

East West Rail Phase 2

Compound A1: Land north east of Charbridge Lane

Environmental Appraisal Report

Appendix D – Arboricultural Impact Assessment

Network Rail

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Contents

Section	Page
1. Introduction	1
1.1 Scope of assessment	1
1.2 Overview	1
1.3 Construction compounds	1
1.4 Compound A1: Land north east of Charbridge Lane	2
2. Methodology	3
2.1 General	3
2.2 Spatial scope	3
2.3 Data gathering	3
2.4 Survey	4
2.5 Limitations to survey	4
3. Existing tree data	5
3.1 Existing tree stock	5
3.2 Local planning authority & relevant policies	7
3.3 Statutory designations	7
4. Arboricultural Impacts	8
4.1 General	8
4.2 Arboricultural Impacts	8
5. Mitigation	10
5.1 Arboricultural mitigation measures	10
5.2 Temporary Highway Works	10
Appendix A Tree survey key and method for measurements and categorisation criteria	12
A.1 Survey Key	12
A.2 Measuring Table	14
A.3 BS5837:2012 Cascade Chart	15
Appendix B	1
B1. Tree survey schedules	1
Appendix C Tree Protection Plan '133735_2A-EWR-OXD-XX-DR-L-019001'	1
Tables	
Table 3.1: Girth sizes to classify ancient trees (true veteran)	6
Table 3.2: Table 3.2: Local planning authorities and relevant policies	6
Table 3.3: Local planning authorities and relevant policies	7
Inserts	
Insert 3.1: tree group G478. This existing gap being for underground utilities	5
Insert A.2: BS5837:2012 measurement of tree stems dependant on tree form methods	14
Insert A.3: BS5837:2012 cascade chart for tree quality assessment	15

1. Introduction

1.1 Scope of assessment

- 1.1.1 This document is an Arboricultural Impact Assessment (AIA) and presents the findings of the tree survey which has been undertaken for the Project. It reports specifically on the impacts on the recorded trees within Compound A1 as part of advanced works planning applications.
- 1.1.2 The tree survey has been undertaken by qualified arboriculturists in accordance with the British Standard *BS5837:2012 'Trees in Relation to Design, Demolition and Construction – Recommendations'* to produce this AIA and is supplemented by a Tree Protection Plan (TPP) covering the compound area, drawing number '133735_2A-EWR-OXD-XX-DR-L-019001'. The TPP is included within Appendix C of this AIA.
- 1.1.3 This AIA assesses the effects of the construction of compound A1 on the existing tree stock, to determine the current extent of tree removals required to facilitate its construction and operation. It forms an appendix to an Environmental Appraisal Report (EAR) being submitted as part of the planning application for the compound.

1.2 Overview

- 1.2.1 Network Rail Infrastructure Limited (NR) have submitted The Network Rail (East West Rail Bicester to Bedford Improvements) Order application, under the Transport and Works Act 1992, for construction and operation of Phase 2 of the East West Rail (EWR) Project; this Order is here referred to as the EWR2 TWAO. This TWAO application has been accompanied by an Environmental Statement (ES), in accordance with The Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 (here referred to as the Applications Rules).
- 1.2.2 The Project Area is within the counties of Oxfordshire County Council (OCC) and Buckinghamshire County Council (BCC) and comprises works along approximately 78 route km of existing railway or railway alignment, running between Bicester in the west to Bedford in the east, with a spur south to Aylesbury and a short spur north to Bletchley. The Project runs through the following local authority areas:
- Cherwell District Council (CDC), within OCC
 - Aylesbury Vale District Council (AVDC), within BCC
 - Milton Keynes Council (MKC), a unitary authority
 - Central Bedfordshire Council (CBC), a unitary authority
 - Bedford Borough Council (BBC), a unitary authority
- 1.2.3 The EWR Alliance would construct the Project. To help ensure that it can be constructed in a timely and cost-effective manner and achieve programme, it is proposed to set up some of the construction compounds required for the Project in advance of the making of the TWAO.
- 1.2.4 Planning applications are being submitted for these advance works; to which this Arboricultural Impact Assessment (AIA) relates to Compound A1. This AIA should read alongside the EAR which describes the advance works entailed in providing these compounds and sets out what the environmental effects of these advance works are expected to be.

1.3 Construction compounds

- 1.3.1 Construction compounds will be required across the Project to facilitate the construction and management activities. Each compound will act as the primary point of access off the local highway network into the site. The siting of compounds has considered feedback from landowners, means of access via the local highway network, environmental features and constraints, existing topography and land ownership.
- 1.3.2 There are two types of compound proposed for advance construction:

- Strategic compound – larger, main compounds from which construction and main project management is undertaken
- Satellite compound – smaller compounds from which construction for that section is managed

- 1.3.3 The Project has been split into six Route Sections based on geography, operation and construction programme and methods. The Route Sections are 2A, 2B, 2C, 2D, 2E and the HS2 Interface Area (which sits between Route Section 2A, 2B and 2E).
- 1.3.4 Advance construction is proposed for eleven of the Project compounds: four in in Route Section 2A; six in in Route Section 2B; and one in in Route Section 2C. The advance compound locations and details are summarised in Table 1.1 in the EAR.
- 1.3.5 These works are programmed to commence in February 2019 and run through to September 2019, prior to the making of the TWAO. Construction periods will be staggered at adjacent locations to avoid peaks in activity and vehicle movements to minimise effects on the local communities and road network, unless the vehicle journeys are planned to serve more than one compound. A summary programme is provided in Inset 1.1 of the EAR.

1.4 Compound A1: Land north east of Charbridge Lane

- 1.4.1 The compound is within Route Section 2A and is a satellite compound. It incorporates site accommodation, hard stand for car parking and materials storage facilities along with an extensive 'laydown' area. The layout of the compound is included on other drawings submitted with the planning application, specifically the 'A1 Site Design' drawing number '133735_2A-EWR-OXD-XX-DR-L-019011'. The layout is not illustrated on the TPP, but the tree constraints were utilised to inform the layout of the proposals. Further details of the compound are provided within the EAR.

2. Methodology

2.1 General

- 2.1.1 This AIA has been undertaken in accordance with the British Standard *BS5837:2012 “Trees in Relation to Design, Demolition and Construction – Recommendations”*. The standard gives recommendations and guidance on the relationship between trees and the design, demolition and construction process, setting out the principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures.
- 2.1.2 *BS5837:2012* does not set explicit parameters for measuring the sensitivity of an arboricultural resource; nor does it assess the magnitude of impact of a proposed development on trees (other than by providing a record of the number of trees that would need to be removed to facilitate the development). Rather, the British Standard provides parameters which enable the arboriculturist to assess the quality of all the trees, hedges and other arboricultural features that may be affected by the development that is proposed. Whilst the BS categories are open to varied interpretation, the guidelines in the cascade chart of *BS5837:2012* (see insert A.1 in Appendix A of this AIA) provide details on how to determine tree qualities and can be used to inform the design process to retain those trees of higher quality where possible.

2.2 Spatial scope

- 2.2.1 The survey included trees both within and adjacent to the compound planning application boundary.
- 2.2.2 The TPP (see Appendix C of this AIA) shows trees that have been surveyed.
- 2.2.3 The redline compound application boundary is shown on the ‘A1 Site Design’ drawing. The redline shown on the TPP covers permanent and temporary landtake required for the TWAO.
- 2.2.4 This AIA is targeted at the impacts on the trees. It does not cover the subsequent impacts such tree removal would have on ecological or landscape receptors.

2.3 Data gathering

- 2.3.1 Data have been collected in accordance with *BS5837:2012*, as outlined in Appendix A of this AIA. The purpose of the tree categorisation method applied by the arboriculturist is to identify the quality and value (in a non-fiscal sense) of the existing tree stock, allowing informed decisions to be made concerning which trees should be removed and which retained if development is to occur.
- 2.3.2 For a tree to qualify under any given category, it should fall within the scope of that category’s definition as defined in Appendix A of this AIA (categories U, A, B, C) and, for trees in categories A to C, it should qualify under one or more of the three subcategories (1, 2, 3). Subcategories 1, 2 and 3 are intended to reflect arboricultural and landscape qualities, and cultural values, respectively. Where trees within the survey schedules (see Appendix B of this AIA) do not have an assigned subcategory, the default position for these trees is for landscape qualities, therefore, subcategory 2.
- 2.3.3 Trees were recorded as individual specimens and groups. Where trees were recorded as groups measurements were either taken from the largest tree within the group or a range was provided incorporating smallest to largest tree measurements. The method of measuring diameters is defined in Appendix A of this AIA.
- 2.3.4 This level of survey meets the requirements of *BS5837:2012*, which states that ‘trees growing as groups or woodland should be identified and assessed as such’. The standard defines the term group as ‘trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally including for biodiversity (e.g. parkland or wood pasture).
- 2.3.5 Crown spreads of the surveyed trees were given as an average measurement or as a range. The average measurement was taken from the cardinal point relevant to the direction of the compound. This level of survey is deemed sufficient by the arboriculturist to establish the extent of the crown spread in

the direction of any future proposals. All crown spread measurements should be taken from the tree survey schedules (see Appendix B of this AIA).

- 2.3.6 The trees were assessed in line with the Visual Tree Assessment (VTA) method developed by Mattheck and Breloer (1994). This method is based on the axiom of uniform stress, whereby a tree will grow in response to environmental stimuli to produce a structure that bears forces evenly across its surface. As such an internal defect, such as decay, would initiate a noticeable change in the stem's shape to accommodate the physical change.

2.4 Survey

- 2.4.1 The tree survey works have been undertaken by qualified and experienced arboriculturists.
- 2.4.2 The approach to the survey involved ground level walked assessments.
- 2.4.3 The locations of individual trees and the start and end points of groups were where possible plotted using proprietary GIS data capture software on Trimble hand-held mobile mappers. These locations were verified using available aerial imagery.
- 2.4.4 Where possible significant trees within the compound area or adjacent to it were recorded as individual specimens, this is to try and ensure their retention where feasible. Significant trees in the context of this AIA relate to the more mature trees.
- 2.4.5 Where trees have been recorded individually as *BS5837:2012* category A, B or C trees, their crown spreads and root protection areas are illustrated on the accompanying TPP. For the tree groups, the outline of the groups has been plotted using available aerial imagery; however, their root protection areas are omitted. Except where individual trees are plotted as part of groups.

2.5 Limitations to survey

- 2.5.1 Where access was restricted due to safety concerns, then the trees were recorded from positions of safety or from available vantage points.
- 2.5.2 Where access permitted, trees were identified and inspected from ground level only and were not climbed. No invasive examination techniques (such as increment boring, or internal decay detection) were carried out and as such no assessment of the internal condition of the wood of these trees can be given. The tree survey undertaken is not intended to be a tree risk management survey targeting safety-related issues. However, in some cases where defects have been recorded then management recommendations have been provided and are detailed within the tree survey schedules (see Appendix B of this AIA).
- 2.5.3 Validity, accuracy and findings of the tree locations will relate directly to the accuracy of the available aerial imagery and the GIS data capture software being used. As such the accuracy of the tree locations is potentially open to discrepancies and their locations may need verifying. Where tree groups have been illustrated as an outline this covers the extents of the tree group. It does not always illustrate individual trees within the groups. Where individual trees were identified they were plotted separately.
- 2.5.4 The report does not comment on possible effects of trees on neighbouring properties, including in relation to subsidence or heave, or with regard to possible hazards presented by trees surveyed.
- 2.5.5 Trees are living organisms subject to changes outside human control. Trees and their environment alter with the seasons and it is as well to inspect trees whilst in full leaf and when out of leaf. Following harsh or unexpected weather conditions, or heavy storms it is also prudent to inspect trees. Changes to ground water conditions will affect the root growth of a tree. Such changes are not always the result of human influence and other factors may be involved.

3. Existing tree data

3.1 Existing tree stock

- 3.1.1 The recorded tree stock form part of the existing railway corridor vegetation and as part of linear groups of trees and shrubs growing along field boundaries. The hedgerows are primarily thorn species and have received periodic management by failing operations, which has damaged some branches on the standard trees, but not significantly at present.
- 3.1.2 The trees recorded are primarily common oak and ash, with a range of age classifications recorded, from young to veteran specimens. They have received minimal past management intervention with varying amounts of dead wood and other defects recorded in some crowns.
- 3.1.3 In some cases, management recommendations have been made to manage the risk of harm to adjacent people or property due to existing defects recorded within the trees. These management recommendations included further detailed inspection by an arboriculturist and crown works to reduce the risk of branch or stem failures towards the compound area. The specific trees and proposed works are also described in section 5 of this report.
- 3.1.4 The proposed area for the compound is a broadly triangular shaped field that is bound by vegetation on all its boundaries. Individual standard oak trees are growing within the field and on its boundaries, these are tree references T190, T191, T192, T193 & T194. The trees are of high landscape amenity value due to the size and scale. They are also of high arboricultural significance given their relatively advanced ages. The layout of the compound has been adapted to ensure the retention of these trees.
- 3.1.5 G478 lies to the east of Bicester road, and comprises a mixture of planted and self-sown stock. Given the limited size and age of the trees the group is of low quality. Insert 3.1 shows the group, at the point proposed for the access into the compound area.



Insert 3.1: tree group G478. This existing gap being for underground utilities.

Veteran trees

3.1.6 The arboriculturists utilised girth size to qualify veteran trees based on criteria established by Neville Fay's 'Defining and surveying veteran and ancient trees' (Fay, 2007). The relevant section of the table has been reproduced in table 3.1. The girth size confirming if the tree has entered into ancient life stages. The arboriculturists also determined veteran trees based on whether the trees are old relative to others of the same species. This is to take into account that different rooting and growing environments can influence growth rates of trees, meaning whilst there may be guidance on stem sizes associated with ancient trees, in some cases the arboriculturists used their own judgement to determine the age of the tree and subsequent identification as a veteran

Table 3.1: Girth sizes to classify ancient trees (true veteran)

Age Class	Tree Stem Size		
	>2.5m stem girth >795mm stem diameter	>4.0m stem girth >1273mm stem diameter	>4.5m stem girth >1432mm stem diameter
Ancient	Field maple Rowan Yew Birch Holly and other smaller trees	Oaks Ash Scots Pine Alder	Sycamore Lime Horse chestnut Sweet chestnut Elm species Poplar species Beech Willows Other pines and exotics

Insert Source: information taken from Table 1 of Neville Fay's 'Defining and surveying veteran and ancient trees', March 2007

3.1.7 The evaluation process revealed the results within table 3.2.

Table 3.2: Ancient trees (true veteran) recorded

Tree Reference	Species & comments	Route Section	Location/nearest post code
T190	Common oak	2A	SP 60284, 23206 Launton, Bicester OX25 6EP
T191	Common oak	2A	SP 60323, 23234 Launton, Bicester OX25 6EP
T194	Common oak	2A	SP 60176, 23271 Launton, Bicester OX25 6EP

3.1.8 These trees shall be retained and the layout of the compound has been adapted to ensure their retention.

3.1.9 Trees can qualify as 'veteran' specimens given the presence of habitat features of certain sizes and number. A process of trying to identify these trees has not been undertaken as part of this assessment. However, the trees growing within the eastern boundary hedgerow contain a number of veteran habitat features, including sections of dead wood and storm damage.

3.2 Local planning authority & relevant policies

- 3.2.1 The report identifies the local planning authority and their planning policies related to trees.
- 3.2.2 The table 3.3 details the local planning authority and relevant planning policies that were observed during a review of their available documentation online:

Table 3.3: Local planning authorities and relevant policies

Local Authority	Documents	Planning Policy
Cherwell District Council	Adopted Cherwell Local Plan 2011-2031 Part 1, July 2015	ESD 10 'The protection of trees will be encouraged' ESD 15 'New development should respect significant trees'

3.3 Statutory designations

- 3.3.1 Trees may be protected through a Tree Preservation Order (TPO). The law on TPOs is in Part VIII of the Town and Country Planning Act 1990 as amended and in the Town and Country Planning (Tree Preservation) (England) Regulations 2012.
- 3.3.2 A TPO is made by a local planning authority in respect of a tree(s) as the tree is considered to bring amenity value to the surrounding area. A TPO makes it an offence to cut down, uproot, lop, top, wilfully damage or wilfully destroy a protected tree without authorisation. Works permitted by an Act of Parliament are exempt from these regulations.
- 3.3.3 No TPO's were recorded within the planning application boundary.

4. Arboricultural Impacts

4.1 General

- 4.1.1 This AIA takes into account the tree stock deemed likely to be affected by the construction and operation of the compound and identifies their condition and suitability for retention. The AIA is supplemented by the TPP (Appendix C of this AIA) that illustrates the following information:
- The red line planning application boundary
 - The trees recorded as part of the survey and their specific reference numbers
 - Trees currently identified for removal as part of the TWAO
 - The provisional location of tree protection fencing (barriers) around trees identified for protection and those that can potentially be retained

4.1.2 The 'A1 Site Design' drawing covers the compound layout, which has informed using TPP. Some trees within the compound red line boundary, and others on its boundary have already been identified for removal as part of the TWAO, these are marked in yellow on the TPP.

4.1.3 The tree survey schedules within Appendix B of this AIA cover all the trees recorded as part of this assessment in line with the *BS5837:2012* guidance. A column has been included to indicate the impact of the compound works.

4.1.4 Entries in the impact column include removal (abbreviated as REM and highlighted as red); part removal of groups (abbreviated as PRG and highlighted as orange); and retained (abbreviated as RET and highlighted as green).

Root protection areas

4.1.5 The root protection area (RPA), as defined in the *BS5837:2012*, is the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. This area should be protected from disturbance "in order to avoid unacceptable damage to the tree as a result of severance or asphyxiation of the root system."

4.1.6 The recommended minimum area (m²) to avoid potentially harmful disturbance has been calculated and entered into the tree schedules (see Appendix B of this AIA) for all trees, while the RPAs of the tree groups have not been illustrated.

4.1.7 The RPA does not take into account existing hard infrastructure or other mechanical impedance that can restrict the spread of tree roots. This relevant for a large majority of trees within the compound which have areas of existing hard stand adjacent to them or they are growing within areas of significant level change to that of the existing ground level, i.e. on sloped banks of a wet ditch. As such there will either be root barriers to growth in certain directions, or the morphology effected by the growing conditions.

4.2 Arboricultural Impacts

4.2.1 The impacts of the work have been assessed, and at present the vegetation removal is limited to part of G351 and G478 to facilitate construction access into the compound and onto the railway corridor.

4.2.2 Tree T194 was identified for potential removal as part of the TWAO but can now be retained as part of the compound works. Similarly, all of tree group G478 was identified for removal as part of the TWAO but now only part removed as part of the compound application.

4.2.3 Tree group G351 is within the existing railway corridor and was identified for complete removal under the TWAO. It is not known whether trees can be retained within this group at present, especially as the haul road from the compound enters at this point.

- 4.2.4 The RPAs of the recorded trees have been used to define the compound layout. These areas shall require protection during the works and the provision of site fencing and tree protection fencing will provide this protection.
- 4.2.5 The protection measures are limited at this time to the provision of protective barriers to define construction exclusion zones (CEZs) in the form of a 'heras' type fencing or similar. The location of protective fencing has been illustrated on the TPP. However, as the layout of the compound has been adapted to retain trees in the north and east of the site, the 'A1 Site Design' drawing illustrates the position of compound perimeter fencing and the location of internal fencing to protect those trees inside the compound facility. This plan shall be utilised to confirm the location of the fencing on site.

5. Mitigation

5.1 Arboricultural mitigation measures

5.1.1 The tree survey schedules (see Appendix B of this AIA) show management recommendations for those trees which at the time of the survey were identified as requiring management intervention to manage the risk of full or partial failure of the tree or tree part. This includes the following trees:

- G480 – fell dead elm within falling distance of compound area
- T194 – detailed inspection of root plate by an arboriculturist prior to any construction operations
- T367 – reduction in height of tree if works within falling distance of the tree due to structural defects recorded
- T368 – detailed inspection of root plate by an arboriculturist prior to any construction operations
- T369 – remove hung-up broken branch and undertake aerial inspection of branch unions within middle to upper crown
- T370 – tree to be coppiced or pollarded as specified arboriculturist after detailed inspection

5.1.2 Those trees that can be retained have perimeter fencing and internal fencing between the trees and the compound area as shown on the 'A1 Site Design' drawing. The use of this fencing will provide continued protection for the trees throughout the construction process and define construction exclusion zones (CEZ). The locations of the internal fencing have been confirmed using the RPA of the trees. The provision of any further fencing can be provided where deemed appropriate by the arboriculturist.

5.1.3 The specification for any further protective fencing should be as a minimum a 'Heras'-type fencing, which should be installed to protect both the crowns and RPAs of trees and to establish a CEZ around the trees. Site operations not permitted in the CEZ without consultation with an arboriculturist include the storage of plant, equipment or materials; vehicular or plant access; the washing down of vehicles or machinery; the handling, discharge or spillage of any substances, including cement washings. No mechanical digging, scraping or excavation shall be permitted in the CEZ and no earthworks or changes in the finished ground levels other than those agreed by an arboriculturist.

5.2 Temporary Highway Works

5.2.1 Considering the scale of these Project elements (which comprise temporary minor works to widen junction splays and create passing places), a simplified assessment of these works has been carried out to identify any that have the potential for significant landscape and/or visual effects.

5.2.2 A localised assessment of the immediate environs within 100 metres of these works has been undertaken to establish the potential for effects on landscape and visual receptors. This is an appropriate Study Area, as the works are too minor in scope and scale to affect the wider landscape character or have a noticeable effect on visual amenity beyond this distance.

5.2.3 For the Temporary Highway Works on Construction Access Routes, mitigation measures include:

- The exact location of road widening and kerb re-alignments within the Project Area will be determined at the detailed design stage. This will follow a detailed assessment of the existing landscape elements, to reduce the effect on existing trees and hedgerows. The Project area for Temporary Highway Works encompasses a larger area than is required for the works.
- Road widening will be carried out on whichever side of the existing highway would have the least effect on existing landscape elements, where practicable. Road widening and kerb re-alignment works will be located in open verge areas where practicable, to minimise impacts on existing trees and hedgerows.
- Where existing mature trees and woodland areas lie in close proximity to the Temporary Highway Works, these will be protected with fencing for the duration of the works.

- Where impacts on existing mature trees are unavoidable (to the crown and/or the root system), an arboricultural consultant will undertake a survey in accordance with *BS5837:2012* which will include:
 - Assessment of the health and condition of affected trees
 - Feasibility of retention
 - Specify any tree works, such as crown lifting/balancing, to facilitate the works, or protection measures to retain the tree if feasible.
- Where hedgerows and/or trees line both sides of the road, and a proportion will require removal to accommodate passing places, the location of the widened highway section shall be determined by considering the likely visual effects. Removal of vegetation that screens the highway from nearby houses and/or PRoW shall be avoided if practicable.

5.2.4 Any trees or hedges that are removed to accommodate the Temporary Highway Works will be re-instated by new planting at the end of the construction phase.

Appendix A Tree survey key and method for measurements and categorisation criteria

A.1 Survey Key

Type: Tree (T), Group (G), Woodland (W), Hedgerow (H)

Tree ID: Sequential reference number given to the tree(s) as shown on the tree survey drawings.

Species: This is the common name given to the tree.

Height (Ht): tree height from the base of the tree to its full stem height, measured in metres (m). Measurements are taken to the nearest half metre or provided as ranges for some groups.

Stem diameter (mm): measured in accordance with figure A1 below. Measurements are provided as ranges for some groups.

Root Protection Area (m²): plotted around each of the category A, B trees on relevant drawings, illustrating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability. The protection of the roots and soil structure is treated as of paramount importance.

Branch spread (m): measurement of crown spread to the four cardinal points; if the crown is balanced a single measurement is given. Crown spread plotted on the tree survey drawings. Measurements are taken to the nearest half metre. In some cases ranges are provided for groups, or maximum spread.

1st significant branch and direction of growth (m): measurement of the height of the first significant branch above ground level, given in metres and direction of growth for some trees e.g. 2.4-N

Canopy height (m): height of the canopy above ground level. Measurements are taken to the nearest half metre.

Life stage: The following abbreviations are used:

NP = Newly planted

Y = Young trees <1/5 life expectancy.

SM = Semi-Mature trees 1/5 – 2/5 life expectancy.

EM = Early Mature trees 2/5 – 3/5 life expectancy.

M = Mature trees 3/5 – 4/5 life expectancy

OM= Over-Mature trees >4/5 life expectancy

VET = ancient tree

Estimated remaining contribution, in years:

<10

10+

20+

40+

Highway reference: Highway plot reference if applicable

Category grading: As per *BS5837:2012* chart in accordance with figure A2 below.

A – Illustrated as light green (RGB code 000-255-000)

B – Illustrated as mid blue (RGB code 000-000-255)

C – Illustrated as grey (RGB code 091-091-091)

U – Illustrated as dark red (RGB code 127-000-000)

General observations, particularly of structural and/or physiological condition: e.g. observations of any decay and physical defect including details of vitality and any preliminary management recommendations where applicable e.g..

Vitality: Good, fair, poor or dead

Good – a tree with little or no obvious physiological defects; leaf density and colour is typical for the species, bud, flower and fruit production are good and there are no signs of dieback at any point throughout the crown.

Fair – a tree with moderate physiological defects; leaf density is less than typical for the species, leaf cover is chlorotic, bud, flower or fruit production are deficient, there are signs of minor dieback within the crown, there is a moderate degree of deadwood within the crown.

Poor – a tree with major or multiple physiological defects; evidence of extensive crown thinning, bud, flower or fruit production is poor or missing, there are signs of advanced dieback throughout the crown, there is extensive or major deadwood throughout the crown.

Dead – a tree that has died due to either old age, drought, disease, pest infestation, physical damage to the main stem or rooting system, or a combination of these factors.

Preliminary management recommendations: any identified preliminary management to rectify defects recorded in general observations. These may include the need for further detailed inspection, or works to address immediate hazard to life or property.

Impact:

Remove – abbreviated as REM in red highlighted box

Part remove – abbreviated as PRG in orange highlighted box

Potential remove – abbreviated as POT REM in yellow highlighted box

Retain – abbreviated as RET in a green highlighted box

Blank – where impact to be confirmed prior to construction or tree outside of current Project boundary

Route Section:

2A

2B

2C

2D

2E

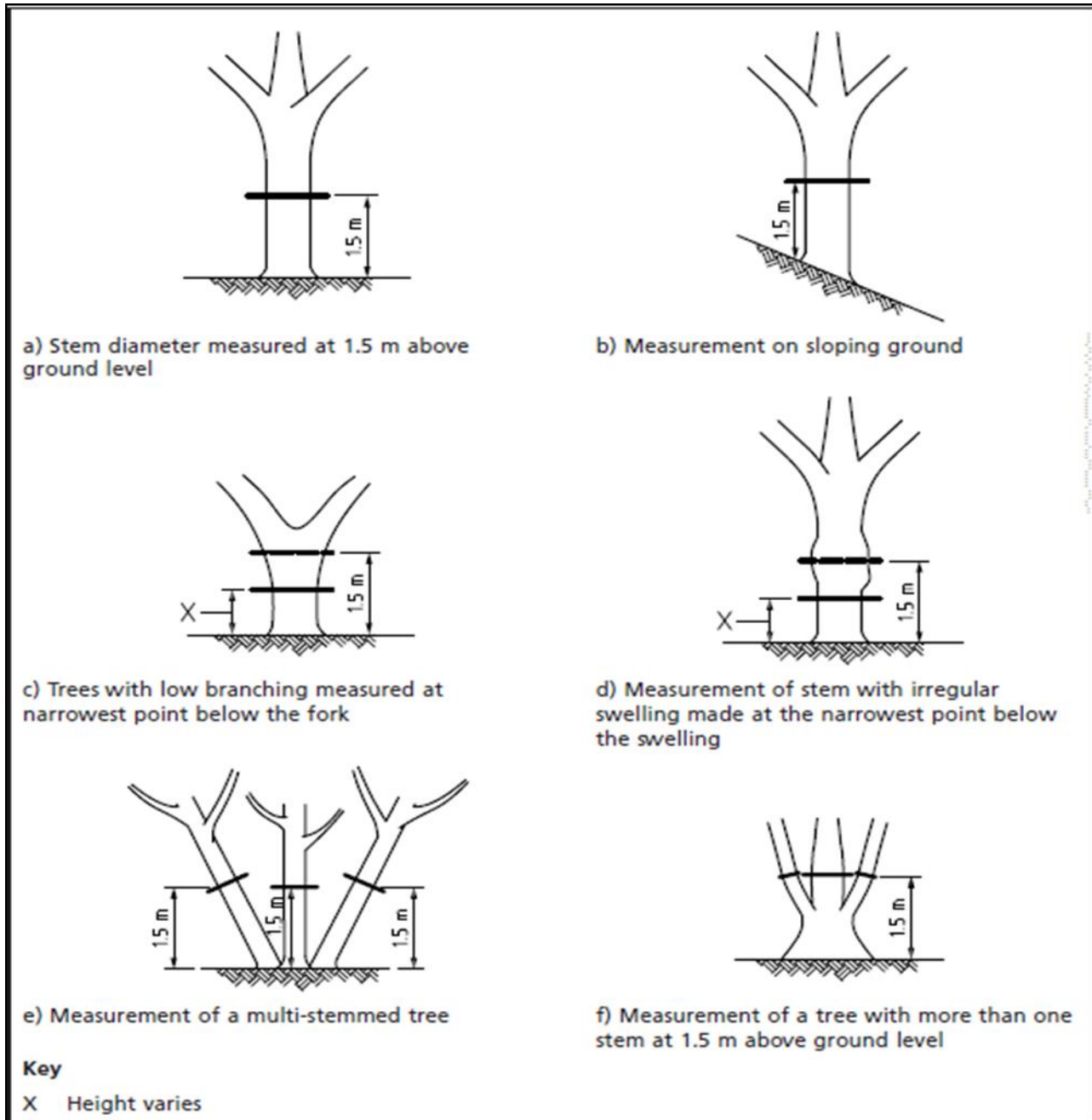
HS2 Interface

(Note: a '#' or '*' will denote that a measurement is estimated)

A.2 Measuring Table

A.2.1 Measurement of tree stems dependant on tree form.

Insert A.1: BS5837:2012 measurement of tree stems dependant on tree form methods



A.3 BS5837:2012 Cascade Chart

A.3.1 Cascade chart for tree quality assessment from BS5837:2012

Insert A.2: BS5837:2012 cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)		
Trees unsuitable for retention (see Note)			
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<ul style="list-style-type: none"> Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <p><i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i></p>		
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation
Trees to be considered for retention			
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value

Appendix B

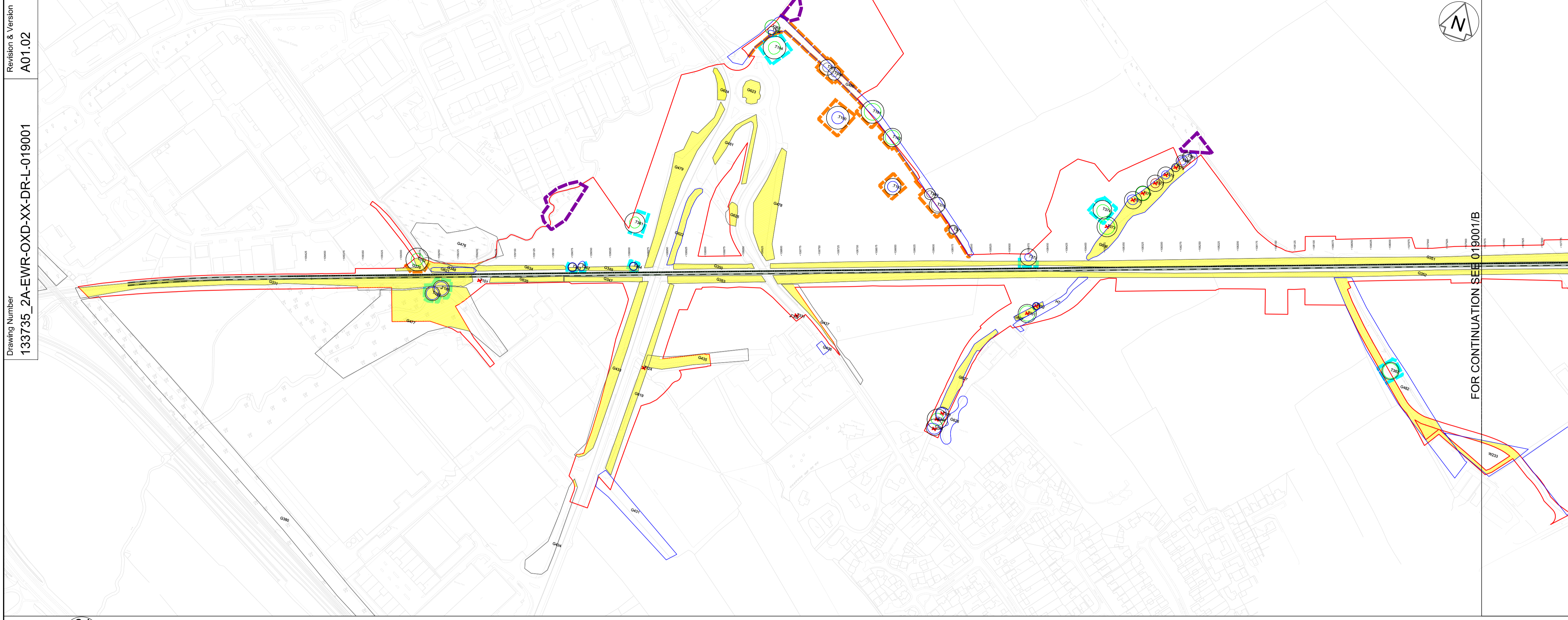
B1. Tree survey schedules

Type	Tree ID	Species	Height	Stem Diameter	RPA Radius	Canopy Spread	First Branch	Canopy Height	Life Stage Y/SM/EM/M	Estimated Remaining Contribution (Years)	Category Grading	General Observations inc. Structural and/or Physiological	Impact (REM, PRG, POT REM, RET, BLANK)	Route Section
G	351	Mixed	5-10	150-300	3.6	0-5	0	0	Semi-Mature	20+	C	Limited visual amenity value; Dense understorey present; Generally scrubby self-set trees	PRG	2A
G	478	Mixed	2-5	150-300	3.6	-	1	1	Semi-Mature	20+	C	Limited public/visual amenity value;	PRG	2A
G	480	Common Ash, Elm, Hawthorn, Blackthorn, Crab Apple, Field Maple	To 18	600	7.2	To 9	n/a	GL	Y-M	40+	B2	Field boundary vegetation. Lapsed hedgerow. Intermittent standard trees. Lower crowns lifted by animal grazing. Occasional dead elm. Fell where within falling distance of compound.	RET	2A
T	190	Common Oak	17	1250	15.0	8 all points	6 all	1.5	M	20+	B1	Exposed, structural root system with 'stil' like appearance. Extensive basal hollowing. <i>Fistulina hepatica</i> decay fungus attached to base of damaged root. Soil compaction at Base. Extensive damage to roots caused by cattle. 15% large diameter deadwood in crown. Fair to good physiological condition. Crown re-trenching.	RET	2A
T	191	Common Oak	20	1250*	15.0	11	3-S	2	V	40+	A1/2/3	Field boundary tree. Good vitality. Basal cavity to south, pronounced buttress roots either side of cavity, indicative of adaptive wood to compensate for any loss in structural stability. Moderate ivy encroachment on main stem to 7m. Co-dominant stems from 6m, union not visible. Obscured by ivy. Moderate diameter dead wood in lower crown, most likely as a result of a competition for light.	RET	2A

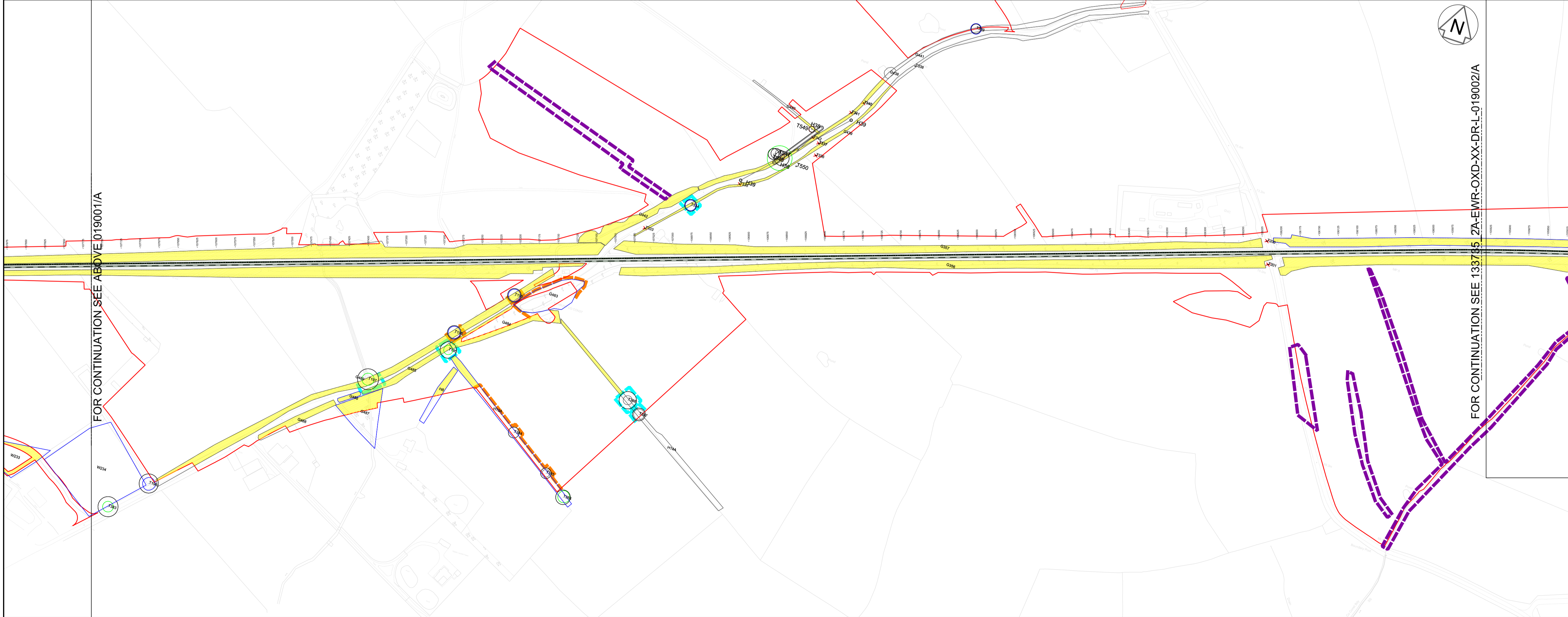
T	192	Common Oak	18	1000*	12.0	9.5	3-S	2	M	40+	A2	Good vitality. Crown break at 4m into Co-dominant stems, union appears sound. Occasional moderate diameter dead wood in lower crown, indicative of a competition for light. Base not accessible. Shallow ditch immediately south. Dry at time of survey.	RET	2A
T	193	Common Oak	15	900	10.8	7 all points	3 all	1.5	M	40+	B1	Soil compaction at base. Significant damage to structural roots caused by cattle. Crown breaks at 5m. Fair physiological condition. Crown thinning in top half, secondary lower crown forming. 5% major and minor deadwood in crown	RET	2A
T	194	Common Oak	18	1260	15.0	N8 E8 S9 W8	3 all	1.2	M	40+	A1	Extensive basal decay. Fungal brackets east side between buttresses. Decay behind can be probed 700mm. Extensive, compensatory growth in root system. Storm damage in crown. 5% large diameter deadwood in crown. Good physiological condition - Detailed inspection of rootplate required if access required within falling distance of tree.	RET	2A
T	365	Common Oak	18	800	9.6	9.5	6-S	4	M	40+	A1/2	Fair to good vitality. Part of field boundary hedgerow. Wet ditch to North. Moderate diameter dead wood in lower crown. Synonymous with competition for light with adjacent trees.	RET	2A
T	366	Field Maple	8	440	5.3	S-9, 4, N-0	2-S	1.6	EM	20+	B2	Fair to good vitality. Crown suppressed to north. Small diameter dead wood in crown. Slight lean on main stem to south. Not significant at present	RET	2A
T	367	Common Ash	17	850	10.2	6 all points	5 all	1.8	OM	10+	C2	Twin-stemmed from 3m. Woodpecker hole at 4.5m in main leader. Old Inonotus hispidus fungal decay bracket attachments above this point in 3 co-dom stems. Further woodpecker holes above. 40% dieback in top of crown. 20% large diameter deadwood in crown. Fair to poor physiological condition - Reduce to a height of 10-12m if access required within falling distance of tree.	RET	2A

T	368	Common Ash	14	700	8.4	4 all points	5 all	2	OM	10+	C2	Inonotus hispidus fungal decay brackets attached to stem at 0.5 and 1.0m. Slight hollow sound in adjacent area. Decay at old wounds throughout crown. Fair physiological condition. 10% large diameter deadwood in crown - Detailed basal inspection if accessed required within falling distance of tree	RET	2A
T	369	Common Ash	7	600*	7.2	4.5	2-SW	2	EM	10+	C2/3	Fair vitality. Sections of sunken bark on main stem. Indicative of internal decay, however, appears localised to north west. Storm damage within crown, hung up broken branch to south east. Further frayed wounds in crown indicative of past storm damage. Remove hung up broken branch. Undertake aerial inspection of crown at same time to assess all branch wounds in crown for decay	RET	2A
T	370	Crack Willow	18	3 x 500	10.4	N & E=11, S&W=8	4 all	1	M	10+	C1	Dense basal growth prevents inspection. Co-dominant stem to south-east historically subsided, appears more recently stable. Storm damage throughout crown. 5% major and minor deadwood in crown. Good physiological condition. Tree liable to further branch failures and storm damage. - Tree may be pollarded or coppiced.	RET	2A
T	371	Field Maple	8.5	500	6.0	5	2-SW	1.7	M	10+	C2/3	Fair vitality. Crown retrenchment. Thinning & dieback in upper crown, through loss in vitality, synonymous with trees entering over maturity. Decay pockets at old branch wounds. Hollow main stem, habitat value. Part of field boundary vegetation	RET	2A

Appendix C Tree Protection Plan ‘133735_2A-EWR-OXD-XX-DR-L-019001’



01
A



01
B

KEY

xxx		Category A Tree + Tree Ref.
xxx		Category B Tree + Tree Ref.
xxx		Category C Tree + Tree Ref.
xxx		Category U Tree + Tree Ref.
xxx		Category A Tree Group/ Woodland Group + Tree Ref.
xxx		Category B Tree Group/ Woodland Group + Tree Ref.
xxx		Category C Tree Group/ Woodland Group + Tree Ref.
xxx		Category U Tree Group/ Woodland Group + Tree Ref.
		Application Boundary and Extent of Permanent and Temporary Proposed Works
		Tree Protection Fencing
		Potential Tree Protection Fencing
		Tree - Group "To Be Removed"
		Tree To Be Removed
		Potential Further Survey Location

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Rev	Date	Description of Revisions	Desd	Chkd	Appr	Suitability
A01	20/06/18	SUBMITTED TO TWAO UNIT				
Accepted for Outline Design						A4



Project
**The Network Rail
(East West Rail Bicester
to Bedford Improvements)
Order**

Drawing Title
**TREE PROTECTION PLAN
ROUTE SECTION 2A
SHEET 2**

Designed	mark inglis	Signed	M. Inglis	Date	20/06/18
Drawn	Anthony Thrower	Signed	A. Thrower	Date	19/10/17
Checked	Thomas Dale	Signed	T. Dale	Date	20/06/18
Approved	Colin Murphy	Signed	C. Murphy	Date	22/06/18

Scale(s)
1:2500
ELR - Project Chainage (Miles Yards)
OXD -

Design Package Risk Classification
Normal

Sheet
2 of 28

Alternative Reference
Revision
A01