012 and removed grate at base of trunk
24	London Plane 'Pyramidalis'	No	No	B	Remove due to direct conflict with road realignment
25	London Plane	No	No	B	Remove due to direct conflict with road realignment

Tree Ref	Species	TPO	CA	Retention Category	Recommended Actions
	'Pyramidalis'				
26	London Plane 'Pyramidalis'	No	No	B	Remove due to direct conflict with road realignment
27	London Plane 'Pyramidalis'	No	No	B	No action required
28	London Plane 'Pyramidalis'	No	No	B	No action required
29	London Plane	No	No	C	Remove due to direct conflict with tram lines
30	London Plane	No	No	C	Remove due to direct conflict with tram lines
31	London Plane	No	No	C	Remove due to direct conflict with tram lines
32	London Plane	No	No	C	Remove due to direct conflict with tram lines
33	London Plane	No	No	C	Remove due to direct conflict with tram lines
34	London Plane	No	No	C	Remove due to direct conflict with tram lines
35	London Plane	No	No	C	Remove due to direct conflict with tram lines
36	London Plane	No	No	C	Remove due to direct conflict with tram lines
37	Rowan	No	No	B	Remove due to direct conflict with tram lines
38	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
39	Italian Alder	No	No	C	Protect with Barrier Protection to BS5837:2012
40	Cherry spp	No	No	B	Protect with Barrier Protection to BS5837:2012
41	Bird Cherry	No	No	B	Protect with Barrier Protection to BS5837:2012
42	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
43	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
44	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
45	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012
46	Rowan	No	No	B	Protect with Barrier Protection to BS5837:2012
47	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
48	London Plane	No	No	A	Protect with Barrier Protection to BS5837:2012
49	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012
50	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012
51	Common Lime	No	No	B	Protect with Barrier Protection to BS5837:2012
52	Common Lime	No	No	B	Protect with Barrier Protection to BS5837:2012
53	Common Lime	No	No	B	Protect with Barrier Protection to BS5837:2012
54	Common Hawthorn	No	No	B	Protect with Barrier Protection to BS5837:2012
55	Sorbus spp	No	No	B	Remove due to direct conflict with pavement realignment
56	Bird Cherry	No	No	B	Remove due to direct conflict with road realignment
57	Great White Cherry	No	No	B	Remove due to direct conflict with pavement realignment
58	Common Hawthorn	No	No	C	Remove due to direct conflict with road realignment
59	Norway Maple	No	No	B	Remove due to direct conflict with pavement realignment
60	Crab apple hupehensis 'Cardinal'	No	No	B	Remove due to direct conflict with road realignment

Tree Ref	Species	TPO	CA	Retention Category	Recommended Actions
61	Common Lime	No	No	B	Remove due to direct conflict with pavement realignment
62	Wild Cherry	No	No	B	Remove due to direct conflict with road realignment
63	Common Lime	No	No	B	Remove due to direct conflict with road realignment
64	Crab apple hupehensis 'Cardinal'	No	No	B	Remove due to direct conflict with pavement realignment
65	London Plane	No	No	B	Remove due to direct conflict with pavement realignment
66	London Plane	No	No	B	Protect with Barrier Protection to BS5837:2012
67	Scots Pine	No	No	C	Remove due to direct conflict with tram lines
68	Scots Pine	No	No	C	Remove due to direct conflict with tram lines
69	Scots Pine	No	No	C	Remove due to direct conflict with tram lines
70	Scots Pine	No	No	C	Protect with Barrier Protection to BS5837:2012
71	Scots Pine	No	No	C	Protect with Barrier Protection to BS5837:2012
72	Scots Pine	No	No	C	Protect with Barrier Protection to BS5837:2012
73	Scots Pine	No	No	C	No action required
74	Scots Pine	No	No	C	No action required
75	Scots Pine	No	No	C	No action required
76	Scots Pine	No	No	C	No action required
77	Scots Pine	No	No	C	No action required
78	Scots Pine	No	No	C	No action required
79	Scots Pine	No	No	C	No action required
80	Scots Pine	No	No	C	No action required
81	Scots Pine	No	No	C	No action required
82	Scots Pine	No	No	C	No action required
83	Scots Pine	No	No	C	No action required
84	Scots Pine	No	No	C	No action required
85	Scots Pine	No	No	C	No action required
86	Scots Pine	No	No	C	No action required
87	Scots Pine	No	No	C	No action required
88	Scots Pine	No	No	C	No action required
89	Whitebeam	No	No	C	Remove due to direct conflict with tram lines
90	Wild Cherry	No	No	C	Remove due to direct conflict with tram lines
91	Wild Cherry	No	No	C	Remove due to direct conflict with tram lines

4.2 Tree Removal

37 trees will require removal to facilitate construction of the Eastside Extension scheme. Of these none were assessed as category A (high retention value), 22 were assessed as category B (moderate retention value) and 15 were assessed as category C (low retention value).

4.3 Barrier Protection

Barrier protection has been specified in accordance with BS5837:2012 for 30 trees across the site during the construction work. Barrier protection has also been prescribed for the newly planted saplings bordering the edge of the Eastside City Park. An indicative alignment of barrier protection is detailed on the Tree Protection Plan (Appendix B.2). This protection is installed so that construction activity is excluded from the RPAs and canopy areas of any trees planned for retention.

4.4 Demolition

One building has been identified for demolition onsite on the corner of Dale End and Arthur Street (see Appendix A.2 drawing MMD-300207-C-DR-00-ARB-0006). Trees 11 and 12 are located in close proximity to this building. As such, the demolition should be undertaken inwards, within the footprint of the existing building. If any existing hard surface is scheduled for removal, care should be taken not to disturb tree roots that might be present beneath it. Plant operating from Albert Street must also ensure that moving arm or booms do not stray into the construction exclusion zones demarked by the tree protection fences surrounding these trees.

4.5 Tree Prescribed No Action

Trees prescribed no action have been deemed to be far enough away from construction and demolition activity that they will not be affected by the works.

5 Conclusions

There were 91 individual trees within the area surveyed between Bull Street and High Street Deritend Birmingham, UK. The following retention categories were assigned:

- Category A i.e. 6 trees (trees of high retention value);
- Category B i.e. 42 trees (trees of moderate retention value)
- Category C i.e. 43 trees (trees of low retention value).
- Category U i.e. 0 trees (trees for removal on arboricultural grounds).

In order to facilitate the scheme 37 trees will require removal as they are in direct conflict with the proposed development.

- Category A i.e. 0 trees (trees of high retention value);
- Category B i.e. 22 trees (trees of moderate retention value)
- Category C i.e. 15 trees (trees of low retention value).
- Category U i.e. 0 trees (trees for removal on arboricultural grounds).

The trees that require removal have all been assessed as either category B or C. These trees have value primarily as landscape features, providing amenity value in what is generally a very urban area. However, the arboricultural value of these trees is relatively low and their young to semi mature age means that they could be easily replaced with mitigation planting after the Scheme is complete. Areas where mitigation planting is particularly important to maintain the landscape value of the area include the pedestrianised area outside Hotel La Tour and the corner of Bull Street and Dale End. Opportunities also exist to improve the amenity value of the area surrounding the BEE. New areas which should be considered for mitigation planting include the central reservation of Deritend High Street and the newly created space created by the demolition of the building on the corner of Albert Street and Dale End.

The majority of trees that require removal are located within the green space at the corner of Park Street and Fazeley Street. Whilst these trees do provide landscape value for the area, the majority of trees in this group (including all 6 Category A trees) will be retained. The retention of these large trees and the majority of the smaller trees in this group mean that the overall visual impact of the removals will be limited.

Temporary barrier protection in accordance with BS5837:2012 has been specified for 30 individual trees across the site and a number of saplings on the periphery of the Eastside City Park. This is to ensure construction activity does not encroach upon the RPA of these established trees or damage tree trunks or limbs.

Trees 11 and 12 are proposed to be retained and protected with barriers. However, it should be noted that these trees have metal grates set around their lower trunk/basal area. These grates will constrict the trees' growth and damage the cambium if left in situ. The immediate removal of these grates is recommended as these trees are to be retained and incorporated into the new landscape design of the area.

On completion of the development, an arboriculturalist should inspect the retained trees to identify any:

- Signs of intolerance to the change in conditions and/or the effect of the development; and,
- Accidental damage that may have occurred during construction.

Following this inspection, a tree work specification may be required for remedial works necessary to address any issues identified.

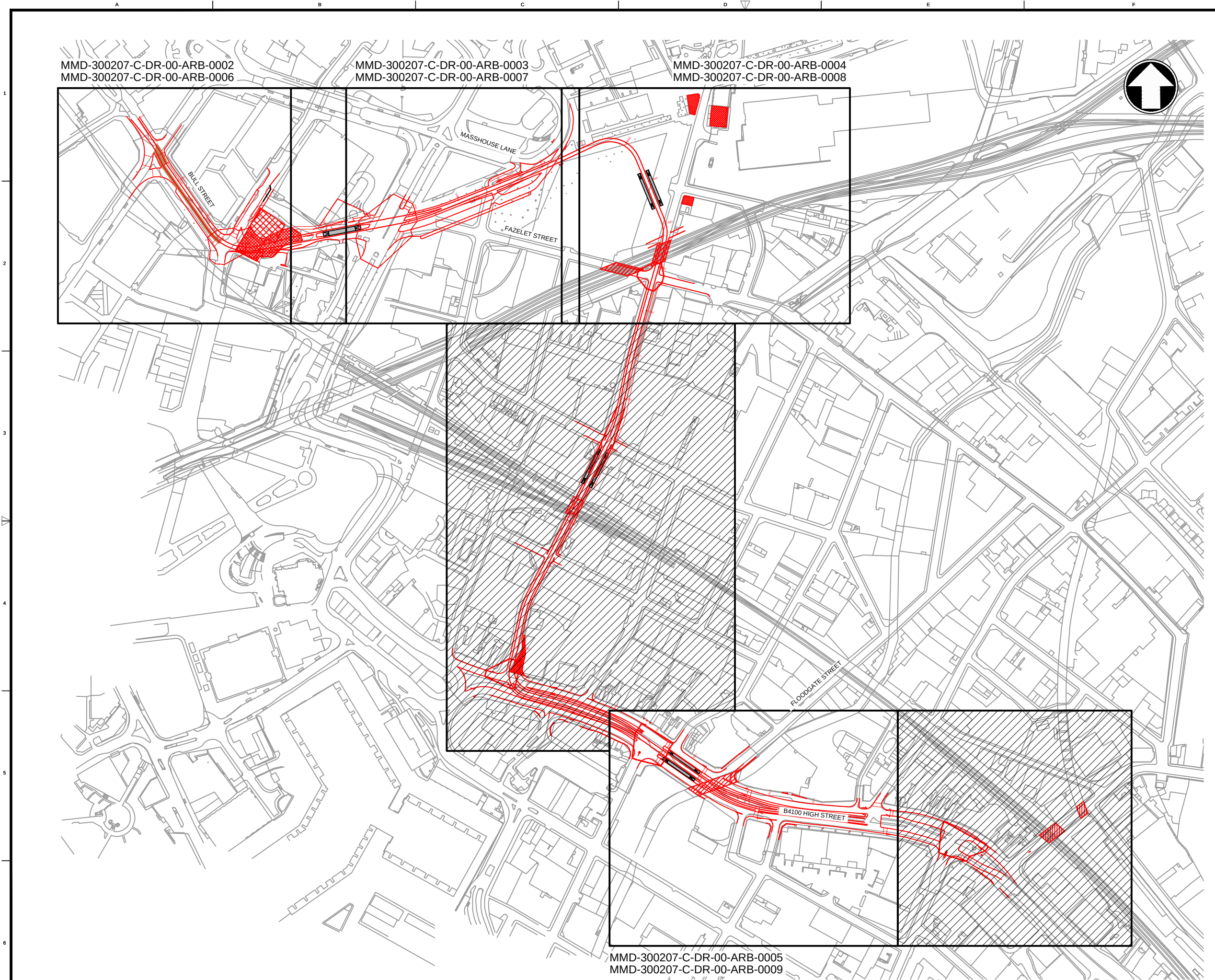
Appendices

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Appendix A. Drawings

A.1 Tree Constraints Plans

A.2 Tree Protection Plans



MMD-300207-C-DR-00-ARB-0002
MMD-300207-C-DR-00-ARB-0006

MMD-300207-C-DR-00-ARB-0003
MMD-300207-C-DR-00-ARB-0007

MMD-300207-C-DR-00-ARB-0004
MMD-300207-C-DR-00-ARB-0008

MMD-300207-C-DR-00-ARB-0005
MMD-300207-C-DR-00-ARB-0009

Notes

1.

All dimensions are in millimetres unless otherwise stated.

2.

Do not scale any items or information from this drawing.

3.

To be read in accordance with Midland Metro Eastside Extension
Arboricultural Report (May 2015).

Key to symbols

NO Trees Surveyed

Reference drawings

P1	20.05.16	DL	First Issue	RL	CP
Rev	Date	Drawn	Description	Ch'k'd	App'd

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Sheet Layout

Designed	J Sothcott	JS	Eng check		
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Scale at A1	1:500	Status	PRE	Rev	P1

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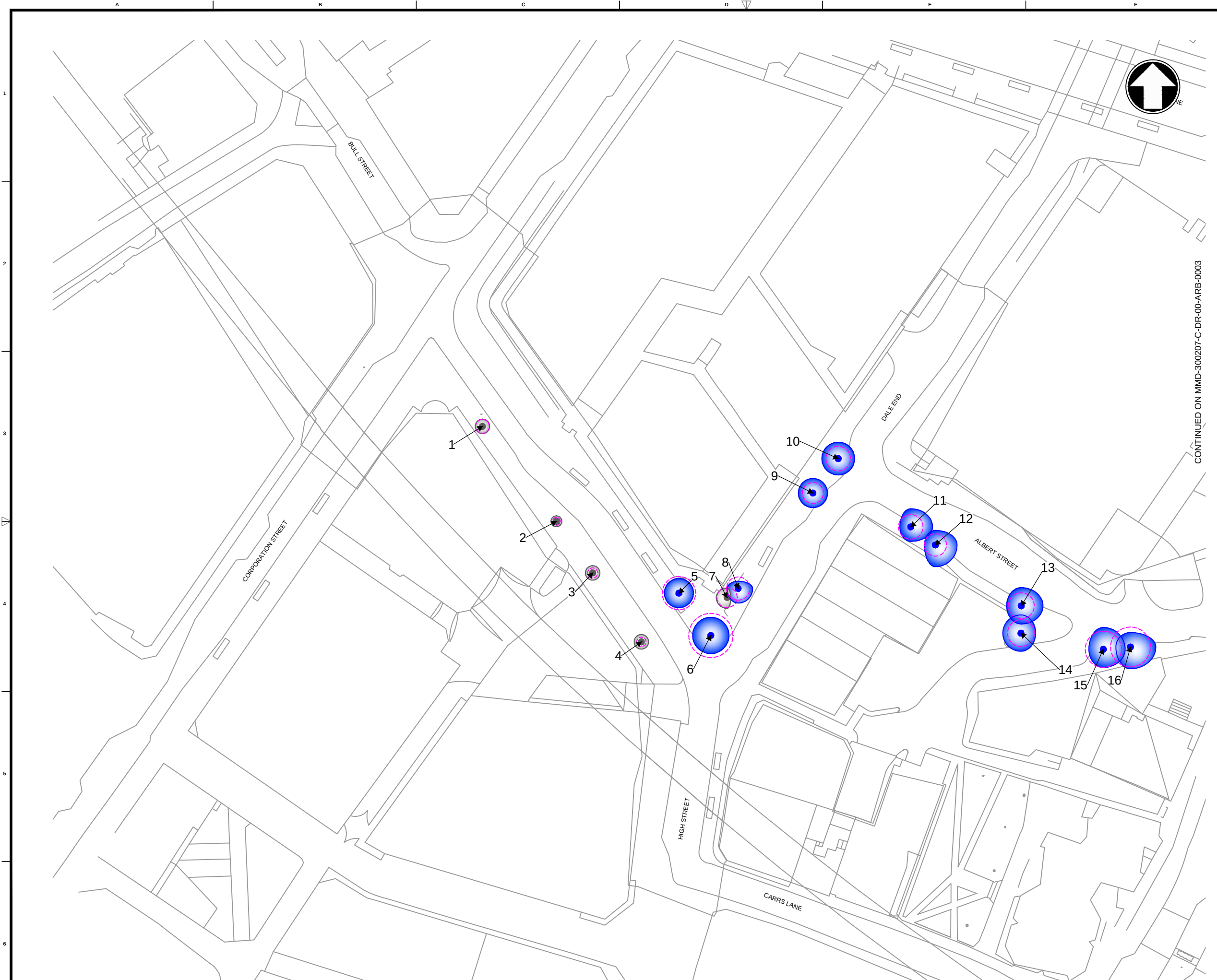
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Key to symbols

12 Tree Reference

Approximate extent of canopy

Tree Root Protection Area (RPA)

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

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Rev	Date	Drawn	Description	Ch'k'd	App'd



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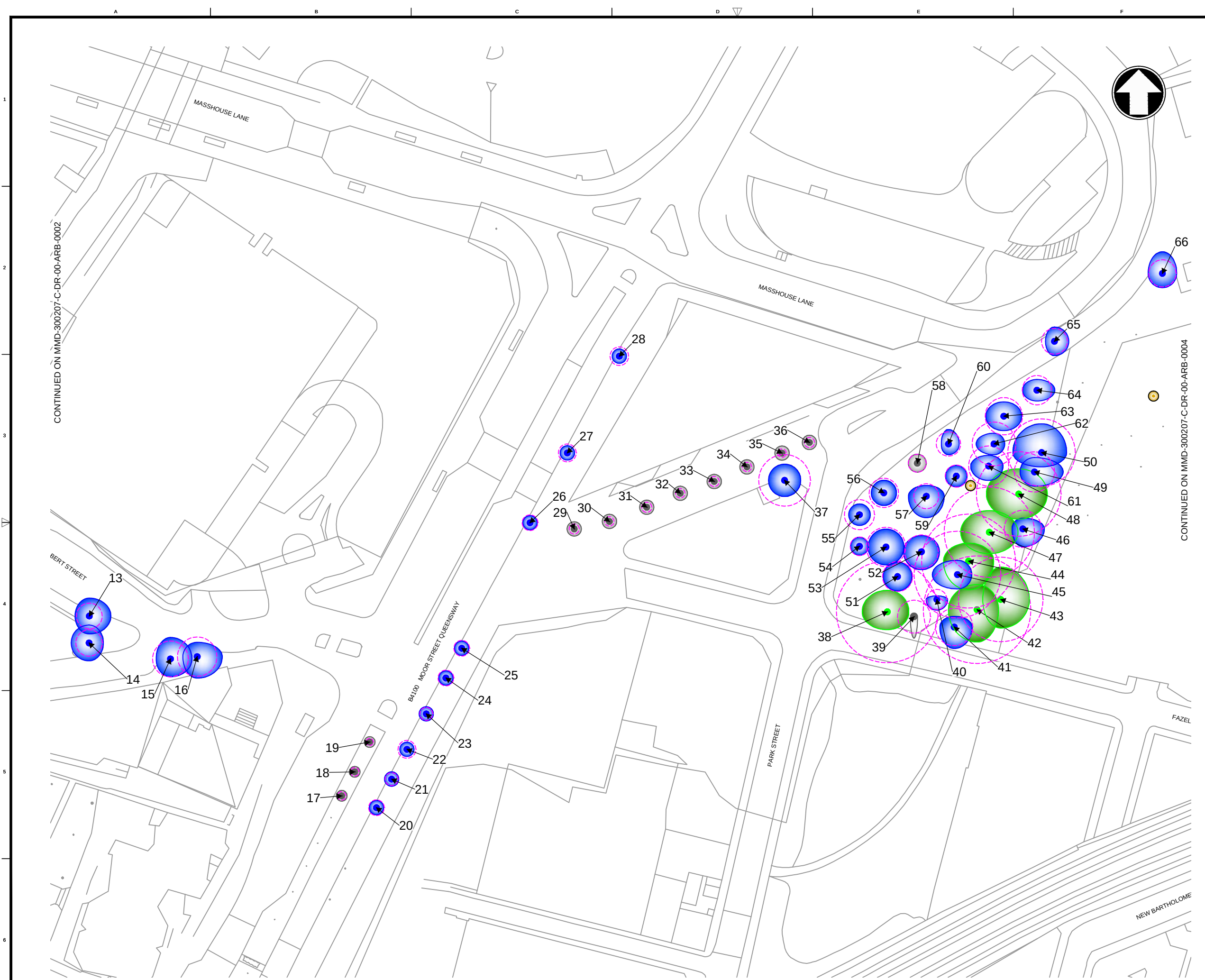
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Title

Midlands Metro
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Tree Constraints Plan Sheet 1 of 4

Designed	J Sothcott	JS	Eng check		
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Dwg check	R Lennon	RL	Approved	C Peeler	CP
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Key to symbols

12 Tree Reference

Approximate extent of canopy

Tree Root Protection Area (RPA)

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

P1	20.05.16	DL	First Issue	RL	CP
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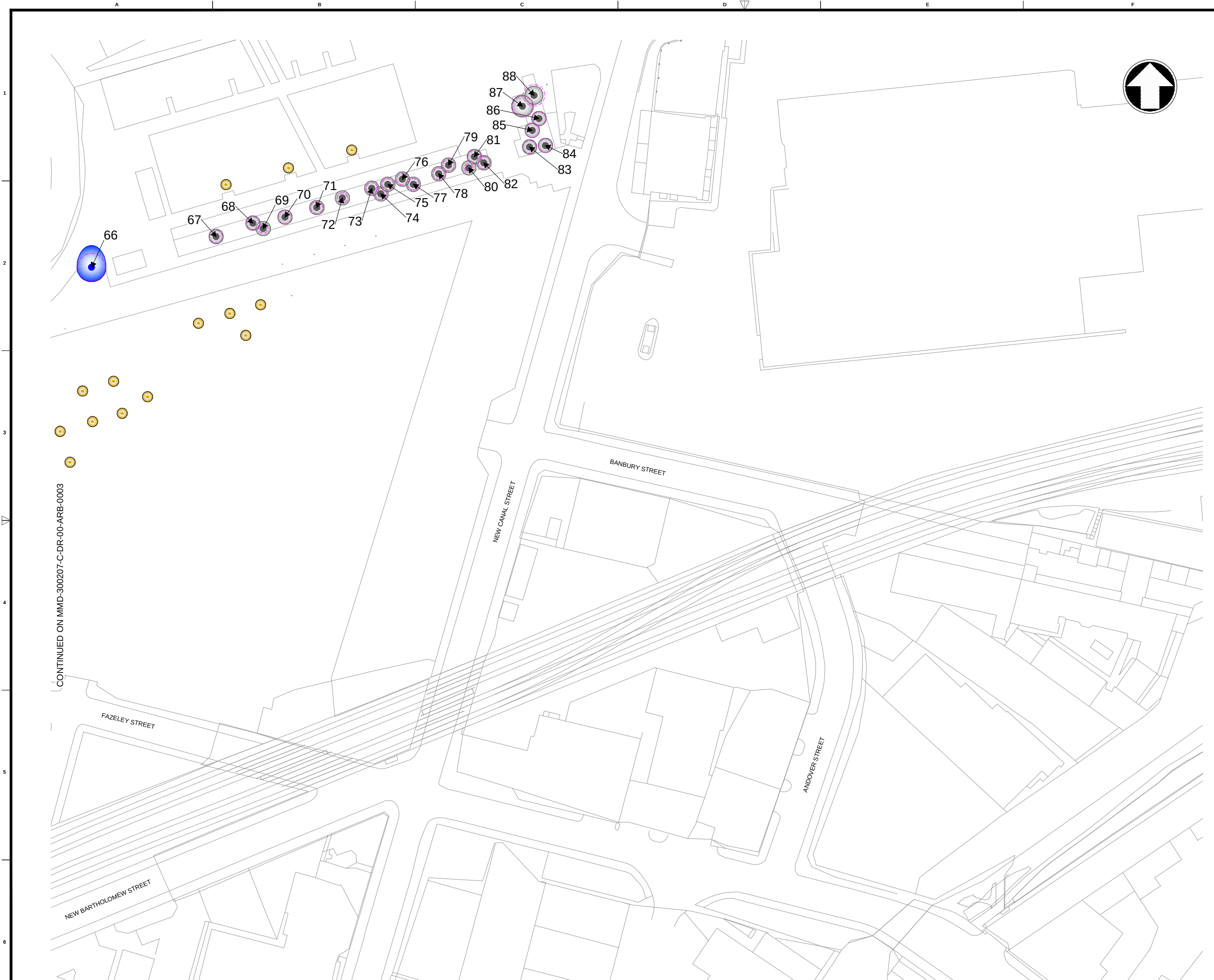
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Midland Metro
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Tree Constraints Plan Sheet 2 of 4

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Dwg check	R Lennon	RL	Approved	C Peeler	CP
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Drawing Number MMD-300207-C-DR-00-ARB-0003					



Notes

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Key to symbols

12 Tree Reference

Approximate extent of canopy

Tree Root Protection Area (RPA)

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

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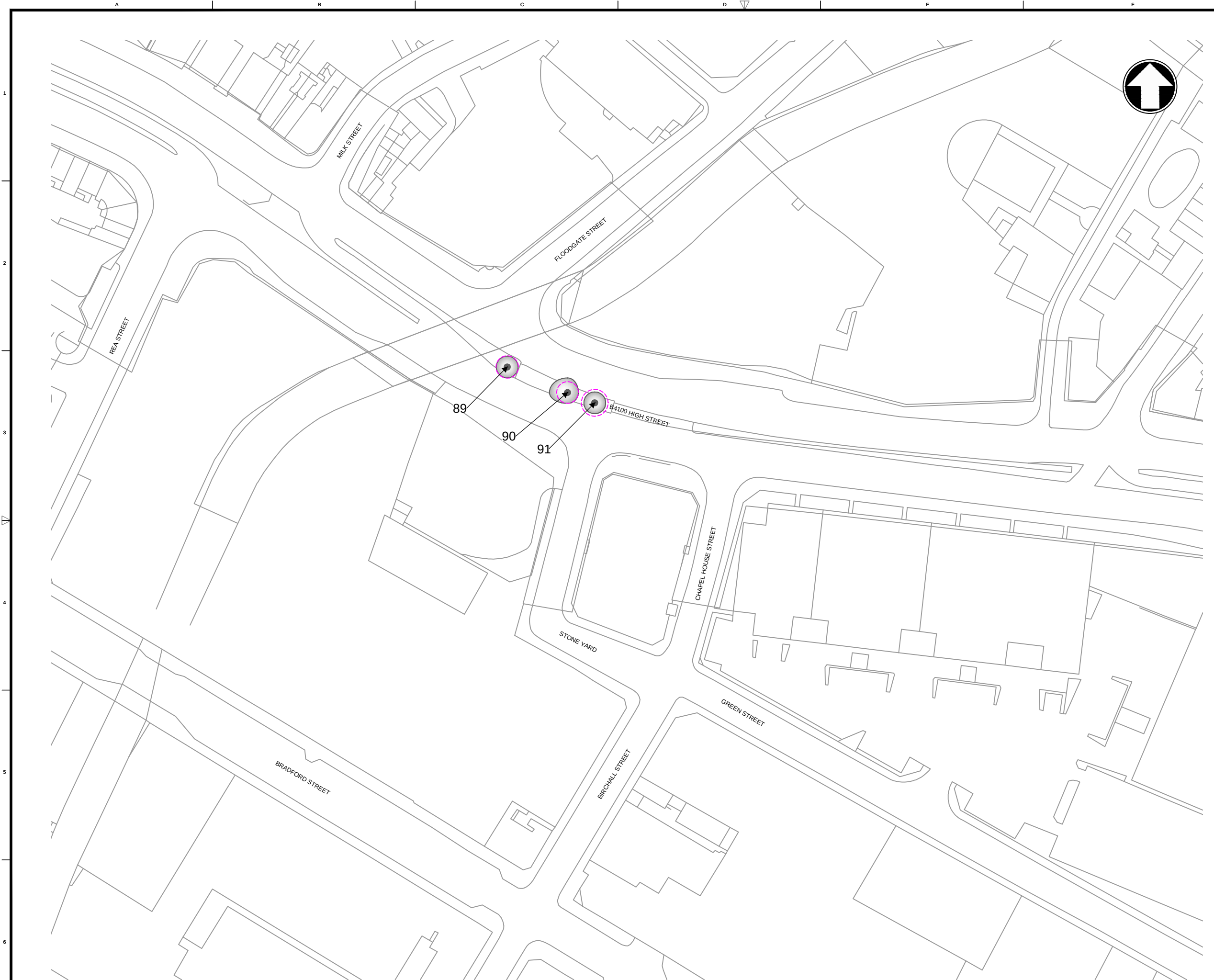
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Midland Metro
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Tree Constraints Plan Sheet 3 of 4

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Dwg check	R Lennon	RL	Approved	C Peeler	CP
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Key to symbols

12 Tree Reference

Approximate extent of canopy

Tree Root Protection Area (RPA)

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

P1	20.05.16	DL	First Issue	RL	CP
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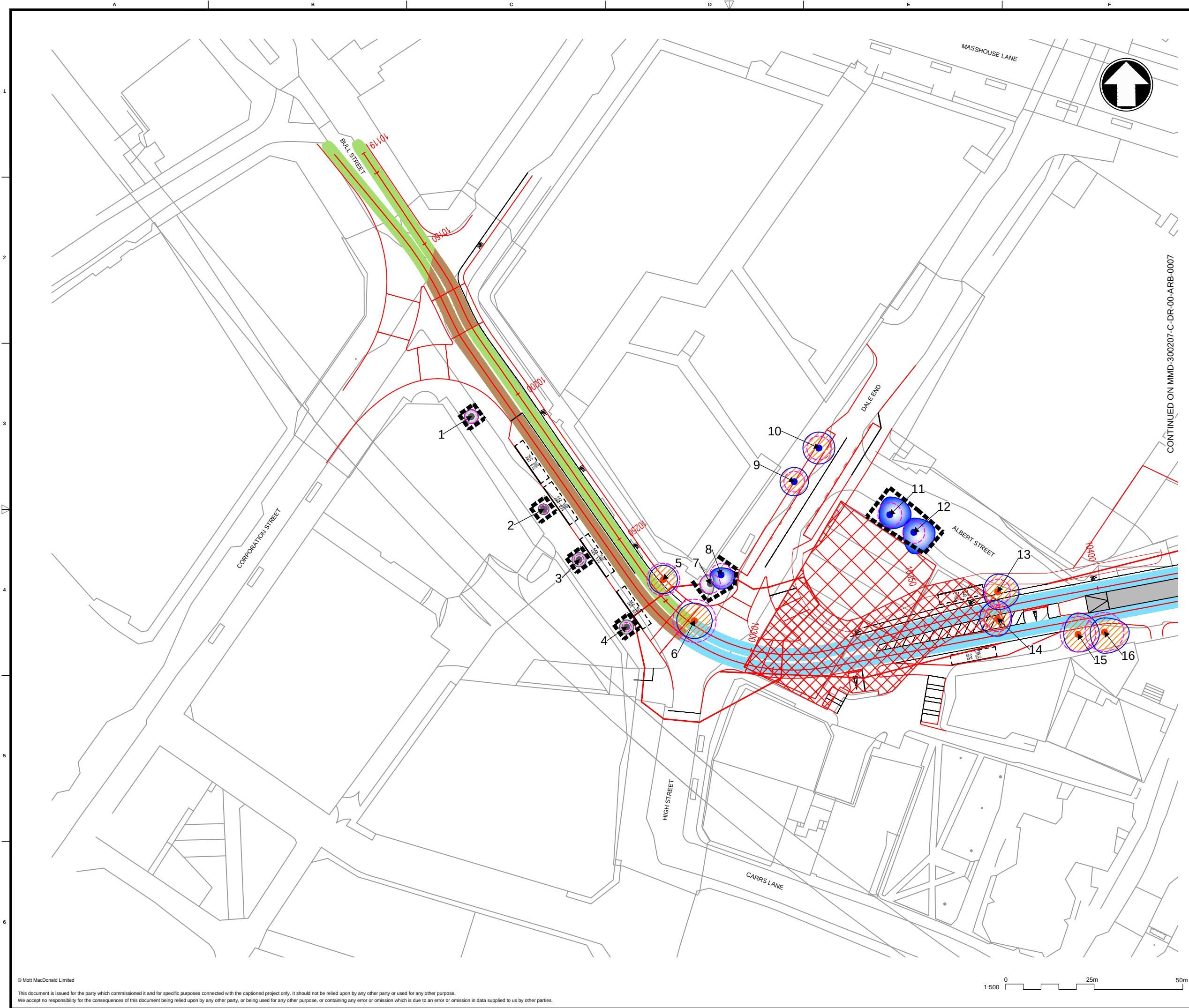
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Tree Constraints Plan Sheet 4 of 4

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Key to symbols

12 Tree Reference

- Approximate extent of canopy
- Tree Root Protection Area (RPA)
- Tree to be removed
- ▬ Protective barrier

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

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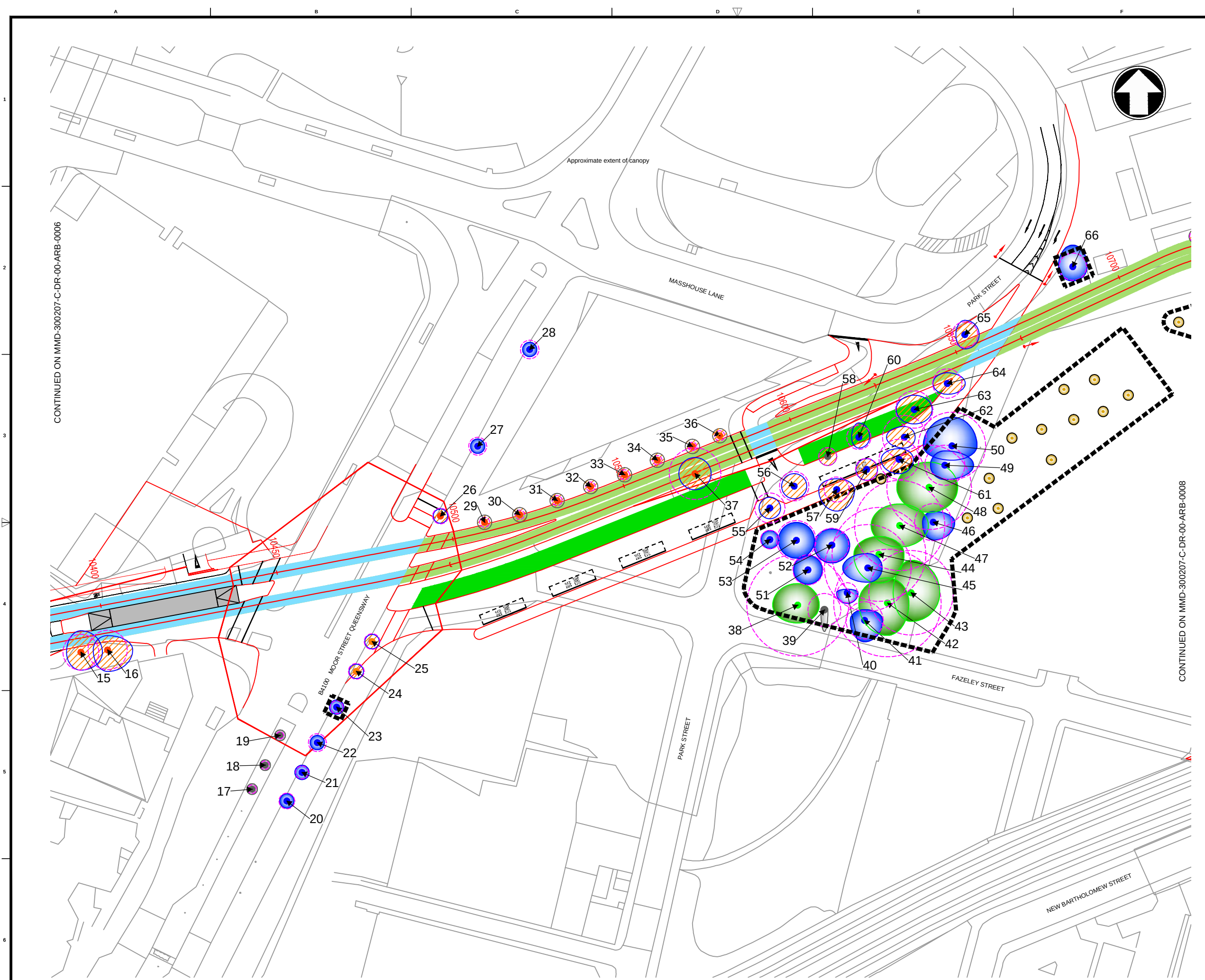
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Tree Protection Plan Sheet 1 of 4

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Key to symbols

12 Tree Reference

- Approximate extent of canopy
- Tree Root Protection Area (RPA)
- Tree to be removed
- ▬ Protective barrier

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

P1	20.05.16	DL	First Issue	RL	CP
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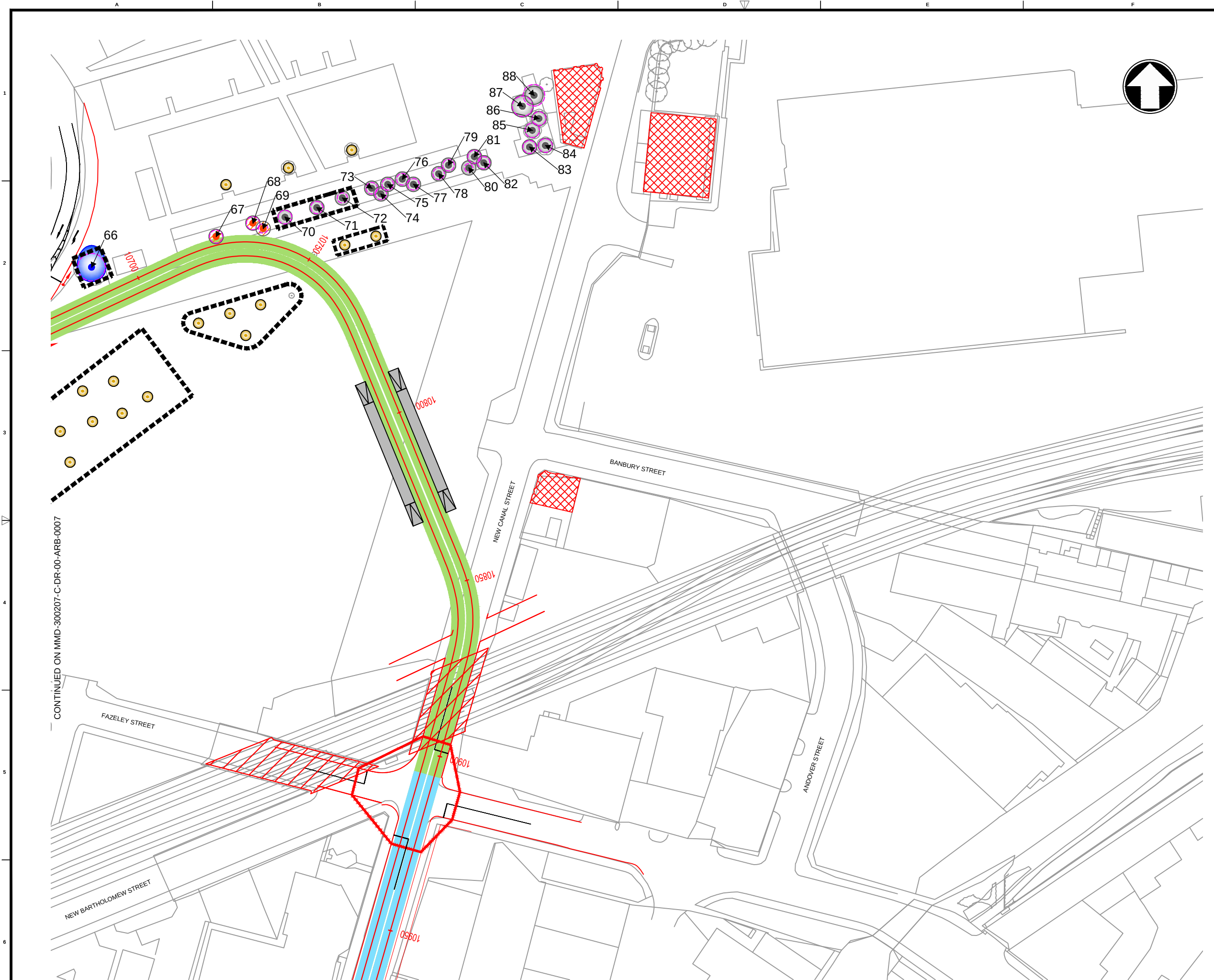
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Tree Protection Plan Sheet 2 of 4

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Key to symbols

12 Tree Reference

- Approximate extent of canopy
- Tree Root Protection Area (RPA)
- Tree to be removed
- Protective barrier

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

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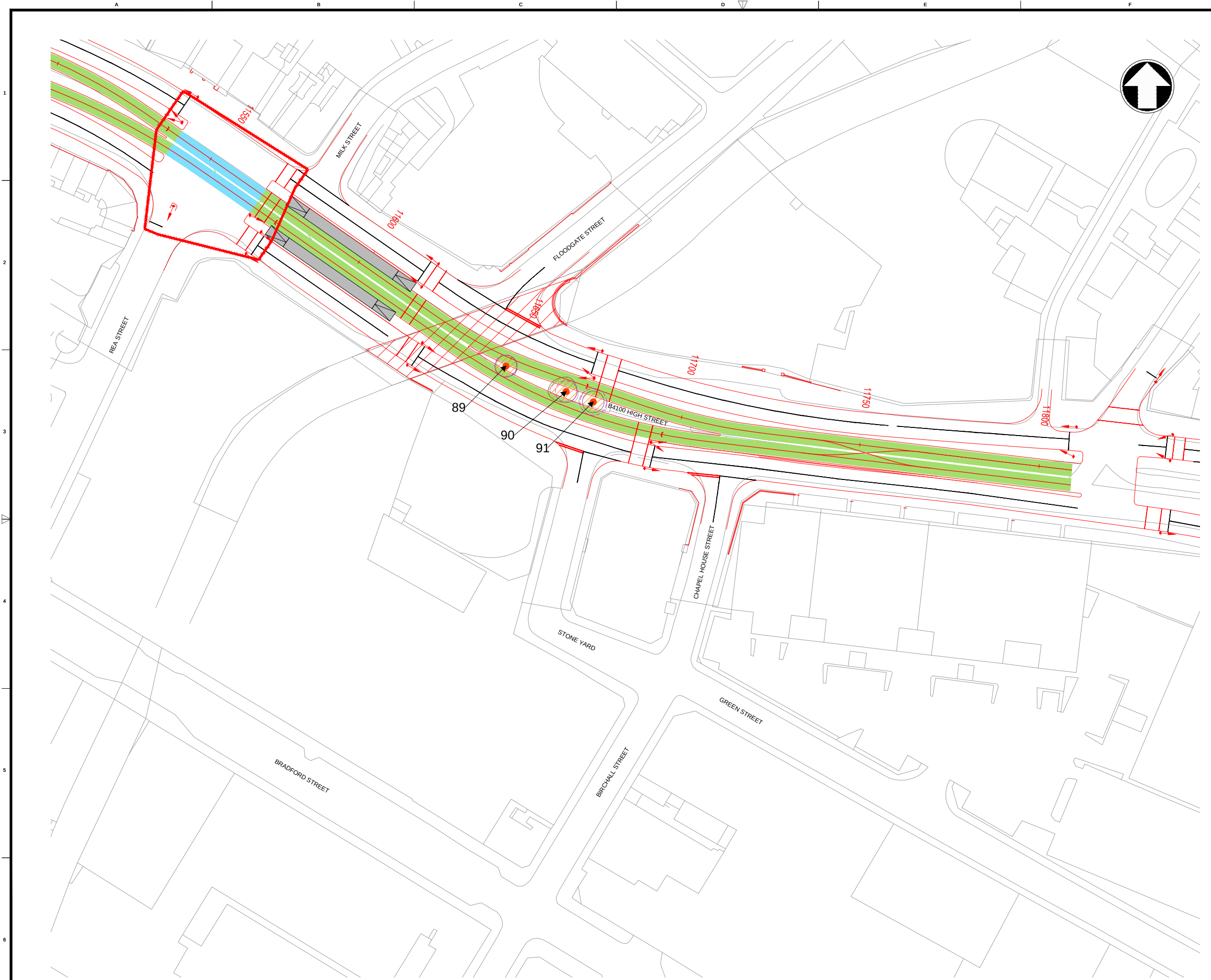
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Tree Protection Plan Sheet 3 of 4

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Key to symbols

12 Tree Reference

- Approximate extent of canopy
- Tree Root Protection Area (RPA)
- Tree to be removed
- Protective barrier

Individual Trees

- Ungraded
- Grade A Trees
- Grade B Trees
- Grade C Trees
- Grade U Trees to be removed for reasons of sound arboricultural management
- Sapling

Reference drawings

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Tree Protection Plan Sheet 4 of 4

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Drawing Number MMD-300207-C-DR-00-ARB-0009					

Appendix B. Key to Tree Survey Schedule

Key to Tree Survey Schedule

Tree Reference	Unique reference or Tree Tag number, identifying each tree and/or tree group on the accompanying plan/s.	
Species	Tree species giving the vernacular and full botanic name.	
Height	Recorded in metres, measured in m from the base of the tree.	
Stem Diameter	Tree trunk diameter measured at 1.5m above ground level (on sloping ground above highest ground level) or immediately above root flare for multi-stemmed trees. Expressed in millimetres. (est) dimension estimated; (av) average or max maximum dimension used in groups.	
Branch Spread	Tree canopy extent taken from centre of tree trunk to edge of general canopy line along the four principal points of the compass (note this distance is to the general canopy line in certain cases and that an exceptional or etiolated branch may extend beyond stated figure).	
Crown Clearance	Existing height above ground level of 1) first significant branch and direction of growth (e.g. 2.4 N); and 2) canopy, to inform on ground clearance, crown/stem ratio and shading. Measured in m (rounded up to nearest half metre for dimensions up to 10m and up to nearest metre for dimensions over 10m).	
Life Stage	Estimated life expectancy assessed in accordance with figures provided in Arboricultural Association Leaflet No. 4 tree Management. Note: these age classes may be pre-fixed with 'Early' or 'Late' in the Tree Survey Schedule to provide a more accurate indication of age.	
	Y	Young: within first quarter of normal life expectancy.
	SM	Semi Mature: within second quarter of normal life expectancy.
	EM	Early Mature: within third quarter of normal life expectancy.
	M	Mature: within final quarter of normal life expectancy.
	OM	Over Mature: senescent trees nearing end of their anticipated life expectancy.
	V	Veteran: exhibiting features of biological, cultural or aesthetic value characteristic of individuals surviving beyond typical age range
	D	Dead.
General Observations	Observations particularly of structural and/or physiological condition (e.g. the presence of any decay and physical defect), and/or preliminary management recommendations.	
Estimated Remaining Contribution	Relates to the potential life expectancy of the tree in its current setting, shown in years as one of the following categories: <10; 10+; 20+; and, 40+.	
Category Grading in accordance with Table 1 (BS 5837:2012)	Tree categorisation as defined by Table 1 – Cascade chart for tree quality assessment of British Standard 5837:2005. Decisions regarding which trees are to be retained should be influenced by their retention categories as suggested below.	
	A	Trees of high quality and value; > 40 years contribution remaining; marked light green on plan. Category is sub-divided as follows: 1 particularly good example; essential component of group e.g. in avenues; 2 screening value, particular visual importance 3 significant conservation, historical, commemorative or other value (includes veteran or wood pasture trees). Tree retention is highly desirable: significant amendments to any proposed development should be considered before removing these trees
	B	Trees of moderate quality and value with a significant life expectancy; > 20 years contribution remaining; marked mid-blue on plan. Category sub-divided as follows: 1 Trees that may be of impaired condition in relation to trees in category above; 2 Trees present in numbers/groups attracting higher collective rating; internal to site, of limited visual impact to locality; 3 Trees with clear conservation or cultural benefits. Tree retention is desirable: amendments to any proposed development should be considered before removing these trees.
	C	Trees of low quality and value; >10 years contribution remaining; marked grey on plan. Includes young trees below 150mm diameter (to which consideration for transplanting should be given). Note that “C” trees will usually not be retained where they would impose a significant constraint on development. Category sub-divided as follows: 1 Trees not qualifying in higher categories; 2 Trees within groups of low landscape value, having limited screening value; 3 Trees with very limited conservation or other cultural benefits. Trees could be retained however the removal of some of these trees should be considered acceptable if required to facilitate any proposed development.
	U	Trees for removal; those in such a condition that are dead, dying, dangerous, severely suppressed or where any existing value would be lost within 10 years; marked dark red on plan. These trees should be removed or treated in such a way as to make them safe where they have high ecological value or benefits.

Appendix C. Tree Survey Schedule

Table C.1: <Insert Table Title here>

Tag Number	Tree Type	Life Stage	Height (m)	Crown Spread (m)				Height + direction 1st significant branch (m)	Crown Height				No of Stems	Stem Diameter (mm)	Root Protection Area (RPA)		Condition				BS5837 Category		contribution (years)	Comment
				N	E	S	W		N	E	S	W			RPA Radius (M)	RPA (m2)	Crown	Stem	Basal Area	General Physical	Category	Sub Category		
1	Common Hornbeam	Young	4.5	2	2	2	2	2n	2	2	2	2	1	160	1.9	11.6	Good	Good	Good	Good	C	2	20+	Not on topographical survey. Street tree, recent planting, resin bound gravel tree pit
2	Common Oak	Young	3	1.5	1.5	1.5	1.5	2	2	2	2	2	1	90	1.1	3.7	Fair	Good	Good	Fair	C	2	20+	Not on topographical survey. Street tree, establishing well in grated tree pit
3	Common Oak	Young	4	2	2	2	2	2	2	2	2	2	1	120	1.4	6.5	Good	Good	Good	Good	C	3	20+	Not on topographical survey. Street tree, establishing well in grated tree pit
4	Common Oak	Young	4	2	2	2	2	2	2	2	2	2	1	110	1.3	5.5	Good	Good	Good	Good	C	2	20+	Not on topographical survey. Street tree, establishing well in grated tree pit
5	Common Lime	Semi mature	8	4	4	4	4	2s	5	5	5	5	1	380	4.6	65.3	Fair	Fair	Fair	Good	B	2	20+	Street tree. Minor wound on stem, occluding. Tarmac surrounded basal area. old pruning wounds
6	Silver Maple	Semi mature	12	5	5	5	5	2	5	5	5	5	1	510	6.1	117.7	Good	Good	Fair	Good	B	2	20+	Street tree, good amenity feature, in good health. Basal area lifting and constrained by block paving
7	Cappadocian Maple	Young	5	2.5	1	3	3	2s	3	3	3	3	1	230	2.8	23.9	Fair	Poor	Poor	Poor	C	2	<10	Half of sapwood dead or missing on trunk. Lots of deadwood in crown.
8	Norway Maple	Semi mature	6	2	4	4	3	2s	4	4	4	4	1	270	3.2	33	Good	Fair	Fair	Fair	B	2	20+	Deadwood in crown, basal area constrained by block paving
9	Small Leaved Lime	Semi mature	8	4	4	4	4	4e	4	4	4	4	1	240	2.9	26.1	Good	Good	Good	Good	B	2	20+	Street tree, good amenity feature. good form and health
10	Common Lime	Semi mature	10	4.5	4.5	4.5	4.5	5	5	5	5	5	1	280	3.4	35.5	Good	Good	Good	Good	B	2	20+	Street tree, good amenity feature. good form and health
11	London Plane	Semi mature	12	5	6	4	3	6w	6	6	6	6	1	280	3.4	35.5	Fair	Fair	Fair	Fair	B	2	20+	Leaning for light, tree grate will soon constrict basal area, recommend removing grate
12	London Plane	Semi mature	14	4	6	6	3	3s	6	6	3	6	1	260	3.1	30.6	Fair	Fair	Fair	Fair	B	2	20+	Leaning for light, tree grate will soon constrict basal area, recommend removing grate
13	London Plane	Semi mature	10	5	6	5	4	5	4	4	4	4	1	300	3.6	40.7	Good	Good	Good	Good	B	2	40+	Street tree, good amenity feature. Lifting paving.
14	London Plane	Semi mature	12	5	4	5	5	5s	4	4	4	4	1	310	3.7	43.5	Good	Good	Good	Good	B	2	40+	Street tree, good amenity feature. Lifting paving.
15	London Plane	Semi mature	14	6	6	5	4	6e	8	6	6	9	1	420	5	79.8	Fair	Good	Good	Good	B	2	40+	Slightly uneven crown distribution due to light, good amenity feature. Lifting paving
16	London Plane	Semi mature	12	4	7	6	4	4n	4	4	4	6	1	460	5.5	95.7	Fair	Fair	Good	Good	B	2	40+	Slight lean for light and uneven crown distribution. good amenity feature. Lifting paving.
17	London Plane	Young	4	1.5	1.5	1.5	1.5	2	2	2	2	2	1	100	1.2	4.5	Good	Good	Good	Good	C	2	40+	New street amenity feature, establishing well
18	London Plane	Young	4	1.5	1.5	1.5	1.5	2	2	2	2	2	1	100	1.2	4.5	Good	Good	Good	Good	C	2	40+	New street amenity feature, establishing well
19	London Plane	Young	3	1.5	1.5	1.5	1.5	2	2	2	2	2	1	80	1	2.9	Good	Good	Good	Good	C	2	40+	New street amenity feature, establishing well

Tag Number	Tree Type	Life Stage	Height (m)	Crown Spread (m)				Height + direction 1st significant branch (m)	Crown Height				No of Stems	Stem Diameter (mm)	Root Protection Area (RPA)		Condition				BS5837 Category		contribution (years)	Comment
				N	E	S	W		N	E	S	W			RPA Radius (M)	RPA (m2)	Crown	Stem	Basal Area	General Physical	Category	Sub Category		
20	London Plane 'Pyramidalis'	Semi mature	9	2	2	2	2	2e	4	4	4	4	1	180	2.2	14.7	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
21	London Plane 'Pyramidalis'	Semi mature	8	2	2	2	2	2	4	4	4	4	1	150	1.8	10.2	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
22	London Plane 'Pyramidalis'	Semi mature	10	2	2	2	2	2s	4	4	4	4	1	210	2.5	20	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
23	London Plane 'Pyramidalis'	Semi mature	9	2	2	2	2	2w	4	4	4	4	1	150	1.8	10.2	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
24	London Plane 'Pyramidalis'	Semi mature	9	2	2	2	2	2e	4	4	4	4	1	180	2.2	14.7	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
25	London Plane 'Pyramidalis'	Semi mature	9	2	2	2	2	3	4	4	4	4	1	180	2.2	14.7	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
26	London Plane 'Pyramidalis'	Semi mature	10	2	2	2	2	4	4	4	4	4	1	180	2.2	14.7	Good	Good	Good	Good	B	2	40+	Wound to base of stem; occluding. Fastigate form. New amenity planting, forms part of avenue of trees
27	London Plane 'Pyramidalis'	Semi mature	11	2	2	2	2	2w	4	4	4	4	1	210	2.5	20	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
28	London Plane 'Pyramidalis'	Semi mature	10	2	2	2	2	2s	4	4	4	4	1	220	2.6	21.9	Good	Good	Good	Good	B	2	40+	Fastigate form. New amenity planting, forms part of avenue of trees
29	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	120	1.4	6.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
30	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	110	1.3	5.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
31	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	120	1.4	6.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
32	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	110	1.3	5.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
33	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	120	1.4	6.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
34	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	110	1.3	5.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
35	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	100	1.2	4.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area
36	London Plane	Young	4	2	2	2	2	2	2	2	2	2	1	120	1.4	6.5	Good	Good	Good	Good	C	2	40+	Young, establishing well. part of newly landscaped pedestrianised area

Tag Number	Tree Type	Life Stage	Height (m)	Crown Spread (m)				Height + direction 1st significant branch (m)	Crown Height				No of Stems	Stem Diameter (mm)	Root Protection Area (RPA)		Condition				BS5837 Category		contribution (years)	Comment
				N	E	S	W		N	E	S	W			RPA Radius (M)	RPA (m2)	Crown	Stem	Basal Area	General Physical	Category	Sub Category		
37	Rowan	Mature	8	4.5	4.5	4.5	4.5	3	2	2	2	2	1	600	7.2	162.9	Fair	Poor	Fair	Fair	B	2;1	20+	Inside temporary hoarding, no direct access, Stem diameter estimated. Very large included union also large wound on stem.
38	London Plane	Mature	14	6	6	5	7	4	5	5	5	5	1	1180	14.2	630	Fair	Good	Good	Good	A	2;1	40+	Located in parkland area. Large, prominent amenity feature. Heavily pruned in past but still good form
39	Italian Alder	Semi mature	8	1	1	6	1	5s	5	5	5	5	1	380	4.6	65.3	Poor	Poor	Good	Fair	C	2	<10	Located in parkland area. Extreme lean to the south
40	Cherry spp	Young	5	1	3	3	3	2	2	2	2	2	1	230	2.8	23.9	Fair	Good	Good	Good	B	2	40+	Located in parkland area. Established amenity feature. Pink double flower blossom
41	Bird Cherry	Semi mature	8	3	5	6	4	2	4	4	4	4	1	430	5.2	83.7	Fair	Good	Good	Good	B	2	20+	Located in parkland area. Not on topographical survey. Uneven crown distribution otherwise good amenity feature
42	London Plane	Mature	15	7	6	9	8	5sw	9	2	4	4	1	1260	15	707	Good	Good	Good	Good	A	2;1	40+	Located in parkland area. Not on topographical survey. Extremely prominent amenity feature.
43	London Plane	Mature	16	9	8	8	5	3s	8	7	5	10	1	980	11.8	434.5	Good	Good	Good	Good	A	2;1	40+	Located in parkland area. Not on topographical survey. Extremely prominent amenity feature
44	London Plane	Early mature	15	5	7	8	7	4n	4	4	4	4	1	1090	13.1	537.6	Good	Good	Good	Good	A	2;1	40+	Located in parkland area. Extremely prominent amenity feature
45	London Plane	Early mature	15	4	4	4	7	4sw	8	8	8	3	1	1010	12.1	461.5	Fair	Fair	Good	Fair	B	2;1	40+	Located in parkland area. Missing one large limb
46	Rowan	Semi mature	9	3	6	5	3	2.5e	4	4	4	4	1	430	5.2	83.7	Fair	Fair	Good	Good	B	2	20+	Located in parkland area. Uneven crown distribution.
47	London Plane	Early mature	16	6	8	6	8	5	5	5	5	5	1	1050	12.6	498.8	Good	Good	Good	Good	A	2;1	40+	Located in parkland area. Prominent amenity feature,
48	London Plane	Mature	15	7	8	7	9	4e	7	7	7	7	1	980	11.8	434.5	Good	Good	Good	Good	A	2;1	40+	Located in parkland area. Extremely prominent amenity feature
49	London Plane	Semi mature	13	4	8	4	4	5e	6	6	6	6	1	470	5.6	99.9	Fair	Fair	Good	Fair	B	2	20+	Located in parkland area. Slight lean due to competition
50	London Plane	Early mature	12	8	7	4	8		6	6	6	6	1	780	9.4	275.3	Good	Good	Good	Good	B	2;1	40+	Located in parkland area. Good form, prominent amenity feature
51	Common Lime	Semi mature	14	4	4	4	4	3s	3	3	3	3	1	350	4.2	55.4	Good	Good	Good	Good	B	2	40+	Located in parkland area. Good form and vigour
52	Common Lime	Semi mature	11	4.5	5	5	5	2s	3	3	3	3	1	390	4.7	68.8	Fair	Fair	Good	Good	B	2	40+	Located in parkland area. One large limb pruned in pruning, crown is compensating
53	Common Lime	Semi mature	12	5	5	5	5	2.5	3	3	3	3	1	460	5.5	95.7	Good	Good	Good	Good	B	2	40+	Located in parkland area. Good even form, prominent amenity feature
54	Common Hawthorn	Semi mature	5	2.5	2.5	2.5	2.5	2	2	2	2	2	1	220	2.6	21.9	Good	Good	Good	Good	B	2	40+	Located in parkland area

Tag Number	Tree Type	Life Stage	Height (m)	Crown Spread (m)				Height + direction 1st significant branch (m)	Crown Height				No of Stems	Stem Diameter (mm)	Root Protection Area (RPA)		Condition				BS5837 Category		contribution (years)	Comment
				N	E	S	W		N	E	S	W			RPA Radius (M)	RPA (m2)	Crown	Stem	Basal Area	General Physical	Category	Sub Category		
55	Sorbus spp	Semi mature	5	3	3	3	3	2	2	2	2	2	1	350	4.2	55.4	Good	Good	Good	Good	B	2	40+	Located in parkland area
56	Bird Cherry	Semi mature	6	3.5	3.5	3.5	3.5	2e	2	2	2	2	1	340	4.1	52.3	Good	Fair	Good	Good	B	2	40+	Located in parkland area. Included union and large burr
57	Great White Cherry	Semi mature	6	3	5	6	5	2	2	2	2	2	1	290	3.5	38.1	Good	Good	Good	Good	B	2	40+	Located in parkland area. Very good spreading form, heavy white blossom
58	Common Hawthorn	Semi mature	5	2.5	2.5	2.5	2.5	2	2	2	2	2	1	210	2.5	20	Fair	Good	Good	Poor	C	2	10+	Located in parkland area. Large amount of deadwood in crown
59	Norway Maple	Semi mature	8	3	3	3	3	2.5	2	2	2	2	1	260	3.1	30.6	Good	Good	Good	Good	B	2	40+	Located in parkland area. Good form and amenity value
60	Crab apple hupehensis 'Cardinal'	Semi mature	6	4	3	3	2	2	2	2	2	2	1	280	3.4	35.5	Good	Good	Good	Good	B	2	40+	Located in parkland area. Pink blossom and leaves tinged purple red
61	Common Lime	Semi mature	12	3	4	4	5	2w	4	4	4	4	1	470	5.6	99.9	Fair	Fair	Good	Good	B	2	40+	Located in parkland area
62	Wild Cherry	Semi mature	10	3	3	3	5	2w	3	3	3	3	1	510	6.1	117.7	Good	Good	Good	Good	B	2	40+	Located in parkland area
63	Common Lime	Semi mature	9	4	5	4	5	2e	3	3	3	3	1	430	5.2	83.7	Good	Good	Good	Good	B	2	40+	Located in parkland area
64	Crab apple hupehensis 'Cardinal'	Semi mature	5	3	5	3	4	2	2	2	2	2	1	340	4.1	52.3	Good	Good	Good	Good	B	2	40+	Located in parkland area. Pink flower and red purple leaf
65	London Plane	Semi mature	8	4	4	4	2.5	3	2	3	3	5	1	300	3.6	40.7	Good	Good	Fair	Good	B	2	40+	Street tree, lifting block paving
66	London Plane	Semi mature	9	6	4	4	4	3e	4	4	4	4	1	320	3.8	46.3	Good	Good	Good	Good	B	2	40+	Street tree
67	Scots Pine	Young	5	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	150	1.8	10.2	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
68	Scots Pine	Young	5	2	2	2	2	2	1.5	1.5	1.5	1.5	1	150	1.8	10.2	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
69	Scots Pine	Young	4	2	2	2	2	2	1.5	1.5	1.5	1.5	1	110	1.3	5.5	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
70	Scots Pine	Young	5	2	2	2	2	2	1.5	1.5	1.5	1.5	1	160	1.9	11.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
71	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	140	1.7	8.9	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
72	Scots Pine	Young	3	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	120	1.4	6.5	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
73	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
74	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
75	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
76	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
77	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
78	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area

Tag Number	Tree Type	Life Stage	Height (m)	Crown Spread (m)				Height + direction 1st significant branch (m)	Crown Height				No of Stems	Stem Diameter (mm)	Root Protection Area (RPA)		Condition				BS5837 Category		contribution (years)	Comment
				N	E	S	W		N	E	S	W			RPA Radius (M)	RPA (m2)	Crown	Stem	Basal Area	General Physical	Category	Sub Category		
79	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	130	1.6	7.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
80	Scots Pine	Young	3	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	100	1.2	4.5	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
81	Scots Pine	Young	4	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	150	1.8	10.2	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
82	Scots Pine	Young	3.5	2	2	2	2	1.5	1.5	1.5	1.5	1.5	1	140	1.7	8.9	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
83	Scots Pine	Young	3	2	2	2	2	0.3	1.5	1.5	1.5	1.5	1	150	1.8	10.2	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
84	Scots Pine	Young	4	2	2	2	2	0.3	1.5	1.5	1.5	1.5	1	160	1.9	11.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
85	Scots Pine	Young	4	2	2	2	2	0.3	1.5	1.5	1.5	1.5	1	170	2	13.1	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
86	Scots Pine	Young	4	2	2	2	2	0.3	1.5	1.5	1.5	1.5	1	160	1.9	11.6	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
87	Scots Pine	Young	4	3	3	3	3	0.3	1.5	1.5	1.5	1.5	1	230	2.8	23.9	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
88	Scots Pine	Young	4	2.5	2.5	2.5	2.5	0.3	1.5	1.5	1.5	1.5	1	250	3	28.3	Good	Good	Good	Good	C	2	40+	Young tree part of landscape planting of pedestrianised area
89	Whitebeam	Semi mature	6	3	3	3	3	2	2	2	2	2	1	260	3.1	30.6	Fair	Fair	Fair	Fair	C	2	10+	Planted in the central reservation area of highway, lifting paving blocks
90	Wild Cherry	Semi mature	8	4	3	3	5	2w	2.5	2.5	2.5	2.5	1	250	3	28.3	Fair	Fair	Fair	Fair	C	2	20+	Planted in centre of highway in raised planting area on central reservation
91	Wild Cherry	Semi mature	8	3	3	3	3	2	2.5	2.5	2.5	2.5	1	310	3.7	43.5	Fair	Fair	Fair	Fair	C	2	20+	Planted in centre of highway in raised planting area on central reservation

Appendix D. Root Protection Area Calculations

Tree	Species	Stem Diameter (mm)	*RPA Circle Radius (m)	*RPA (m2)
1	Common Hornbeam	160	1.9	11.6
2	Common Oak	90	1.1	3.7
3	Common Oak	120	1.4	6.5
4	Common Oak	110	1.3	5.5
5	Common Lime	380	4.6	65.3
6	Silver Maple	510	6.1	117.7
7	Cappadocian Maple	230	2.8	23.9
8	Norway Maple	270	3.2	33
9	Small Leaved Lime	240	2.9	26.1
10	Common Lime	280	3.4	35.5
11	London Plane	280	3.4	35.5
12	London Plane	260	3.1	30.6
13	London Plane	300	3.6	40.7
14	London Plane	310	3.7	43.5
15	London Plane	420	5	79.8
16	London Plane	460	5.5	95.7
17	London Plane	100	1.2	4.5
18	London Plane	100	1.2	4.5
19	London Plane	80	1	2.9
20	London Plane 'Pyramidalis'	180	2.2	14.7
21	London Plane 'Pyramidalis'	150	1.8	10.2
22	London Plane 'Pyramidalis'	210	2.5	20
23	London Plane 'Pyramidalis'	150	1.8	10.2
24	London Plane 'Pyramidalis'	180	2.2	14.7
25	London Plane 'Pyramidalis'	180	2.2	14.7
26	London Plane 'Pyramidalis'	180	2.2	14.7
27	London Plane 'Pyramidalis'	210	2.5	20
28	London Plane 'Pyramidalis'	220	2.6	21.9
29	London Plane	120	1.4	6.5
30	London Plane	110	1.3	5.5
31	London Plane	120	1.4	6.5
32	London Plane	110	1.3	5.5
33	London Plane	120	1.4	6.5
34	London Plane	110	1.3	5.5
35	London Plane	100	1.2	4.5
36	London Plane	120	1.4	6.5
37	Rowan	600	7.2	162.9
38	London Plane	1180	14.2	630

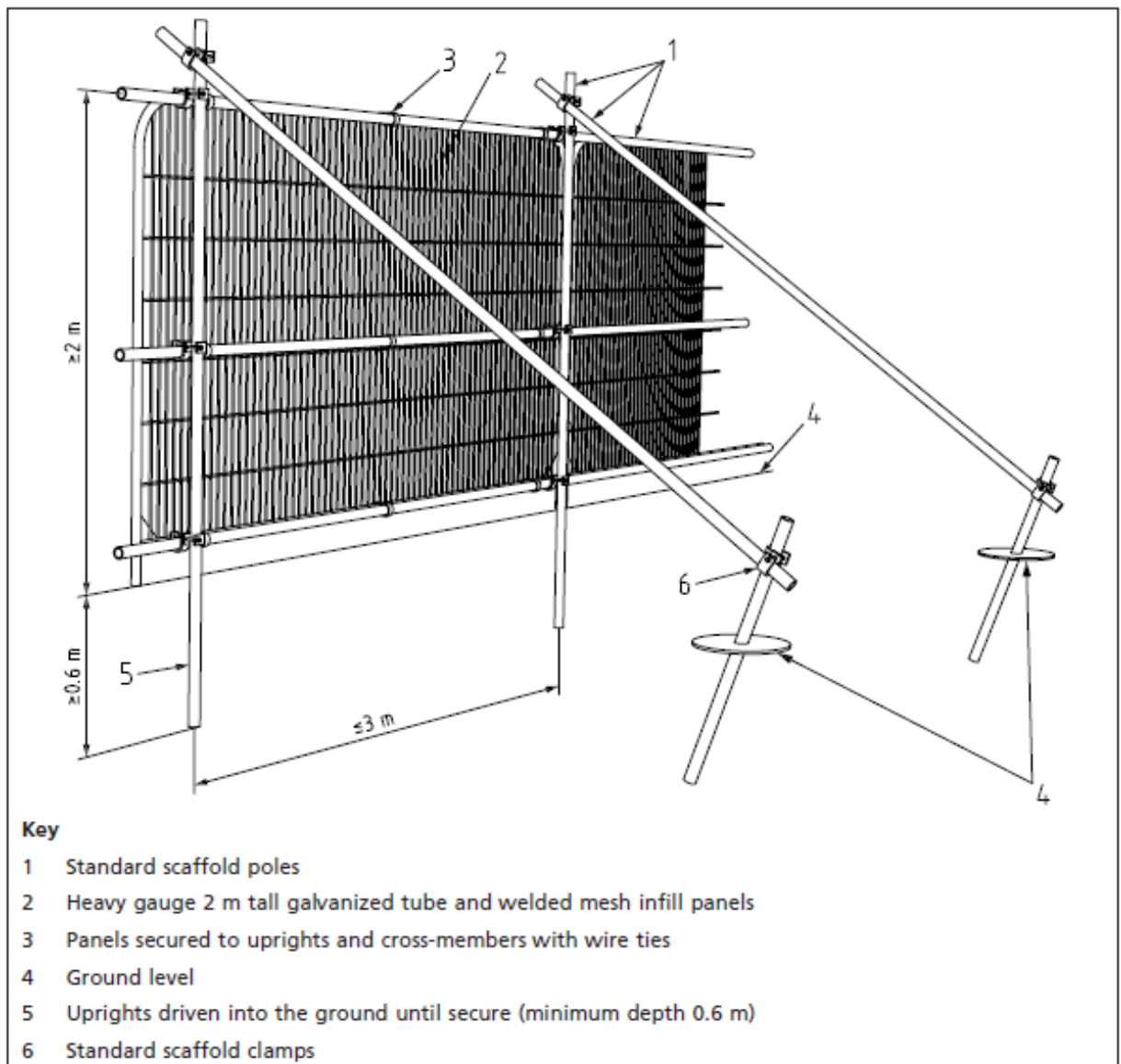
Tree	Species	Stem Diameter (mm)	*RPA Circle Radius (m)	*RPA (m2)
39	Italian Alder	380	4.6	65.3
40	Cherry spp	230	2.8	23.9
41	Bird Cherry	430	5.2	83.7
42	London Plane	1260	15	707
43	London Plane	980	11.8	434.5
44	London Plane	1090	13.1	537.6
45	London Plane	1010	12.1	461.5
46	Rowan	430	5.2	83.7
47	London Plane	1050	12.6	498.8
48	London Plane	980	11.8	434.5
49	London Plane	470	5.6	99.9
50	London Plane	780	9.4	275.3
51	Common Lime	350	4.2	55.4
52	Common Lime	390	4.7	68.8
53	Common Lime	460	5.5	95.7
54	Common Hawthorn	220	2.6	21.9
55	Sorbus spp	350	4.2	55.4
56	Bird Cherry	340	4.1	52.3
57	Great White Cherry	290	3.5	38.1
58	Common Hawthorn	210	2.5	20
59	Norway Maple	260	3.1	30.6
60	Crab apple hupehensis 'Cardinal'	280	3.4	35.5
61	Common Lime	470	5.6	99.9
62	Wild Cherry	510	6.1	117.7
63	Common Lime	430	5.2	83.7
64	Crab apple hupehensis 'Cardinal'	340	4.1	52.3
65	London Plane	300	3.6	40.7
66	London Plane	320	3.8	46.3
67	Scots Pine	150	1.8	10.2
68	Scots Pine	150	1.8	10.2
69	Scots Pine	110	1.3	5.5
70	Scots Pine	160	1.9	11.6
71	Scots Pine	140	1.7	8.9
72	Scots Pine	120	1.4	6.5
73	Scots Pine	130	1.6	7.6
74	Scots Pine	130	1.6	7.6
75	Scots Pine	130	1.6	7.6
76	Scots Pine	130	1.6	7.6

Tree	Species	Stem Diameter (mm)	*RPA Circle Radius (m)	*RPA (m2)
77	Scots Pine	130	1.6	7.6
78	Scots Pine	130	1.6	7.6
79	Scots Pine	130	1.6	7.6
80	Scots Pine	100	1.2	4.5
81	Scots Pine	150	1.8	10.2
82	Scots Pine	140	1.7	8.9
83	Scots Pine	150	1.8	10.2
84	Scots Pine	160	1.9	11.6
85	Scots Pine	170	2	13.1
86	Scots Pine	160	1.9	11.6
87	Scots Pine	230	2.8	23.9
88	Scots Pine	250	3	28.3
89	Whitebeam	260	3.1	30.6
90	Wild Cherry	250	3	28.3
91	Wild Cherry	310	3.7	43.5

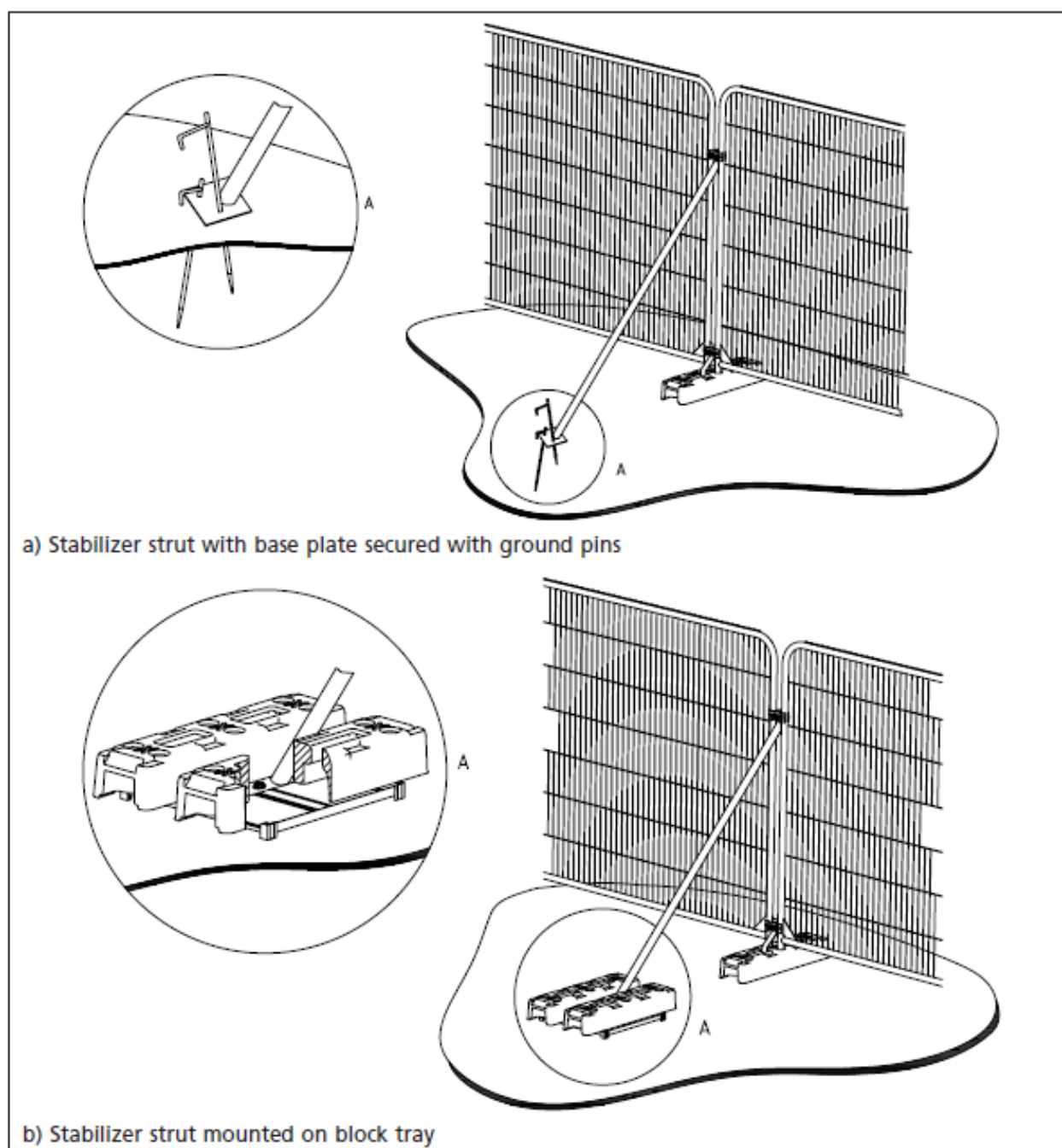
Appendix E. Temporary Protective Fencing and Ground Protection

Permission to reproduce extracts from British Standard BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations is granted by BSI. British Standards can be obtained in PDF or hard copy formats from the BSI online shop: www.bsigroup.com/Shop or by contacting BSI Customer Services for hardcopies only: Tel: +44 (0)20 8996 9001, Email: cservices@bsigroup.com.

E.1 Extract from BS5837:2012: Default Specification for Protective Barrier



E.2 Extract from BS5837:2012: Examples of above ground stabilizing systems



E.3 Extract from BS5837:2012 Ground Protection during Demolition and Construction

6.2.3.2 Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

6.2.3.3 New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

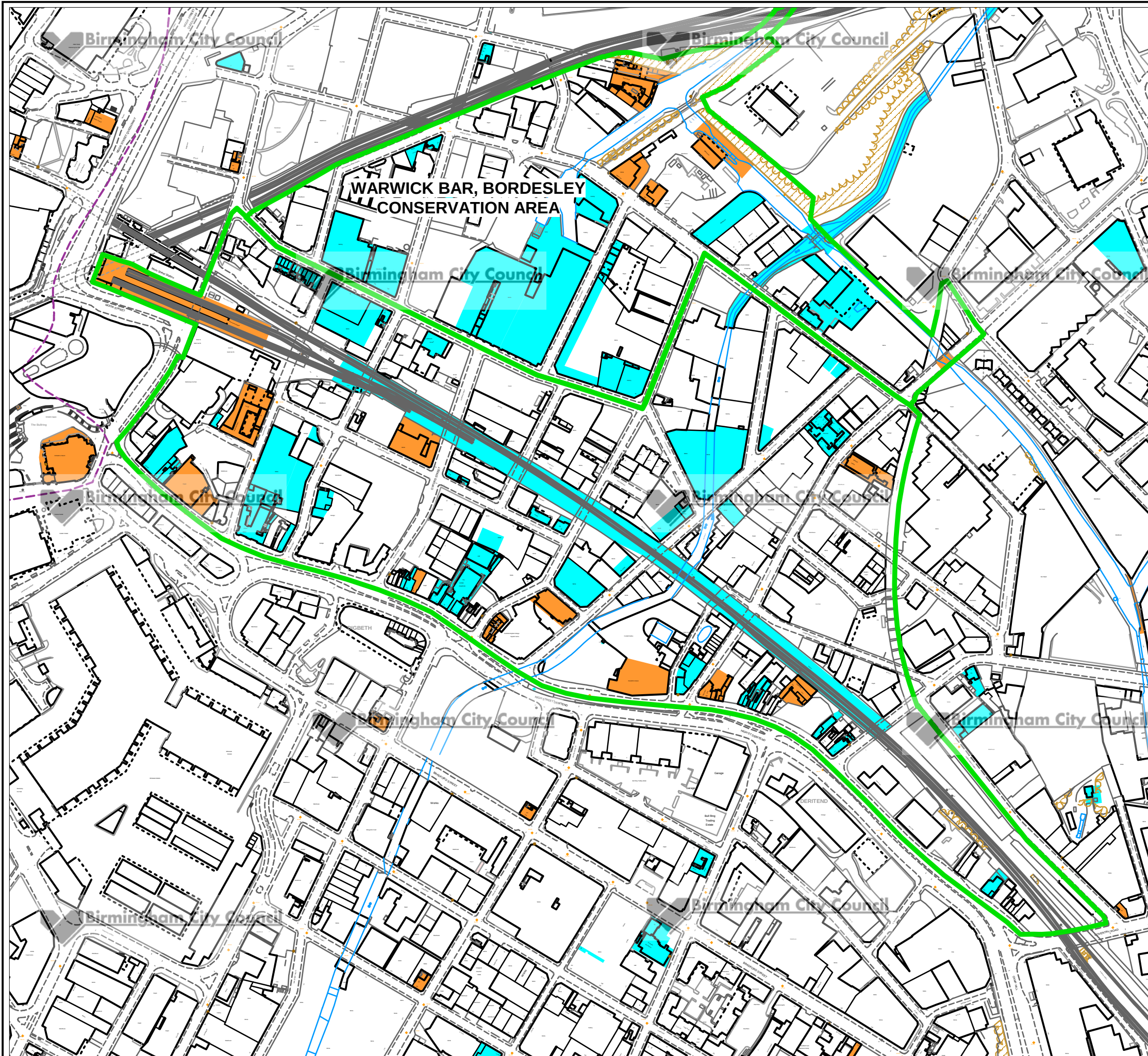
NOTE The ground protection might comprise one of the following:

- a) *for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;*
- b) *for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;*
- c) *for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.*

6.2.3.4 The locations of and design for temporary ground protection should be shown on the tree protection plan and detailed within the arboricultural method statement (see 6.1).

6.2.3.5 In all cases, the objective should be to avoid compaction of the soil, which can arise from the single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

Appendix F. Conservation Area Information



DIGBETH, DERITEND AND BORDESLEY HIGH STREETS CONSERVATION AREA

NO.31



DATE OF DESIGNATION
31ST MAY 2000

AREA 28.68 Ha. (70.86 Acres)

- BOUNDARY OF CONSERVATION AREA
- STATUTORILY LISTED BUILDINGS
- LOCALLY LISTED BUILDINGS



Scale 1:4000



Planning Management
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WARWICK BAR CONSERVATION AREA NO.23



DATE OF DESIGNATION
25TH JUNE 1987

DATE EXTENDED
31ST MAY 2000

AREA 16.19 Ha. (40.00 Acres)

- BOUNDARY OF CONSERVATION AREA
- STATUTORILY LISTED BUILDINGS
- LOCALLY LISTED BUILDINGS



Scale 1:4000



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MAP PRODUCED BY GIS TEAM, STRATEGIC PLANNING

Appendix G. References

British Standard BS 5837:2012 Trees in Relation to design, demolition and construction – Recommendations; April 2012; ISBN 978 0 580 69917 7

British Standard BS 3998:2010 Recommendations for Tree Work; Third (present) edition, December 2010; ISBN 978 0 580 53777 6

The National Joint Utilities Group, Issue 1 – 8th October 2007, Volume 4 - Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees

Arboricultural Association, 1991, Leaflet 4 - Tree Management