Norwich Western Link

Environmental Statement

Chapter 10: Biodiversity

Appendix 10.35: Arboricultural Impact Assessment

Author: WSP UK Limited

Document Reference: 3.10.35

Version Number: 00

Date: March 2024

Contents

Tables

Glossary of Abbreviations and Defined Terms

Term	Definition
Ancient Tree	A tree that has passed beyond maturity and is old, or aged, in comparison with trees of the same species. Characterised by biological, cultural or aesthetic features of interest.
Ancient Woodland	Any wooded area that has been continuously wooded since 1600 AD
Arboricultural Method Statement	A methodology for the implementation of any aspect of development which is within the root protection area, or has the capacity to adversely affect, any retained tree.
Arboriculturist	A person who has, through relevant education, training or experience, gained expertise in the field of trees in relation to construction.
ATI	Ancient Tree Inventory
British Standard BS 5837:2012	Provides guidance and recommendations for the integration of trees and development. To be interpreted by appropriately qualified and experienced persons.
BS 5837	British Standard BS 5837:2012 ‘Trees in relation to design, demolition and construction - Recommendations
Conservation Area	An area of special architectural or historic interest identified by the Local Planning Authority.
Construction Exclusion Zone	An area within which all site clearance and construction activities, access and storage of materials are prohibited.
Crown	The upper part of a tree, measured from the lowest branch, including all branches and foliage.
Notable Tree	A tree that is very large but does not qualify as ancient or veteran.
OCEMP	Outline Construction Environmental Management Plan
Plantation on Ancient Woodland Site	An area of ancient woodland where the former native tree cover has been felled and replaced by planted trees, usually of species not native to the site.

Term	Definition
Root Protection Area	Layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's vitality.
RPA	Root Protection Area
TPO	Tree Preservation Order
Tree Preservation Order	An order made by the Local Planning Authority to protect specific trees, groups of trees or woodlands in the interests of amenity.
Veteran Tree	A tree that has the biological or aesthetic characteristics of an ancient tree but is not ancient in years compared with others of the same species.
WHRA	Wildlife Hazard Risk Assessment

Foreword

The Proposed Scheme is an Environmental Impact Assessment (EIA) development and therefore, under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, requires the submission of an Environmental Statement that presents the likely significant environmental effects of the Proposed Scheme.

This Appendix provides an assessment of the potential impacts associated with Arboriculture arising from the Proposed Scheme as part of the EIA process.

The assessment first determines the potential impacts arising from the construction and operation phases of the Proposed Scheme on Arboricultural Features. The assessment then presents the Mitigation measures and determines the potential residual impacts arising from the construction and operation phases of the Proposed Scheme on Arboricultural Features considering these measures.

The assessment of residual impacts determined the potential effects arising from the construction and operation phases of the Proposed Scheme to be not significant for the majority of Important Arboricultural Features.

The only residual significant negative impacts arising from the construction and operation phases of the Proposed Scheme are the effects of removing high quality features including the loss of veteran trees.

1 Introduction

1.1.1 This Appendix reports the outcome of the assessment of arboricultural impacts arising from the Proposed Scheme.

1.1.2 This Appendix describes the assessment methodology and the baseline conditions relevant to the assessment, which have been used to reach these conclusions, as well as a summary of the impacts leading to the additional compensation measures required to avoid, prevent, reduce or, if possible, offset any likely significant adverse effects, and the likely residual effects and any required monitoring after these measures have been employed. Opportunities for environmental enhancement, where such opportunities exist, are also discussed.

1.1.3 This Appendix (and its associated figures and appended data) is intended to be read as part of the wider Environmental Statement (ES), with reference to **Chapter 10: Biodiversity** (Document Reference: 3.10.00) and **Chapter 9: Landscape** (Document Reference: 3.09.00).

2 Legislative framework, policy and guidance

2.1 Legislative framework

Policy

National planning policy framework

2.1.1 The National Planning Policy Framework (NPPF) 2023, includes relevant guidance in chapter 15: Conserving and Enhancing the Natural Environment. Guidance provided includes:

i) Paragraph 180(b) recognises the economic and other benefits that trees and woodlands provide and the fact that they should be considered as part of a planning decision; and
ii) Paragraph 186(c) identifies the principle that 'development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists'.

National Planning Policy Statement for National Networks

Guidance

BS 5837:2012 Trees in relation to design, demolition and construction - recommendations

2.1.2 British Standard BS 5837 has guided the preparation of this Appendix. It provides recommendations and guidance on the relationship between trees and design, demolition and construction processes. It sets out principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures (irrespective of the need for planning consent). Whilst guiding the process of tree categorisation it contains no methodology for the assessment of significance of impacts.

Ancient woodland, ancient trees and veteran trees: protecting them from development

2.1.3 The Forestry Commission and Natural England have published information for the protection of ancient woodland, ancient trees and veteran trees from

development (**Ref 1.1**). The guidance includes advice on the use of semi-natural buffer zones as a means of protection. Measures need to be proportionate to the development and the potential arboricultural impacts.

Local Air Quality Management Technical Guidance LAQM, Defra 2022

2.1.4 Air quality modelling is detailed in **Chapter 6: Air Quality** (Document Reference 3.06.00). The guidance outlines the critical level for air quality impacts on ecological receptors. Ancient woodland and ancient and veteran trees have been identified within the air quality models.

3 Consultation, scope, methodology and significance criteria

3.1 Consultation undertaken to date

3.1.1 A summary of the consultation activities undertaken in support of the preparation of this assessment is provided in **Table 3.1**.

Table 3-1 Summary of consultation undertaken

Body / organisation	Statutory body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Norfolk County Council Tree officer	Senior tree and woodland advisor	At scoping opinion stage, a presentation of arboricultural survey data was made.	The principles of compensation for loss of trees (including ancient and veteran) were outlined. An agreement for continuing engagement was reached.
Norfolk County Council Tree and Woodland officer	Senior tree and woodland advisor Tree advisor	Meeting of 10 December 2020 to receive feedback on proposed approach to tree and woodland compensation measures and identify areas of convergence or divergence from tree policy and ambitions for enhanced tree cover.	Recognition of the nature and extent of impacts on arboricultural features. Discussion on potential compensation measures for loss of irreplaceable habitat. Agreement in principle over the replacement ratios for loss of arboricultural features.

Body / organisation	Statutory body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Norfolk Wildlife Trust.	Written comments on behalf of the organisation.	No data	Concern over the loss of arboricultural features focussed particularly on associated species and not the inherent value of trees. Wider biodiversity impacts of the loss of arboricultural features are addressed in Chapter 10: Biodiversity (Document Reference 3.10.00).

3.2 Scope of the assessment

3.2.1 The scope of this assessment has been established through a process established in **Chapter 5: Approach to EIA** (Document Reference: 3.05.00).

Elements Scoped out of the assessment

3.2.2 Hedgerows were recorded within the arboricultural survey but individual tree stems smaller than 75mm stem diameter (at 1.5m stem height) were scoped out of the arboricultural assessment. However, a comprehensive hedgerow assessment is included in **Chapter 10: Biodiversity** (Chapter Reference: 3.10.00).

Elements Scoped into the assessment

Construction Phase

3.2.3 The following elements are considered to have the potential to give rise to likely significant effects during construction of the Proposed Scheme and have therefore been considered within this assessment:

- The permanent loss of areas or numbers of irreplaceable habitats, which includes ancient and veteran trees;
- The indirect effects of air quality on ancient woodlands, ancient and veteran trees;
- The removal of a significant number of arboricultural receptors of high, medium and low quality (to include other woodlands and individual trees);
- Damage to soil and tree roots / canopies of retained trees, for example, from soil stripping, that results in deterioration of condition and reduce longevity of retention; and
- Deposition of dust to trees and woodlands.

Operation Phase

3.2.4 The following elements are considered to have the potential to give rise to likely significant effects during operation of the Proposed Scheme and have therefore been considered within this assessment:

- An initial overall net loss in tree canopy cover would persist into the operational phase, until compensation areas of tree planting establish and develop; and
- The increase in deposition of ammonia and oxides of nitrogen, which has the potential to affect existing and compensation planting of trees, tree groups and woodland, particularly the modelled air quality impacts on veteran trees.

3.3 Extent of the Study Area

3.3.1 The Study Area for arboricultural survey was identified as the area of potential direct impacts within which arboricultural features may be physically impacted by the Proposed Scheme. It extends the Site Boundary shown in Appendix 3.10.35c with a buffer of up to 15 metres (following BS 5837). The purpose of the buffer is to ensure that arboricultural features which are outside the footprint of the Proposed Scheme but whose root protection areas extend into the developable area are recorded and considered. The planning application Red Line Boundary extends beyond the Site Boundary as this includes land for compensation which is largely not included within the Study Area although some information has been recorded and therefore included. As there would be no loss of arboricultural features beyond the Study Area this is not considered within this Appendix.

3.3.2 The Study Area for air quality impacts is outlined in **Chapter 6: Air Quality** (Document Reference: 3.06.00). In this Appendix, the indirect effects of air quality on trees addresses those trees which were part of the arboricultural survey. A geographically wider assessment of air quality impacts to ecological receptors, including trees, is included in the Air Quality Appendix 10.34 to **Chapter 10: Biodiversity** (Document Reference: 3.10.00)**.**

3.4 Method of Baseline Data Collation

Desk Study

3.4.1 A desk-study has been undertaken to identify statutory and non-statutory constraints applicable to arboricultural features within the arboricultural Study Area. Broadland District Council is responsible for TPOs and conservation areas within the arboricultural Study Area. Broadland District Council was contacted to identify TPOs within the arboricultural Study Area. Subsequently interactive mapping became available to confirm that information remains current.

3.4.2 Woodland habitat inventory data was examined on Defra's MAGIC mapping system (**Ref 1.2**) which provides authoritative geographic information about the natural environment from across government.

3.4.3 Desk study of data regarding ancient, veteran and notable trees has been undertaken using information held on the Ancient Tree Inventory (ATI), a database maintained by the Woodland Trust.

3.4.4 The ATI contains information volunteered to the Woodland Trust. The voluntary provision of information is inevitably incomplete and the competency of inputs to the ATI is not guaranteed. The ATI is a valuable tool to support field survey by a qualified arboricultural consultant.

3.4.5 The ATI has provided evidence for the existence of numerous ancient and veteran trees within the Site Boundary. The information on these trees includes a grid reference but the voluntary provision of the data does not ensure topographical precision.

Site Surveys

3.4.6 A walkover survey of arboricultural features within the arboricultural Study Area was undertaken (non-continuously) during December 2019 and January and February 2020, with additional surveys in July 2022. The survey was undertaken by a Principal Arboricultural Consultant with their findings shown in sub-appendix 3.10.35a and sub-appendix 3.10.35c.

3.4.7 The arboricultural assessment involved a non-intrusive walkover survey of qualifying arboricultural features, with potential to be affected by the Proposed Scheme.

3.4.8 Qualifying features within the Study Area were inspected and classified by a suitably qualified and experienced arboriculturist in accordance with BS 5837. Qualifying trees are defined as individual trees with a stem diameter of at least 75mm, measured at 1.5m above ground level. Where trees form groups, either aerodynamically through mutual support or by forming a screen or other

such feature, they were recorded as groups or woodlands. This scope was consistent with paragraph 4.4.2.3 of BS 5837.

3.4.9 Each arboricultural feature identified was assessed in transparent, understandable and systematic manner as set out in Table 1 of BS 5837. The trees were assigned a category based on their current condition and status:

- Category A – trees of high quality.
- Category B – trees of moderate quality.
- Category C – trees of low quality.
- Category U – unsuitable for retention - trees in such a condition that they cannot realistically be retained in the context of the current land use for longer than 10 years.

3.4.10 All qualifying trees were inspected from ground level using the Visual Tree Assessment (VTA) method. This is a non-invasive method for ascertaining the physiological and structural condition of trees and may require the use of an acoustic mallet and small probe. The VTA included only the above ground portion of the trees. No aerial inspection, internal sampling or excavation was undertaken, nor any laboratory testing carried out.

Assessment Methodology

3.4.11 The survey was undertaken by a suitably qualified and experienced arboriculturist.

3.4.12 The survey was undertaken with topographical survey data forming the base mapping. The arboricultural survey was undertaken in accordance with the following criteria:

- Arboricultural features have been recorded as tree groups or wooded areas where this has been deemed appropriate. Tree groups have been recorded on the basis that they form distinct arboricultural features either aerodynamically, visually or because they contain trees of similar cultural and biodiversity value. Wooded areas are recorded

where larger expanses of trees exist and included features which may otherwise be referred to as copses, spinneys or shelterbelts.

- Hedges have been recorded where they form substantial internal or boundary features or where they contribute meaningfully to the landscape character of the local area.

3.4.13 The trees have been inspected using a method of Visual Tree Assessment, adopting the following measures:

- The tree survey was carried out from ground level only.
- No tissue samples were taken nor was any internal investigation of the subject trees undertaken.
- Tree heights and crown spreads have been estimated to the nearest 1m.
- Stem diameters were measured in accordance with Annex C of BS 5837. Diameters of single stem trees on level ground have been measured at 1.5m above ground level. The diameters of other commonly encountered stems have been measured where most appropriate and this is recorded within the schedule. The combined stem diameters for multi-stemmed trees have been calculated in accordance with BS 5837 paragraph 4.6.1.

3.4.14 Root Protection Areas (RPAs) were calculated as an area equivalent to a circle with a radius 12 times the stem diameter of single trees, or an extension of tree groups by 12 times the diameter of the dominant edge trees. As set out in BS 5837 the RPA is capped at a radius of 15m.

3.4.15 Following UK Government standing advice (**Ref 1.1**), the RPA for ancient and veteran trees is a buffer with a radius of 15 times the stem diameter with no size cap. Ancient woodlands are given a buffer of 15m.

3.4.16 The survey for veteran trees (of which ancient trees are a sub-set in tree classification terms) considered the following physical features and attributes:

- low, fat, squat shape because the crown has retrenched through age;
- wide trunk compared with others of the same species;
- hollowing of the trunk;
- foliose lichens;
- bryophytes and ferns;
- mistletoe;
- stem and branch cavities;
- natural water pools;
- rougher / more fissured bark;
- vascular plants and other trees;
- suckers;
- extensive hollowing of the trunk;
- dead branches / stag headedness / crown retrenchment;
- wood decaying fungal fruiting bodies;
- decayed areas of wood;
- sap runs / bark fluxes; and
- aerial roots growing into decayed wood or branches.

Significance Criteria

3.4.17 The quality of arboricultural features has been determined in accordance with BS 5837 Table 1, a summary of which is provided in the Tables below. It is a quality assessment and enables comparison between categories. BS 5837 does not interpret the significance of effect in EIA terms of the Proposed

Scheme's impact on these trees but enables informed decisions to be made regarding the removal and retention of arboricultural features in the context of the development. The EIA significance of effect of the tree removal as an ecological resource is considered in **Chapter 10: Biodiversity** (Document Reference 3.10.00).

3.4.18 Ancient and veteran trees are a sub-set of Category A trees with elevated importance. UK Government standing advice (**Ref 1.1**) explicitly identifies the importance of the retention of ancient and veteran trees. The standing advice makes clear that ancient and veteran trees provide an irreplaceable habitat and compensation measures cannot mitigate for their loss.

3.4.19 The quality of each arboricultural feature is defined based on its sub-category, for its arboricultural, landscape or cultural quality and are explained in **Table 3.2, Table 3.3, Table 3.4** and **Table 3.5**. Sub-categories carry equal weight, do not influence retention priority and indicate the primary value(s) associated with each surveyed item. The quality and sub-category assigned to each arboricultural feature are identified within the Arboricultural Survey Schedule included in this report. Estimated remaining contribution, in years, is a professional judgement of the longevity of the trees providing arboricultural, landscape or cultural qualities. Trees are dynamic organisms which are influenced by a variety of environmental variables and whose health and condition can change rapidly.

Table 3-2 Category A sub-categories for arboricultural features with an estimated remaining contribution greater than 40 years

Sub-category	Qualities	Description
1	Arboricultural	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).

Sub-category	Qualities	Description
2	Landscape	Trees, groups, or woodlands of particular visual importance as arboricultural and / or landscape features.
3	Cultural	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood pasture).

Table 3-3 Category B sub-categories for arboricultural features with an estimated remaining contribution greater than 20 years

Sub-category	Qualities	Description
1	Arboricultural	Trees that might be included in Category A, but are downgraded because of impaired condition, such that they are unlikely to be suitable for retention beyond 40 years; or trees lacking the special quality necessary to merit Category A designation.
2	Landscape	Trees present in numbers, usually 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.
3	Cultural	Trees with material conservation or other cultural value.

Table 3-4 Category C sub-categories for C arboricultural features with an estimated remaining contribution greater than 10 years

Sub-category	Qualities	Description
1	Arboricultural	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.

2	Landscape	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.
3	Cultural	Trees with no material conservation or other cultural value.

Table 3-5 Very low quality Category A arboricultural features with an estimated remaining contribution less than 10 years

Sub-category	Description
None	Trees that have serious irremediable structural defects; Trees that are dead or are showing signs of immediate and irreversible physiological decline; or, Trees infected with significant pathogens or very-low quality trees suppressing specimens of better quality.

4 Baseline conditions

4.1 Desk study

4.1.1 No trees within the Study Area were subject to Tree Preservation Orders (TPO). There are no conservation areas within the Study Area. Information was confirmed by e-mail from the Planning Administrator, Broadland District Council, dated 27 November 2019. Subsequently, an interactive map was examined that confirmed there are no TPO.

4.1.2 The ATI was examined as part of the desk study and at intervals thereafter. The number of the records held on the ATI within the Study Area has increased since original surveys were undertaken. Although the ATI listings provide a grid reference, it has not always been possible to reconcile the records to field survey data.

4.2 Survey Results

4.2.1 A total of 377 arboricultural features were surveyed, details of which are provided within the Arboricultural Survey Schedule included in Appendix 3.10.35a of this report. A summary of the surveyed features including their Quality Category is provided in **Table 4.1**. Tree Constraints Plans showing survey results are in Appendix 3.10.35c.

Table 4-1 Summary of surveyed arboricultural features

BS 5837 Category	Quality	Trees	Tree Group	Wooded Areas	Hedges
A	High	127	18	4	3
B	Moderate	87	59	21	17
C	Low	12	8	0	17
U	Very Low	4	0	0	0
TOTAL	**All**	**230**	**85**	**25**	**37**

5 Sensitive receptors

5.1.1 Sensitive arboricultural features are those with elevated statutory or non-statutory environmental recognition. Statutory protection is afforded by TPO but none were present within the Scheme Boundary.

5.1.2 The arboricultural feature Primrose Grove (central grid reference TG13061491) has been identified as ancient replanted woodland. No other ancient woodland is present within the arboricultural Study Area. The air quality assessment identifies sensitive ecological receptors over a wider area than the arboricultural Study Area and a further ancient woodland, Mouse Wood, has been assessed within Appendix 10.34 of **Chapter 10: Biodiversity** (Document Reference 3.10.00).

5.1.3 Application of BS 5837 identifies high quality trees and groups in the Study Area and these are categorised as Category A. They are the most sensitive receptors and includes all ancient and veteran trees. Additionally, the ancient woodland at Primrose Grove, in which the trees were of moderate quality (Category B) has been identified as a highly sensitive receptor. These sensitive receptors have been listed in **Appendix 3.10.35b**.

5.1.4 Individual trees which possess the physical characteristics and attributes of a veteran tree are recorded as ancient or veteran, Category A3, with diameter as a proxy for age being the principal differentiating factor between the two. All ancient trees are also veteran, and the protection afforded to each category (and therefore sensitivity of the receptor) is the same for both ancient and veteran trees. The distinction is primarily of one of arboricultural interest.

5.1.5 Notable trees possess insufficient attributes and criteria to be considered veteran but are typically large for their species. Other trees that do not possess qualifying attributes and features, or diameter, but are particularly fine arboricultural specimens are designated Category A1. Notable trees were present within woodlands, hedgerows and as individual trees. Many were of

very large diameter but exhibited insufficient characteristic features and attributes to be assessed as ancient or veteran.

5.1.6 Woodlands, hedges, groups and linear groups of trees were identified where trees form a cohesive group with a mutual aerodynamic crown, as recommended in BS 5837. Where the groups include trees with physical characteristics and attributes of an ancient and veteran tree they were categorised accordingly. Similarly, groups were notable where they incorporated notable specimen trees.

5.1.7 All arboricultural constraints are shown in Appendix 3.10.35c: Tree Constraints Plan. Ancient and veteran trees, identified as the key sensitive receptors, are shown in Appendix 3.10.35d: Sensitive Arboricultural Features.

6 Assessment of potential effects, mitigation and residual effects

6.1.1 Revisions to alignment have been made during the development of the Proposed Scheme to reduce ecological impacts (discussed in **Chapter 10: Biodiversity** (Document Reference 3.10.00)) including to veteran and other high quality trees. The realignment avoids direct impacts to ancient woodland but is closer than the original alignment. An Outline Arboricultural Method Statement has been prepared as part of the Outline Construction Environment Management Plan (OCEMP**)** which sets out how that document will develop as a live document and sets out in principle the arboricultural protection measures.

6.1.2 The impacts of the Proposed Scheme on arboricultural features would be realised principally at the construction phase.

6.2 Construction Phase

6.2.1 The impacts of the Proposed Scheme on ancient and veteran trees represents a loss of irreplaceable habitat. The impact of detailed design was reviewed case-by-case, as detailed in Ancient and Veteran Trees Avoidance Alignment Optioneering Report (Document Reference 3.04.04), in collaboration between design team and the arboriculturist. Of the 51 surveyed ancient and veteran arboricultural features seven would be lost because of the Proposed Scheme. Veteran trees to be removed by the Proposed Scheme are: T20; T49; T77; T82; LG138; LG141; and T220. The case-by-case review enabled mitigation by design of other veteran trees close to the Proposed Scheme. Retained trees would be protected during construction, with protection measures specified in the Outline Arboricultural Method Statement (Document Reference 3.03.01d) appended to the OCEMP (Document Reference 3.03.01). No additional tree works would be required to retained ancient and veteran trees.

6.2.2 Ancient woodland (W260) is buffered from the Proposed Scheme with 15m between the woodland and the ground works therefore it is not subject to significant direct construction impacts.

6.2.3 During construction the effects associated with dust is not significant (**Chapter 6: Air Quality** (Document Reference 3.06.00)) with appropriate mitigation including the provision of site hoarding and other dust management measures set out in the OCEMP.

6.2.4 The impacts of the Proposed Scheme on other high quality trees, tree groups and woodlands (Category A features excluding A3 veteran trees) involve the removal of 25 trees, and the removal or part removal from six tree groups (including linear features). Additionally, two woodlands would be partly impacted and two high quality hedgerows require removal. Details of removals and part removals of these features are included in the Arboricultural Survey Schedule at Appendix 3.10.35a. Hedgerows receive further detailed consideration in **Chapter 10: Biodiversity** (Document Reference 3.10.00).

6.2.5 The impacts of the Proposed Scheme on moderate quality trees, tree groups and woodlands (Category B features) involve the removal of 37 trees, and the removal or part removal of 31 tree groups (including linear groups of trees). Part removal of 10 hedgerows is required and seven woodlands would be partly impacted. Details of removals and part removals of these features are included in the Arboricultural Survey Schedule. Additionally, 22 low quality (Category C) arboricultural features would be lost or partly removed.

6.3 Outline Compensation Strategy

Veteran trees

6.3.1 The loss of irreplaceable habitat cannot be mitigated but compensation measures in addition to tree planting would be included in the Landscape and Ecological Management Plan (LEMP) for the Proposed Scheme. Compensation measures would include retention of felled material to provide

essential habitats for the local flora and fauna. As referenced in Ancient and Veteran Trees Avoidance Alignment Optioneering Report (Document Reference 3.04.04), after being felled, each veteran tree would be placed as close to their original location as possible or near existing woodland to provide a deadwood habitat area. A 3-for-1 replacement of the RPA of all the veteran trees has been proposed.

6.3.2 Further compensation through veteranisation of established trees and proactive management of veteran trees would also be included in the Compensation Strategy. The detail of the bespoke compensation strategy for veteran trees would be developed with input from ecology and arboriculture and agreed with the Local Planning Authority.

6.3.3 The residual effect on ancient and veteran trees is a major adverse effect that remains significant following the implementation of compensation measures. Monitoring of retained features and of mitigation and compensation measures will be set out in a LEMP secured under planning condition.

Other trees

6.3.4 All planting proposals discussed below would conform with the Wildlife Hazard Risk Assessment (WHRA) report and its management plan to be secured pursuant to a planning condition.

6.3.5 Essential Environmental Mitigation (Document Reference 2.11.00) sets out areas of woodland and scrub creation. The area of compensation planting for Category A trees has been proposed at a ratio of 3:1. The LEMP for the Proposed Scheme would set out a programme for monitoring and maintaining retained features and the mitigation and compensation measures.

6.3.6 The loss of these high quality features cannot be mitigated in the short-term but the new woodland planting would compensate for the losses and provide diversity to the age structure of arboricultural features in the medium to long-term. Enhancement of connectivity between arboricultural features would be beneficial in the medium term.

6.3.7 The loss of moderate quality arboricultural features can be compensated in the medium-term, whilst providing diversity to the age structure of features. A 2-for-1 replacement of the RPA of moderate quality trees has been proposed and locations are shown in Essential Environmental Mitigation (Document Reference 2.11.00). Enhancement of connectivity between arboricultural features would be beneficial in the medium-term.

6.3.8 The removal of low quality arboricultural features would be a minor impact compensated by replacement in the short term with a 1-for-1 replacement of the RPA at locations shown in Essential Environmental Mitigation (Document Reference 2.11.00).

6.3.9 Woodland enhancement would provide additional benefit to compensate for loss of trees, with Primrose Hill adjacent to ancient woodland being enhanced to improve habitats as shown in Essential Environmental Mitigation (Document Reference 2.11.00).

6.4 Operational Phase

6.4.1 Impacts of the Proposed Scheme on arboricultural features have been considered during the operational phase by modelling air quality on sensitive receptors in **Chapter 6: Air Quality** (Document Reference 3.06.00).

6.4.2 The effect of air quality on ancient woodland and veteran trees was modelled as these were the most sensitive receptors amongst trees, tree groups and woodlands. Atmospheric deposition of oxides of nitrogen, ammonia and nitrogen (N) deposition to ecological receptors have been modelled for impacts in 2019 base year, 2029 opening year and 2044. These receptors included the ancient replanted woodland at Primrose Grove and veteran trees. In 2029 and 2044, critical levels for nitrogen dioxide were not exceeded. Cumulative levels of ammonia exceeded a 1% increase of the critical load at Primrose Grove and for up to 25 veteran trees. Similarly, at these sites critical loads of nitrogen deposition exceeded a 1% increase to the critical load threshold. The effect is one of fertilisation and changes to ammonia and N deposition cannot be discounted as having no effect to the ecological

communities associated with the ancient woodland and veteran trees (addressed in **Chapter 10 Biodiversity** (Document Reference: 3.10.00)). The trees are less sensitive to this fertilisation than the associated ecological communities.

6.4.3 The potential effects are negligible in respect of actively growing healthy trees. The additional nitrogen has a modest fertilisation effect. The impacts relate particularly to the associated elements of tree and woodland habitat and the sensitivity of these receptors is addressed in **Appendix 10.34** of **Chapter 10: Biodiversity** (Document Reference: 3.10.00). Monitoring of compensation tree planting to ensure establishment and development of compensation trees and woodland would be detailed in the LEMP for the Proposed Scheme

6.4.4 The trees within the new compensation planting would be assessed at regular intervals in relation to ensure healthy development and minimum stocking density and retention of tree species diversity. Ultimately the area of canopy cover would match and then exceed the baseline, as the compensation planting matures. Veteran trees would be monitored to determine the benefits of pollarding or crown reduction if new growth is accelerated by the fertilisation effects of N deposition. This would mimic the retrenched crown that is a typical characteristic of veteran trees.

6.5 Cumulative Effects

6.5.1 For direct arboricultural impacts, there are no cumulative effects from the Proposed Scheme beyond the sum of tree losses associated with each development proposal, see sub appendix Cumulative Impacts (Document reference 3.10.36). The environmental services provided by trees in terms of ecology and visual amenity are addressed in **Chapter 10 Biodiversity** (Document Reference: 3.10.00) and **Chapter 9 Landscape** (Document Reference: 3.09.00) respectively.

6.5.2 The assessment of air quality impacts within **Chapter 6 Air Quality** (Document Reference: 3.06.00) uses traffic data that addresses future traffic growth and identified highways developments and so is inherently cumulative.

7 Opportunities for environmental enhancement

7.1.1 Arboricultural compensation and enhancement, involving extensive new tree planting has been developed in association with the related disciplines of landscape and ecology and reported in **Chapter 9 Landscape** (Document Reference: 3.09.00) and **Chapter 10 Biodiversity** (Document Reference: 3.10.00). Compensation and enhancement would incorporate professional arboricultural and woodland advice in relation to species selection, planting stock, planting design, tree protection, tree veteranisation techniques and design of open space within woodland and future monitoring.

7.1.2 The trunk and principal limbs of removed veteran trees would be retained as close as reasonably practical to the original locations of trees within compensation areas. The trees would be prone within landscaping schemes or strapped to suitable retained trees. The locational detail would be developed once additional information on the availability of planting areas and logistical sequencing of vegetation removal is finalised with the delivery contractor. This information will be developed as part of the live Arboricultural Method Statement.

8 Difficulties and uncertainties

8.1.1 Direct access to trees for arboricultural survey was possible for most of the arboricultural features. Ivy was not removed for inspection or improved stem measurements. Where access was not available the features were surveyed from neighbouring land and dimensions were estimated.

9 Summary

9.1.1 **Table 9.1** and **Table 9.2** provides a summary of the findings of the arboriculture impact assessment. Monitoring frequency, duration and methods would be detailed within the LEMP for the Proposed Scheme.

Table 9-1 Summary of assessment for construction phase

Receptor	Potential Effects	Additional Mitigation or Compensation	Residual Effects	Monitoring
Ancient and veteran trees	Loss of irreplaceable habitat	Irreplaceable habitat cannot be mitigated but compensation measures include the salvage of deadwood habitat and a net increase in the area of trees. Design would contribute to the connectivity between existing arboricultural features.	Long-term reduction in the quality of arboricultural resource. Long-term increase in the quantity of trees by number and area.	To be detailed within the LEMP, monitoring would be undertaken to ensure the successful establishment of new arboricultural features to meet stocking density and species targets.
Other Category A trees	Loss or fragmentation of high quality arboricultural features	There would be a net increase in the area of trees. Design would contribute to the connectivity between existing arboricultural features.	Long-term increase in the quantity of trees by number and area	To be detailed within the LEMP, monitoring would be undertaken to ensure the successful establishment of new arboricultural features to meet stocking density and species targets.
Category B trees	Loss or fragmentation of moderate quality arboricultural features	There would be a net increase in the area of trees. Design would contribute to the connectivity between existing arboricultural features.	Long-term increase in the quantity of trees by number and area	To be detailed within the LEMP, monitoring would be undertaken to ensure the successful establishment of new arboricultural features to meet stocking density and species targets.
Category C trees	Loss or fragmentation of low quality arboricultural features	There would be a like for like area replacement of trees. Design would contribute to the connectivity between existing arboricultural features.	Medium term replacement of trees by number and area.	To be detailed within the LEMP, monitoring would be undertaken to ensure the successful establishment of new arboricultural features to meet stocking density and species targets.

Table 9-2 Summary of assessment for operational phase

Receptor	Potential Effects	Additional Mitigation or Compensation	Residual Effects	Monitoring
Ancient and veteran trees	Deposition of ammonia and oxides of nitrogen	Buffer planting of trees and scrub habitat. Harvesting and export of vegetation to export nutrient	Impacts to trees manageable. Associated habitat impacts addressed within Chapter 10 Biodiversity	To be detailed within the LEMP, monitoring of veteran tree response. Coppicing, pollarding, or managed crown reduction to mimic retrenchment, to be considered on case-by-case basis.
Other A category trees	Deposition of ammonia and oxides of nitrogen	Buffer planting of trees and scrub habitat. Harvesting and export of vegetation to export nutrient	Fertilisation effect not impactful to trees but potential impacts to associated habitat impacts addressed within Chapter 10 Biodiversity	To be detailed within the LEMP, monitoring of tree response with selected vegetation removal (in accordance with management plans) and export of nutrients from site.
category trees	Deposition of ammonia and oxides of nitrogen	Buffer planting of trees and scrub habitat. Harvesting and export of vegetation to export nutrient	Fertilisation effect not impactful to trees but potential impacts to associated habitat impacts addressed within Chapter 10 Biodiversity	To be detailed within the LEMP, monitoring of tree response with selected vegetation removal (in accordance with management plans) and export of nutrients from site.
C category trees	Deposition of ammonia and oxides of nitrogen	Buffer planting of trees and scrub habitat. Harvesting and export of vegetation to export nutrient	Fertilisation effect not impactful to trees but potential impacts to associated habitat impacts addressed within **Chapter 10: Biodiversity** (Document Reference: 3.10.00).	To be detailed within the LEMP, monitoring of tree response with selected vegetation removal (in accordance with management plans) and export of nutrients from site.

10 References

- **Ref 1-1:** Forestry Commission and Natural England, 2022. *Ancient woodland, ancient trees and veteran trees: protecting them from development* [Online] Available at [Accessed 10 October 2022].< Government website providing guidance on ancient woodland and ancient and veteran trees >
- **Ref 1-2**:Multi-Agency Geographic Information for the Countryside (MAGIC) [online] Available at < Government mapping tool to illustrate habitats, including woodland >