East Meath - North Dublin Grid Upgrade Environmental Impact Assessment Report (EIAR): Volume 3

Appendix A18.2 – Arboricultural Assessment

EirGrid

March 2024

Contents

Appendix A18.2 – Arboricultural Assessment

1. Introduction

This Appendix presents the likely impacts of the East Meath - North Dublin Grid Upgrade (hereafter referred to as the Proposed Development) with respect to arboriculture, including the impact on trees, groups of trees and woodland. Hedgerows and associated potential impacts is considered in Chapter 10 (Biodiversity) in Volume 2 of this Environmental Impact Assessment Report (EIAR). The assessment should be read in conjunction with Chapter 4 (Proposed Development Description) in Volume 2 of this EIAR, with reference to the glossary of arboricultural terms included in Appendix A of this Appendix. This assessment should also be read in conjunction with Figure 18.2 to Figure 18.5 in Volume 4 of this EIAR.

Owing to the size of the survey area and the number of trees within it, and the anticipated low risk of impacts to many of those trees due to works taking place within the existing public road network, a proportional and focused assessment of the existing tree population was conducted. The assessment used a combination of a baseline dataset illustrating tree cover (based on Lidar and aerial imagery via the National Tree Map (NTM), provided by BlueSky International Ltd (2023)), and targeted site survey work to address limitations which could arise from sole reliance on using the data set in this way.

No topographical survey is currently available and therefore all tree locations have been located using Global Positioning System (GPS) and Lidar data, obtained from the NTM data. Stem location is based on the centre of an indicative circular canopy spread, so stem location is also subject to variation.

Land access was available for the majority of the proposed cable route during the ground truthing surveys. Where land was inaccessible and not visible from surrounding accessible vantage points total reliance on the NTM data has been required. Such areas were isolated and small in size and this is consistent with other large scale infrastructure projects where total land access is not fully available. Where areas of land could not be accessed during the walkover survey due to site conditions, lack of access points etc., trees were observed from adjacent accessible land.

The assessment of arboricultural impacts has been based on GIS data analysis using a range of assumptions and filters. As such, the assessment represents the likely potential impacts whilst adopting a precautionary approach. Some trees identified for removal may be able to be retained when further site-based detailed design is carried out. An example of this may be that trees shown as removed are located on a ditch feature that safely separates them from activities during the Construction Phase.

2. Methodology

2.1.1 Study Area

NTM data was purchased for a wide area of the Proposed Development. This represents a very large dataset which is useful to give context to the surrounding area when making route decisions. The specific NTM data analysis can be undertaken on any specific area of trees within the larger project area but to reduce data analysis effort for the purposes of this assessment, the study area was restricted to 30m (metres) on either side of the Planning Application Boundary which includes Temporary Construction Compounds, Horizontal Direction Drilling (HDD) Compounds, access points, permanent Joint Bays and temporary Passing Bays.

An overview of the Proposed Development including its routing and construction methodologies is included in Chapter 4 (Proposed Development Description) in Volume 2 of this EIAR.

A minimum buffer of 30m has been applied to all compound boundaries and the Planning Application Boundary to allow for the capture of any potential veteran trees which can have an uncapped root protection area (RPA) as per the British Standards Institution (BSI) British Standard (BS) 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012), and using the Ancient Tree Inventory (Woodland Trust 2021) of a stem diameter multiplier of 15 as opposed to the standard 12. For a veteran to have an RPA of 30m, it would have a diameter at breast height of 2m. Identifying a tree any larger than this is considered unlikely, therefore resulting in the 30m cap.

2.1.2 Relevant Guidelines, Policy and Legislation

The following legislation was considered:

- Number 30 of 2000 - Planning and Development Act, 2000 (as amended) - Provides for the making of Tree Preservation Orders (TPOs) by the Planning Authority where it is considered desirable to preserve trees on amenity grounds. This prevents the cutting down, topping, lopping or willful destruction of trees without the specific consent of the Planning Authority. Such TPOs do not apply to the cutting of trees which are dead or dying or have become dangerous, or to the cutting of trees in compliance with statutory obligations to prevent or abate nuisance; and
- Number 31 of 2014 - Forestry Act 2014 - Contains the main provisions for the felling of trees. Under this act it is an offence for any person to uproot or cut down any tree unless the owner has obtained permission in the form of a felling licence from the Forest Service, unless a relevant exemption exists.

The following policy was considered:

- Fingal County Council (FCC)Forest of Fingal, A Tree Strategy for Fingal – This document defines FCC's strategy for sustainable management of trees within Fingal County. It includes County specific guidance for how trees should be considered and protected during development (FCC 2023).

The following technical guidance was considered:

- BS5837:2012 Trees in relation to design, demolition and construction – Recommendations – Details the steps that should be taken to ensure that trees are appropriately and successfully retained when a development takes place (BSI 2012);
- National Joint Utilities Group (NJUG), Vol 4 Issue 2 – Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees – Technical guidance to guide the installation of underground services and allow them to co-exist with trees (NJUG 2007);
- BS3998:2010 Tree Work – Recommendations – Gives general recommendations for tree work. It gives guidance on management options for established trees (including soil care and tree felling) and overgrown hedges (BSI 2010);

- Ancient and other veteran trees: Further guidance on good management – Guidance for veteran tree classification and assessment (Ancient Tree Forum 2013);
- A guide for landowners to managing roadside trees – Guidance on the management of roadside trees in Ireland and the relevant legislation (Department of Agriculture, Food and the Marine and Tree Council of Ireland 2021);
- National Park and Wildlife Service (NPWS) – A Inventory of Ancient and Long-Established Woodland in Ireland – Gives details on the identification of veteran trees in Ireland using species and girth, which gives a specific Irish context to the application of the Ancient Tree Inventory Classification system (NPWS 2010);
- Tree Root Systems – Technical advice paper which considers the various factor influencing tree root growth (Arboricultural Advisory and Information Service 2015);
- The Influence of Soils and Species on Tree Root Depth, Information Note, Peter Crow – Technical advice paper which considers factor influencing tree root depth which is of relevance to buried utilities (Forestry Commission 2005);
- The Root Atlas, Central European forest trees and shrubs, Stocker – European study of tree species rooting depth and spread (Lore Kutschera, Erwin Lichtenegger 2002); and
- The Landscape Below Ground, Proceedings of an International Workshop on Tree Root Development in Urban Soils, International Society of Arboriculture P54-61- A Selection of technical papers which discuss tree root development and environmental influences on tree development (Watson and Neely 1995).

2.1.3 Appraisal Method for the Assessment of Impacts

2.1.3.1 Introduction

Data for the appraisal was collected via a two-stage process. Initially data was gathered from GIS datasets and other publicly available sources and subject to detailed GIS analysis. The analysed data was then subjected to ground truthing surveys by qualified arboriculturalists to check for accuracy and provide information which cannot be wholly gathered from desk-based work (in particular the identification of 'significant trees').

2.1.3.2 Desk-Based Assessment

Using NTM data as a baseline dataset, a desk-based GIS analysis was conducted. Several filters were applied to the data to categorise the existing tree stock within the study area. The NTM dataset contains a range of metadata that allowed this approach. For each individual tree record the NTM records:

- Location as co-ordinates;
- Maximum tree height;
- Canopy area as both an indicative circular canopy and as an actual canopy outline; and
- Approximate stem location based on maximum height.

Using the Jacobs Project Mapper GIS database, each NTM record was created as a unique item with an individual reference number. Tree height and tree canopy sizes were banded in size ranges commonly applied to tree inventory databases (Table 2.1 and Table 2.2). Each band was assigned a colour and a score. The combination of both score for height and canopy size was combined to give a total weighting score, which was also assigned appropriate colour scores (Table 2.3).

To keep the combined weighting score consistent with the preceding scoring bands, once added together, the combined score was divided by two to give an average and maintain a five tier banding structure using the same colour symbology.

Table 2.1: Tree Height Banding

Height Range	Weighting
<5m	1
5-10m	2
10-15m	3
15-20m	4
>20m	5

Table 2.2: Tree Canopy Size Banding

	Range (m^2)		
Radius (m)	Bottom	Top	Weighting
1 to 3	0	28.2743	1
3 to 6	28.2744	113.097	2
6 to 9	113.098	254.47	3
9 to 12	254.48	452.39	4
12+	452.4	upwards	5

Table 2.3: Combined Weighting Banding

Combined Score	Colour
1	
2	
3	
4	
5	

This produced a series of heat maps of trees based on height, canopy size and a combined weighting of both. This gives an indication of the location of the 'important' trees in the study area based on the assumption that taller and larger canopied trees will be the most valuable trees in terms amenity / biodiversity / carbon absorption and storm water interception (collectively referred to as ecosystem services, of which there are numerous) and also that taller, larger canopied trees, in general, are older trees (with some species related exceptions). On all the heat mapping plans, trees in the 'darkest' colours are likely to be trees of greatest importance in the study area.

There is a risk that when using this methodology, a very tall tree with a small canopy or a short tree with very large canopy is underrepresented. While such trees would be very unusual, a review of the data indicated that no records fell into either category after scoring was completed.

2.1.3.3 Root Protection Area Mapping

The RPA of any given tree is the area of ground around that tree which should not be disturbed by excavation, compaction, changes in level or other construction / demolition operations. The extent of the RPA is calculated in accordance with BS5837:2012 Trees in relation to design, demolition and construction – Recommendation (BSI 2012), and is an important metric for understanding the impact a proposal will have on tree removal and retention and how to protect those trees retained.

It is well known that there is a strong relationship between tree height and stem diameter. While this can be influenced by many factors including climate and soils, for the purpose of the desk-based assessment, a ratio of 0.65 was selected. Using this, all trees in the dataset for the study area were assigned an approximate / indicative RPA as calculated as per BS5837:2012 Trees in relation to design, demolition and construction – Recommendation (which is 12 x stem diameter measured at 1.5m from ground level). The majority of available studies on the relationship between tree height and stem diameter have been carried out in the United States of America on forestry trees. Therefore, the RPA generated in this way is likely to underestimate the stem diameter of an open grown tree in Ireland. To allow for this, a second RPA was applied to the NTM indicative circular tree canopies. This was applied as a 2m buffer on the outside of the canopy.

It is a common misconception that tree roots are confined to the canopy drip line of the tree. Numerous studies, as well as in the BS5837:2012 Trees in relation to design, demolition and construction – Recommendation guidance, make it clear that this is not always the case. By applying a 2m buffer, it is considered reasonable that the majority of average tree RPAs will be represented. Tree root morphology is complicated, and few trees grow perfectly circular root systems as calculated by BS5837:2012 Trees in relation to design, demolition and construction – Recommendation. An RPA provides a notional circular buffer around a given stem based on the stem diameter taken at 1.5m. However, this is not necessarily representative of a tree root system, for example, the roots may extend beyond the RPA boundary on one side and remain inside it on the opposite. The root network extent is dependent on many factors including species, age, soil conditions, topography and exposure etc. The assessment has not taken consideration of these above and shows RPAs as an indicative circular form. The two RPAs applied to the individual trees represent what would be reasonably expected to be a maximum and minimum RPA of the trees, with a few notable exceptions, which are discussed in Section 2.1.3.4.

Trees have a finite reserve of energy, produced (and excess stored) each year, throughout the spring / summer seasons, which is utilised for biological processes such as growth and defence against pests or diseases.

Any scheme in proximity to trees has the potential to cause harm to those trees unless control measures are identified and acted upon. As such, it is essential to consider the relationship between the Proposed Development and the retained trees to identify what precautions are necessary and proportionate. The Proposed Development has the potential to impact upon the above ground (canopy, stems and branches) and below ground (rooting environment) parts of the trees.

Whilst some clear and obvious physical damage can occur to trees during the Construction Phase, such as to stems and branches, other impacts are not always so immediately evident, such as damage to the soil structure by compaction and / or changes in ground levels causing root damage, altering the water table and affecting moisture availability.

This assessment recognises that activities during the Construction Phase pose a real and significant threat and assesses the likely impacts of the proposals on the tree stock and, where appropriate, provides mitigation with the view of achieving a harmonious relationship between the trees and the built form.

2.1.3.4 Identifying trees of Significance

Using the weighting system, 'significant' trees are identified through colour coding. However, a desk-based survey runs a high risk of missing 'significant' trees when the assessment criteria is based purely on size metrics.

A significant tree is considered to be:

- An ancient, veteran or notable tree, assessed as per Ancient Tree Inventory (Woodland Trust 2021) (that is a tree of great age for the species, of great girth for the species and exhibiting veteran tree features.);
- Large mature tree (or cohesive groups of trees, and woodland) which would be considered A category under BS5837:2012 Trees in relation to design, demolition and construction – Recommendation (BSI 2012) (Appendix B contains BS5837:2012 categorisation description);
- A tree notable for its ecological / cultural or historical significance, these are likely (but not exclusively) to be found on townland boundaries;
- Ecologically important trees; and
- Trees covered by TPOs.

A TPO check was conducted in County Meath (Meath County Council (MCC) 2021) and Fingal (FCC 2021) and no TPOs were identified in the study area.

The Woodland Trust maintains the Ancient Tree Inventory which is an online resource which records notable veteran and ancient trees across the United Kingdom and Ireland. This inventory was checked and no records were identified in the study area (Woodland Trust 2021). The Heritage Trees of Ireland was checked for any records within the study area and none were found (National Biodiversity Data Centre 2023). Neither database is a definitive record and a lack of records on either database does not necessarily mean no veteran trees are within the study area.

A desk-based only tree survey has a number of inherent risks. One of the greatest risks is missing veteran trees, as the application of the above filters would potentially miss veteran trees which often have very large stems but can have small canopies due to crown retrenchment and senescence caused by great age. There is also a more general risk across the study area that for whatever reason a tree has a large stem diameter but is low in height.

Townland boundaries are some of the oldest features in the Irish countryside. They are based on the Gaelic landholding system which predated the Anglo Norman period (11th century AD onwards). Many townland boundaries incorporate earlier topographical and landscape features. Therefore, it is feasible that these features may contain trees of significant age. Townland boundaries are included in the Ordnance Survey Ireland Prime2 dataset. The townland data set was added to the GIS database to help inform ground truthing survey works.

Due to the timing of the assessment works, significant ecological surveying had been carried out prior to the arboricultural assessments being undertaken (see Chapter 10 (Biodiversity) in Volume 2 of this EIAR). Of particular relevance were bat surveys which recorded tree roost features. Tree bat roost features are commonly found on older trees and importantly veteran trees. Bat tree roost data was overlaid upon the arboricultural survey area data to look for overlapping features which could indicate veteran or other 'significant' trees.

2.1.3.5 Ground Truthing Survey

Ground truthing walkover surveys were carried out by qualified Jacobs arboriculturalists between 16 August 2023 and 19 August 2023. The purpose of this survey was to check the whole study area for 'significant' trees which may have been missed due to the limitations of the desk-based survey.

The arboriculturalists based their assessment of potential veteran (ancient and notable) trees on the guidance provided by the Ancient Tree Forum and the Woodland Trust, specifically the document Practical Guidance, Ancient Tree Guide 4: What are ancient, veteran, and other trees of special interest, November 2008, Woodland Trust (Woodland Trust 2008) and the species-specific guidance on the Ancient Tree Inventory website (Woodland Trust 2023).

Field surveys were conducted using mobile data collection apps generated using ESRI Field Maps. Data was geo-located using the smart devices internal GPS and cross-referenced against the NTM which was displayed as a reference layer in the data-driven map. Using this information, individual 'significant' trees were surveyed as well as a small sample of NTM trees to check the accuracy of the data contained in that data base. The information was then analysed and visualised in ArcGIS Pro. Survey data was handled in accordance with Jacobs Geospatial Information Management Plan standards. Target notes were used to identify areas of significant arboricultural features or arboricultural considerations for the Proposed Development. The ground truthing element found that the desk-based analysis and the underlying NTM data was reliable.

3. Baseline Environment

No TPOs were identified in the study area.

The survey area is predominantly rural with the majority of the trees confined to boundary features and occasional small copses. The most dominant tree species is ash (*Fraxinus excelsior*) which make up in the region of 80% of all the trees in the study area. Beech (*Fagus sylvatica*) is found in limited numbers (in the region of 10%), significantly often associated with townland boundaries and roadside planting. The remaining 10% of tree species is a mix of willows (*Salix spp.*), oak (*Quercus spp.)*, alder (*Alnus spp.*) and occasional other broadleaved and conifer species.

Few large mature trees were encountered within the study area and in general the tree stock is mid-aged trees, with some younger material growing within the hedges. Due to the dominance of ash trees within the study area, tree health was noticeably poor with large swathes of the trees infected with Ash Die Back (ADB).

ADB also known as Chalara or Chalara dieback of ash, is a disease of ash trees caused by a fungus called *Hymenoscyphus fraxineus*. ADB causes leaf loss, crown dieback and bark lesions in affected trees. Once a tree is infected the disease is usually fatal, either directly or indirectly by weakening the tree to the point where it succumbs more readily to attacks by other pests or pathogens, especially *Armillaria* fungi, or honey fungus.

It has caused widespread damage to ash populations in continental Europe, where experience indicates that it can kill young ash trees quite quickly, while older trees can resist it for some time, until prolonged exposure or another pest or pathogen attacking them in their weakened state, eventually causes them to succumb.

Evidence from other parts of Europe and the United Kingdom suggest that infected trees rapidly lose structural integrity and are more prone to branch shedding and total collapse. Furthermore, ash, as a species is known for its inability to retain even small deadwood, which it sheds regularly as it appears in the crown. Storm Betty passed through the study area on 19 August 2023, during the site survey work, and it was noticeable how much damage was sustained by the infected roadside trees, with a huge amount of material down on roads throughout the area.

The Tree Council has produced a document giving guidance on how to deal with ADB to tree owners and managers, 'Ash dieback: an Action Plan Toolkit (Summer 2019)' (The Tree Council 2019). This excellent document gives guidance on assessing the danger posed by the trees infected by ADB. As suggested in the document, the Suffolk County Council Ash Health Assessment System has been adopted. The system categorises ash trees with the symptoms in four categories:

- Ash Health Class (AHC) 1 – 100 – 75% Canopy healthy (Vitality Class 0);
- Ash Health Class (AHC) 2 – 75% -50% Canopy healthy (Vitality Class 1);
- Ash Health Class (AHC) 3 – 50% - 25% Canopy healthy (Vitality Class 2); and
- Ash Health Class (AHC) 4 – 25% - 0% Canopy healthy (Vitality Class 3).

The above system has been used in target notes for the survey, but in general almost all the trees were at least AHC2.

Many of the large individual trees recorded within this survey, as well as groups and woodlands are located within areas of farmland which is subjected to a range of agricultural practices. Regular ploughing and associated sub-soiling are common practice in many areas, and this often occurs close to the stems of large established trees, well within the theoretical RPA calculated by BS5837:2012. Some sub-soilers operate at depth of up to 60cm below the surface, regular ploughs in the region of 12 to 35cm. There is little research done on the impact of such practices on tree root profile, but in many cases the trees affected appear to suffer few adverse impacts. It can be assumed that regular ploughing and sub soiling leads to a deeper rooting profile, and that the rhizosphere is much better adapted to the effects of trafficking from heavy vehicles and equipment. Field trees are generally also significantly crown lifted to allow large farm machinery

to pass below them. This has been taken into consideration when assessing the requirement for tree removals and protection for such trees.

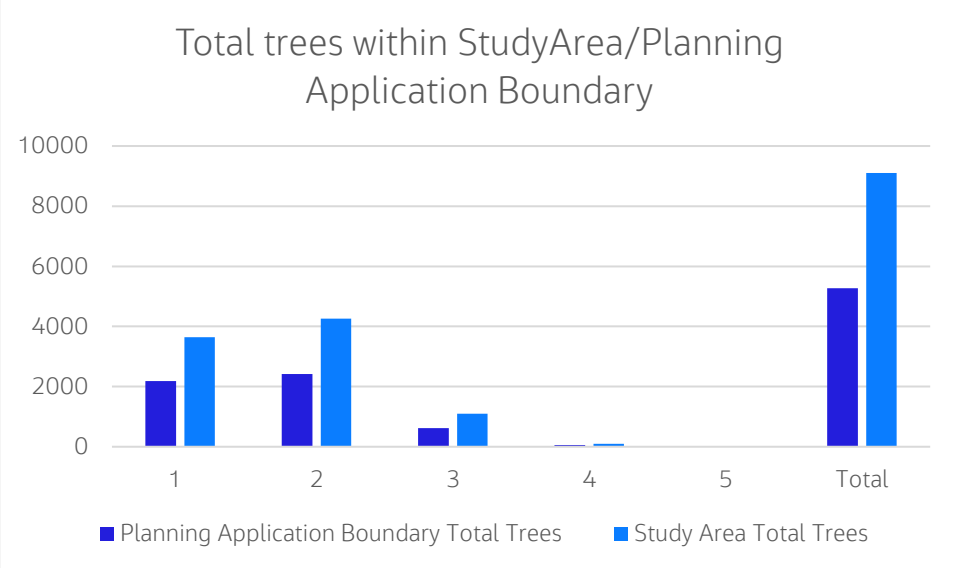
Deep ditches, both dry and carrying water, are also a significant feature of the survey area. Such ditches create an effective root barrier to any trees growing alongside them, and it would not be expected to encounter tree roots on the opposite side of a ditch to which the tree is growing.

Much of the proposed cable route is along surfaced roads. Tree roots need uncompacted soils to grow within and survive, and important element being access to oxygen. Forestry Commission research has found that tree roots do not occur in significant quantities at substantial depths (e.g. more than 2m) in the soil profile (Forestry Commission 2005). There are cases where isolated roots have been found at depths much greater than this, in deep and loose soils (Gilman 1990). However typically between 90 and 99% of a tree's total root length occurs in the upper 1m of soil. All the roads in the study area appears to be of substantial construction and it is considered unlikely they will contain significant rooting from roadside trees, due to the harsh rooting environment they represent.

Table 3.1 and Graph 3.1 show the number of the trees by weighting in both the study area and the Planning Application Boundary.

Table 3.1: Total Trees Within Study Area/Planning Application Boundary

Combined Score	Planning Application Boundary Total Trees	Study Area Total Trees
1	2181	3644
2	2422	4259
3	618	1099
4	50	99
5	1	2
Total	5272	9103



Graph 3.1: Total Trees Within Study Area / Planning Application Boundary

Figures are included in Volume 4 of the EIAR. Figure 18.2 presents trees graded by canopy size, Figure 18.3 presents trees graded by height, and Figure 18.4 presents trees by combined score weighting.

Generally speaking, the higher scoring trees can be considered the most important due to the numerous benefits they deliver increasing with size. Trees with the lower scores are conversely less important in terms of ecosystem and amenity benefits but in most cases represent younger trees which are an essential cohort of

any tree population as they provide the replacement trees as the upper age classes of the population age and die. As such, it is difficult to attribute an arbitrary level at which loss of certain trees of a weighting score of a set amount are less significant than others. Younger trees can more easily be replaced than older trees, as can 'smaller' trees than 'bigger' trees in so far as it takes less time to replace a 10 year old tree than a hundred year old tree. As a generalisation, the loss of trees with a score of 2 or less is of less significance than the higher scoring trees.

Assessing the impact of larger schemes is therefore better considered as canopy area loss rather than individual trees, as the importance of the collective often far outweighs the importance of the individual.

Significant Trees

The features detailed in Table 3.2 were highlighted as 'significant', during the site survey walk over survey.

Table 3.2: Significant Tree Features

Approximate Chainage	Target Note/ Area Reference	Feature Description	Notes
1,000	TN1	Three large mature trees in hedgerow, tree furthest south is on a townland boundary.	2 beech trees and 1 ash all with stem diameters of 800mm plus (southernmost beech 1000mm). Significant mature trees growing in a hedgerow, all in good health and condition. Would be considered A category in BS5837:2012 (BSI 2012).
1,550	TN2	Hedgerow along ditch with larger mature trees.	Hedgerow recently reduced significantly. Mature as in poor condition AHC2/3. Beech trees growing from very large coppiced stools within bank, which suggest considerable age.
2,400	TN3	Linear row of mature beech trees.	Growing on the east side of a deep TLB ditch a row of mature beech trees in good condition and health, reasonable to age at 100 years+, possibly regrowth from previously cut stumps. Would be considered A category in BS5837:2012.
3,050	TN4	Linear feature of large ash trees.	Large ash trees (600mm dbh) mainly growing on east of ditch. Significant trees, but all suffering from advanced ADH (AHC 3/4).
28,700	TN5	Linear feature of roadside beech.	4 large roadside beech (average 600mm dbh) in prominent location. Trees in good health and vigour. Would be considered A category in BS5837:2012 (BSI 2012).

Canopy Area

Canopy area is an important metric and one used by Governments to set targets for both tree planting and to limit deforestation. The Department of Agriculture, Food and the Marine Forest Statistics calculated that 11% of the total land area of Ireland is forestry (which includes some open land but is used here to represent canopy cover) (The Department of Agriculture, Food and the Marine 2022). This compares with an average 33.5% at European Union (EU) level and 30% globally.

The same report also calculated canopy cover of 'hedgerows and trees outside of the forest (HSW)'. This concluded that these features made up 6.4% of land coverage (and excluded open areas, so are more representative of canopy cover). The study area contained little 'forestry' or 'woodland', therefore, the HSW figures are considered the most relevant when considering canopy cover and impact in this assessment.

Within Meath HSW covered 14,000ha (of land area) or 8.3% and within Dublin 5,000ha (of land area) or 5.4% (it is assumed that Dublin in Table 2 of the Forest Statistics Report can be substituted for Fingal, which does not appear in the table). Therefore, the proposed cable route will pass through two counties with above average and below average canopy cover (of HSW).

Canopy area was calculated for the study area by merging all overlapping canopies of trees only to give a combined canopy area of 46ha (See Table 3.3). This equates to a canopy cover of 12% of land area within the study area. 12% is higher than both the county results in the Forestry Statistics, and is higher than the national average (noting that this figure may have been calculated using a different methodology to the Forest Statistics figure as is disregards 'hedgerows').

Table 3.3: Canopy Areas

County	Land Area within Planning Application Boundary (ha)	Canopy Area Within Planning Application Boundary (ha)	Canopy Cover of Planning Application Boundary (as % of Land Area)	Land Area Within the Study Area (ha)	Canopy Area Within the Study Area (ha)	Canopy Cover of the Study Area (as % of Land Area)
Meath	70.56	15.72	22%	201.13	25.70	12.7%
Fingal	71.44	11.60	16%	182.06	20.28	11.1%
Total	141.99	27.32	19%	383.2	46	12%

4. Potential Impacts

4.1.1 Construction Phase

Due to the scale of the Proposed Development and the current stage of design maturity, certain assumptions have been made to assess the impact on trees within the study area. It should be noted that there are many variables which will need to be considered when deciding on the actual removals required. Therefore, the figures presented in this Section represent a precautionary approach (where all at risk trees will require removal), and with further design work could be reduced.

Assumptions for the assessment of removals:

- The 2m indicative maximum RPA was used for the initial assessment. The initial assessment was reassessed through an iterative process of specialist review, which used a combination of site survey target notes, the maximum and minimum RPAs and imagery;
- In off-road sections, a 15m construction corridor is required either side of the proposed cable route and any trees within this corridor will require removal;
- Trees located within the Planning Application Boundary will require removal to facilitate construction activities. The exception to this is where trees are located parallel to the construction corridor, where it is likely that the Construction Phase activities can be undertaken in such a manner that impacts on the trees are limited. When a tree is located outside of the Planning Application Boundary but with more than 20% of the RPA located within the Planning Application Boundary, it will require assessment by an arboriculturalist to determine if it can be retained. Previous iterations of BS5837:2012 Trees in relation to design, demolition and construction – Recommendation (BSI 2012) accepted that in the region of 20% of a tree's RPA could be removed with minimal impacts and the severity of the root damage. The arboriculturalist will need to assess severity of root damage, health of the tree, and potential working practices to determine if a tree can be safely retained or requires removal. These trees have been recorded as 'at-risk' in the assessment;
- Unless trees are located centrally within a Temporary Construction Compound / Horizontal Directional Drilling (HDD) Compound, suitable offsets can be maintained, and trees retained. For each Temporary Construction Compound, a site access will be required, which may require tree removals. Temporary Construction Compound access planning has not been completed at this stage, so indicative removals have been included in the figures;
- On in-road sections, if the proposed cable route and Joint Bay is located within 'blacktop' (the bitumen sealed running surface of the road) then there will be no impact on surrounding trees for the reasons previously discussed;
- Where the proposed cable route leaves the blacktop and moves into the verge, then the same filters applied to the off-road sections have been used. Total loss within Passing Bays has been assumed;
- In off-road sections, where the Proposed Development crosses a hedgerow, the construction activity will be carried out in such a manner that a reduced working width is utilised, minimising tree and hedgerow loss;

- Where access track routing information is available, this has been used to inform removals. Current design guidance is for a 15m clear strip to be applied; and
- In off-road sections, ditches form important tree protection barriers from construction activity. Where possible, removals have been adjusted to take account of physical root barriers which mean the Construction Phase will have minimal impact on trees.

Based on these assumptions, a GIS desk-based assessment (with iterative refinements) was made on the removals required to deliver the Construction Phase of the Proposed Development. The numbers of trees, by weight banding are presented in Table 4.1 and also indicated on the Tree Removal and Retention Plans (Figure 18.5 in Volume 4 in this EIAR). These have been produced at this stage for illustrative purposes to visually demonstrate a precautionary scenario of potential tree removals required to deliver the Construction Phase of the Proposed Development. These are not definitive vegetation removal plans and will require further refinement.

Out of a total of 9,103 trees within the study area, 512 will be required to be removed (5% of all the trees). A further 662 trees are at-risk in the study area (7% of all trees). In a precautionary scenario, where all at-risk trees will be required to be removed, 1,174 trees will need to be felled, representing 12% of the total trees within the study area.

Table 4.1: Tree Loss by Accumulated Weight

Accumulated Weight	Trees at-risk	Trees Removed	Trees Retained	Grand Total
1	297	222	3,125	3,644
2	314	244	3,701	4,259
3	49	41	1,009	1,099
4	2	5	92	99
5	0	0	2	2
Grand Total	662	512	7,929	9,103

While Table 4.1 presents the impacts as numbers of trees, a more useful metric for considering tree loss on a project of this scale is canopy cover. Table 4.2 shows canopy loss within the study area (as some removals may fall outside of the Planning Application Boundary). Based on the above removal calculations, 2.63ha of canopy cover will be lost in the study area, with a further 3.26ha at-risk. In a precautionary scenario, if all the at-risk trees have to be removed, 5.89ha of canopy will be lost. The resulting canopy cover in the study area will be 10% (from its current 12%). If all of the at-risk trees could be retained, the resulting canopy cover of the study area would be 11%.

Table 4.2: Canopy Loss

	Canopy Area Lost Within Study Area	Remaining Canopy Area Within Study Area	Canopy Area 'At Risk' in Study Area
Area in Ha	2.63	43.35	3.26

The precautionary scenario for canopy cover removal (i.e., all of the at-risk trees are removed) would still leave the canopy cover of the study area (10%) higher than the canopy area of both Meath (5.9%) and Fingal (Dublin) (6.5%) as reported in the 2022 Forest Statistics Report, though lower than the national average of 11% (The Department of Agriculture, Food and the Marine 2022).

The impact on significant trees is summarised in Table 4.3.

Table 4.3: Impact on Significant Trees

Chainage	Target Note/ Area reference	Feature Description	Impact from Proposed Development
1000	1	Three large mature trees in hedgerow, tree furthest south is on a TLB.	At-risk, likely to be able to be retained with protective measures and adoption of Arboricultural Method Statement.
1550	2	Hedgerow along ditch with larger mature trees.	At-risk, but damage unlikely due to presence of ditch. Potentially some pruning may be required, but unlikely.
2400	3	Linear row of mature beech trees.	Retained.
3050	4	Linear feature of large ash trees.	At-risk, with some removals required of trees on works (west) side of ditch.
28700	5	Linear feature of roadside beech.	One tree removed and three retained, with protective measures.

4.1.2 Operational Phase

Once the Construction Phase is complete, there should be no direct further requirements for the removal of trees during the Operational Phase of the Proposed Development. A permanent easement of 5m will generally be required above the area of the proposed cable trench. This will be increased on certain land holdings for proposed permanent access tracks and Joint Bays and the section of the proposed cable route between Woodland Substation and the R156 Road and the section of the proposed cable route between the M1 Motorway and Belcamp Substation, or other infrastructure features that require permanent surfaced access. There will be limited opportunity for the replacement of trees lost, therefore the losses identified in the Construction Phase are considered permanent.

An indirect need to fell additional trees may be created by the prevalence of infected ash trees within the study area. As the current tree stock declines further due to the effects of the disease, felling of dead and dangerous trees may be required to ensure the safety of personnel accessing elements of the new infrastructure. This felling will be the responsibility of the landowner upon which the trees are located and is necessary as part of their duty of care to persons on their land and neighbours.

5. Mitigation and Monitoring Measures

5.1.1 Construction Phase

The early desk-based GIS analysis of the existing tree stock, including the generation of indicative RPAs and subsequent site surveys to identify significant trees has fed into iterations of the development of the proposed cable route and its various elements. This means there has been an effort at this current design phase to design out impacts on trees, where possible. Figure 18.5 included in Volume 4 of this EIAR presents a Tree Removal and Retention Plan.

The main element of any AMS is the protection of unmade (that is not protected by a loadbearing surface) RPAs by suitable buffers protected by suitably robust tree protection fencing or other barriers. On linear infrastructure schemes such barriers can often be formed by soil berms. Such schemes often require the pruning of retained trees, and such pruning schedules and specifications will be produced by a qualified arboriculturalist, in line with BS 3998:2010. Trees Work – Recommendations (BSI 2010), and carried out by qualified arboricultural contractors. In this way, any tree pruning will not have a detrimental impact on the trees.

Appendix C of this Appendix contains a Generic AMS which sets out the general principles of the methodology that will be adopted on the Proposed Development, where appropriate. The Generic AMS specifies generic tree protection measures to protect retained trees on-site.

The following mitigation measures will be implemented during the detailed design stage:

- A Project Arboriculturalist will be appointed by the Electricity Supply Board (ESB) to provide relevant additional input to be addressed at appropriate points;

- The Generic AMS (Appendix C of this Appendix) will be reviewed and updated into a site-specific AMS to provide appointed contractors with details on how specific operations need to be performed to protect trees including use of exclusion zones and ground protection; and
- A Tree Protection Plan will be produced providing schematic details of how protective fencing will be installed and any other pre-planned targeted tree protection measures.

In addition, at the detailed design stage, a locally reduced separation between adjacent cable circuits (CP0966 development, under An Bord Pleanála planning reference number 316372, and the Proposed Development) will be considered at the following key locations to reduce the potential impact on adjacent trees:

- Chainage 0,950 to Chainage 1,100;
- Chainage 1,450 to Chainage 1,650;
- Chainage 2,350 to Chainage 2,500; and
- Chainage 3,050 to Chainage 3,150.

This will allow a greater setback between the Proposed Development cable circuit and the adjacent field boundary. Areas of land between the cable circuit and field boundary will also be fenced off and will not be trafficked by heavy plant or machinery.

The following mitigation measures will be implemented during the Construction Phase:

- The site-specific AMS and Tree Protection Plan will be implemented as soon as works begin on-site;
- As far is reasonably practicable, all cable installation works, particularly in the existing road surfaces will adhere to Volume 4 of the Guidance for The Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees is a widely adopted document within the utilities sector (NJUG 2007);
- The Project Arboriculturalist will be retained to advise and resolve any unforeseen tree related issues which might occur and to provide general tree related advice; and
- On-site monitoring will be undertaken at agreed intervals before and during the Construction Phase (this will be achieved through a combined effort between the ESB and the appointed contractor) to ensure protection measures and the site-specific AMS are being implemented correctly.

EirGrid has identified precedence from Germany and the Netherlands, and for safely planting certain shrubs over High Voltage (HV) underground cables, EirGrid has engaged closely with the ESB, and relevant Dutch and German Transmission System Operators across Europe, to understand feasibility of planting over HV underground cables in Ireland. A Draft Over Cable Planting Strategy is in advance development in consultation with the ESB, for which the Design Risk Assessment was ongoing at time of writing (including calculations to assess a possible cable de-rating). The draft strategy combines the requirement for a minimum cable burial depth of 1m (to top of Cement Bound Granular Mixture in the cable trench), use of a high performing Root Barrier Membrane, and a strictly defined shrub species list with known maximum root depths less than 1m. It is possible the Design Risk Assessment may conclude that over cable planting cannot be delivered while guaranteeing cable performance and security. There are also risks that the strictly defined shrub species list is not compatible with landowner farm boundary requirements and / or agricultural farm payments. As such, applying a precautionary principle, in this assessment off-site compensatory planting is assumed for all permanent losses within the easement.

Subject to consent, the compensatory planting will commence in advance of, or in parallel with, the Construction Phase. EirGrid has identified candidate sites in County Meath and Dublin in consultation with a charity partner, who provides compensatory planting options on third-party lands. Whether these candidate sites or other sites are used for compensatory planting, there will be no planting in semi-natural habitats of significant ecological value, which will be verified by the Ecologist employed by the compensation supplier. The off-site compensatory planting will be entirely outside the Planning Application Boundary. A minimum of

130% off site compensatory planting will be delivered by the Developer (ESB), in consultation with EirGrid. The surplus will deliver an overall biodiversity net gain.

5.1.2 Operational Phase

There are no anticipated direct impacts on the retained trees along the route of the Proposed Development during the Operational Phase, and therefore, no specific mitigation is identified.

6. Residual Impacts

6.1.1 Construction Phase

Potential tree removals required to deliver the Construction Phase of the Proposed Development are discussed in Section 4.1.1 and shown on Figure 18.5 in Volume 4 in this EIAR. Out of a total of 9,103 trees within the study area, 512 will be required to be removed (5% of all the trees). A further 662 trees are at-risk in the study area (7% of all trees). In a precautionary scenario, where all at-risk trees will be required to be removed, 1,174 trees will need to be felled, representing 12% of the total trees within the study area. Of the five significant tree 'features' identified during the survey, one can be retained, three are at-risk, and one requires partial removal. It is expected to be able to retain the at-risk 'features' with the implementation of mitigation measures during the Construction Phase. There will be limited opportunity for the replacement of trees lost, and therefore, the losses identified in the Construction Phase are considered permanent.

The new proposed cable route will require specific easements for the safe operation of the cable and for future maintenance. A permanent easement of 5m will generally be required above the area of the proposed cable trench. This will be increased on certain land holdings for proposed permanent access tracks and Joint Bays and the section of the proposed cable route between Woodland Substation and the R156 Road and the section of the proposed cable route between the M1 Motorway and Belcamp Substation, or other infrastructure features that require permanent surfaced access.

At the time of writing, The EirGrid Functional Specification for Underground Cables (EirGrid 2021) stated:

> "*The easement area shall be cleared, and kept clear, of trees and other vegetation with deep root systems as these may damage the cable*".

All planting from the edges of the easement to the edges of the Planning Application Boundary will be replanted.

A Draft Over Cable Planting Strategy is under development for restricted low shrub planting within the cable easement, including the use of a high performing Root Barrier Membrane. This Draft Planting Strategy is undergoing Risk Assessment, in conjunction with a review of international best practice. If approved, by EirGrid and the ESB, the Draft Planting Strategy would complement the commitment to off site compensatory planting for permanent hedgerow loses within the footprint of permanent surfaced areas. The risk assessment may conclude that easement planting cannot be delivered while guaranteeing cable performance and security. Therefore, applying a precautionary principle in this assessment, off site compensatory planting is assumed for all permanent losses within the easement (refer to Section 10.5 in Chapter 10 (Biodiversity) in Volume 2 of this EIAR.

Any residual impact will be distributed across the proposed cable route within Fingal and Meath.

6.1.2 Operational Phase

No residual impacts have been identified during the Operational Phase.

7. Conclusion

The Proposed Development will require the removal of 2.63ha of canopy area, with a further 3.26ha of canopy at-risk of removal. This would lead to a reduction of the canopy area within the study area from its present 12% to 11% if all at-risk trees can be retained, or to 10% if all at-risk trees are removed.

Out of a total of 9,103 trees within the study area, 512 will be required to be removed (5% of all the trees). A further 662 trees are at-risk in the study area (7% of all trees). In a scenario where all at-risk trees are required to be removed, 1,174 trees will need to be felled, representing 12% of the total trees within the study area. Of the five significant tree 'features' identified during the survey, one can be retained, three are at-risk, and one requires partial removal. It is expected to be able to retain the at-risk 'features' with the implementation of mitigation measures during the Construction Phase.

The implementation of a site-specific AMS and associated Tree Protection Plans will minimise any impact on retained trees and significantly reduce the number of at-risk trees which require removal.

Due to the easement requirements of the proposed cable trench and other aspects (including new permanent access tracks and off-road Joint Bays), the tree loss identified above is permanent.

EirGrid has identified precedence from Germany and the Netherlands, and for safely planting certain shrubs over HV underground cables, EirGrid has engaged closely with the ESB, and relevant Dutch and German Transmission System Operators across Europe, to understand feasibility of planting over HV underground cables in Ireland. A Draft Over Cable Planting Strategy is in advance development in consultation with the ESB, for which the Design Risk Assessment was ongoing at time of writing (including calculations to assess a possible cable de-rating). If adopted, the Draft Over Cable Planting Strategy would allow more planting and reduce the loss of hedgerows.

EirGrid has identified candidate sites in County Meath and County Dublin in consultation with a charity partner, who provides compensatory planting options on third-party lands. A minimum of 130% compensatory off site planting will be delivered by the Developer (ESB), in consultation with EirGrid. The surplus will deliver an overall biodiversity net gain.

8. References

Ancient Tree Forum (2013). Ancient and other veteran trees: further guidance on good management – Guidance for veteran tree classification and assessment [Accessed 1 September 2023].

Arboricultural Advisory and Information Service (1995). Tree Root Systems [Accessed 1 September 2023].

BlueSky International Ltd (2023). Purchased dataset from National Tree Map (NTM).

British Standards Institution (2010). BS 3998:2010. Trees Work – Recommendations. London: British Standards Institution. 3rd ed. [hard copy] London: British Standards Institution [Accessed 1 September 2023].

British Standards Institution (2012). BS 5837:2012. Trees in relation to design, demolition and construction – Recommendations. 4th ed. [ebook] London: British Standards Institution. [Online] Available at: https://beta.bathnes.gov.uk/sites/default/files/2020-01/BS5837%202012%20Trees.pdf [Accessed 1 September 2023].

Department of Agriculture, Food and the Marine and Tree Council of Ireland (2021). A guide for landowners to managing roadside trees – Guidance on the management of roadside trees in Ireland and the relevant legislation. [Online] Available at: https://www.gov.ie/en/publication/8fb45-a-guide-for-landowners-to-managing-roadside-trees/ [Accessed 1 September 2023].

Fingal County Council (2021). Forest of Fingal – A Tree Strategy for Fingal, Part 4 The Sustainable Management of Trees in Fingal Management & Maintenance of Trees in Fingal. [Online] Available at: https://consult.fingal.ie/ga/system/files/materials/15700/Part%204%20-%20Forest%20of%20Fingal%2C%20A%20Tree%20Strategy%20for%20Fingal.pdf [Accessed 9 November 2023].

Forestry Commission (2005). The Influence of Soils and Species on Tree Root Depth, Information Note, Peter Crow. [Online] Available at: https://www.rbkc.gov.uk/pdf/Document%2027%20-%20The%20Influence%20of%20Soils%20and%20Species.pdf [Accessed November 2023].

Lore Kutschera, Erwin Lichtenegger (2002). The Root Atlas, Central European forest trees and shrubs, Stocker – European study of tree species rooting depth and spread [Accessed 1 September 2023].

Meath County Council (2021). Meath County Development Plan 2021-2027. [Online] Available at: https://consult.meath.ie/en/system/files/materials/7447/Map%209.3_TPOs%20Statutory.pdf [Accessed 9 November 2023].

National Biodiversity Data Centre (2023). Heritage Trees of Ireland dataset. [Online] Available at: https://data.gov.ie/dataset/heritage-trees-of-ireland [Accessed 1 September 2023].

National Joint Utilities Group (2007). Vol 4 Issue 2 – Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees [Accessed 1 September 2023].

National Park and Wildlife Service (2010). An Inventory of Ancient and Long-Established Woodland in Ireland [Accessed 1 September 2023].

Teagasc (2023). The Department of Agriculture, Food and the Marine, Forest Statistics, Ireland 2020, [Online] Available at: https:// https://www.teagasc.ie/media/website/crops/forestry/advice/Forest-Statistics-Ireland-2022 [Accessed 1 September 2023].

The Tree Council (2019). Ash dieback: an Action Plan Toolkit (Summer 2019) [Online] Available at: https://treecouncil.org.uk/wp-content/uploads/2019/11/Tree-Council-Ash-Dieback-Toolkit-2.0.pdf [Accessed 1 September 2023].

Woodland Trust (2008). Ancient tree guide 4: What are ancient, veteran and other trees of special interest? [Online] Available at: https://www.woodlandtrust.org.uk/media/1836/what-are-ancient-trees.pdf [Accessed 1 September 2023].

Woodland Trust (2021). Ancient Tree Inventory. [Online] Available at: https://ati.woodlandtrust.org.uk/ [Accessed 30 September 2023].

Woodland Trust (2023). Ancient Tree Inventory, Species guides. [Online] Available at: https://ati.woodlandtrust.org.uk/how-to-record/species-guides/ [Accessed 1 September 2023].

Watson and Neely (1995) – The Landscape Below Ground, Proceedings of an International Workshop on Tree Root Development in Urban Soils, International Society of Arboriculture P54-61- A Selection of technical papers which discuss tree root development and environmental influences on tree development.

Directives and Legislation

Number 30 of 2000 - Planning and Development Act, 2000 (as amended)

Number 31 of 2014 - Forestry Act 2014

Appendix A. Comprehensive Glossary of Arboricultural Terms

- Ancient tree: An ancient tree is exceptionally valuable attributed with great age/size/cultural heritage/biodiversity value as a result of significant wood decay and the habitat created from the ageing process. All ancient trees are veteran trees with very few trees of any species reaching the ancient life-stage.
- Bark: A term usually applied to all the tissues of a woody plant lying outside the vascular cambium.
- Buttress zone: The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of their junction.
- Canker: A lesion formed by the death of bark and cambium often due to fungal or bacterial infection.
- Condition: An indication of the physiological vitality of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree.
- Construction exclusion zone: Area based on the Root Protection Area (in square metres) to be protected during development, by the use of barriers and/or ground protection.
- Crown/Canopy: The main foliage bearing section of the tree.
- Crown lifting: A term used to describe the removal of limbs and small branches to a specified height above ground level.
- Deadwood: Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard.
- Dieback: The death of parts of a woody plant, starting at shoot-tips or root-tips.
- Diameter at Breast Height (DBH): Stem diameter measured at a height of 1.5 metres (UK) or the nearest measurable point. Where measurement at a height of 1.5 metres is not possible, another height may be specified.
- Habit: The overall growth characteristics, shape of the tree and branch structure.
- Hazard beam: An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting.
- Minor deadwood: Dead wood of a diameter less than 25mm and or unlikely to cause significant harm or damage upon impact with a target beneath the tree.
- Notable: Notable trees are usually mature trees which may stand out in the local environment because they are large in comparison with other trees around them
- Pollarding: is the removal of the tree canopy, back to the stem or primary branches. Pollarding may involve the removal of the entire canopy in one operation or may be phased over several years. The period of safe retention of trees having been pollarded varies with species and individuals. It is usually necessary to re-pollard on a regular basis, annually in the case of some species.
- Primary branch: A major branch, generally having a basal diameter greater than 0.25 x stem diameter.
- Pruning: The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs.
- Root protection area (RPA): An area of ground surrounding a tree that contains sufficient rooting volume to ensure the tree's survival, calculated with reference to Table 2 of BS5837 (2005).
- Snag/stub: In woody plants, a portion of a cut or broken stem, branch or root which extends beyond any growing-point or dormant bud; a snag usually tends to die back to the nearest growing point.
- Stem/s: The main supporting structure/s, from ground level up to the first major division into branches.
- Topping: In arboriculture it is the removal of the crown of a tree, or of a major proportion of it.
- Tree Preservation Order (TPO): Is an order made by the local authority and placed upon individual trees, groups of trees or areas of trees. The local authority must usually grant permission prior to any works undertaken to affected trees.
- Veteran tree: A loosely defined term for an old specimen that is of interest biologically, culturally or aesthetically because of its age, size or condition and which has usually lived longer than the typical upper age range for the species concerned.

Appendix B. BS5837:2012 Table 1 Cascade Chart for Tree Quality Assessment

Extract from BS5837:2012 Trees in relation to design, demolition, and construction – Recommendations

Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
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	• 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 *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see **4.5.7**.*			See Table 2
	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)	See Table 2
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	See Table 2
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	See Table 2

Appendix C. Arboricultural Method Statement

Jacobs

Generic Arboricultural Method Statement

Date:	March 2024
Project name:	East Meath - North Dublin Grid Upgrade
Project no:	321084AJ
Prepared by:	Jacobs
Document no:	321084AJ-JAC-XX-XX-FN-Z-3182C

Termini Building,
3 Arkle Road,
Sandyford Business Park,
D18 T6T7,
Dublin

T +353 (0)1 269 5666
www.jacobs.com

1.1 Introduction

Jacobs has prepared a Generic Arboricultural Method Statement (AMS) for the East Meath - North Dublin Grid Upgrade (hereafter referred to as the Proposed Development). This is presented in Section 1.2 onwards. The Generic AMS specifies generic tree protection measures to protect retained trees on-site. Once full construction detail and phasing is fixed during the detailed design stage, this document will be reviewed and updated to make the details it contains specific, and a Tree Protection Plan will be produced, and both will be implemented as soon as works begin on-site.

The services of a competent arboriculturist (the Project Arboriculturalist) will be retained during the detailed design stage for relevant additional input at appropriate points. This Project Arboriculturalist will also be retained during the Construction Phase to advise and resolve any unforeseen tree related issue which might occur and to provide general tree related advice.

Additional visits are recommended, post the Construction Phase, to identify any physiological and / or structural defect that may have been caused by the works. This timing of these visits will be agreed with the Project Arboriculturalist.

1.1.1 Arboricultural Actions Required - Next Steps

Table 1 lists the standard elements, as referenced in the British Standards Institution (BSI) British Standard (BS) 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012), recommended to satisfy planning considerations for this Proposed Development and to ensure appropriate tree protection is considered and applied throughout the duration of the works.

Table 1: Follow Up Arboricultural Input Relating to this Proposed Development

Recommended Arboricultural Input	Purpose	Timing	By Whom
Project Arboriculturalist	To provide relevant additional input to be addressed at appropriate points.	As part of the detailed design stage. Also retained during the Construction Phase to advise and resolve any unforeseen tree related issue which might occur and to provide general tree related advice.	The Electricity Supply Board (ESB)
Site-specific AMS	Work information package designed to provide contractors with details on how specific operations need to be performed to protect trees including use of exclusion zones and ground protection.	As part of the detailed design stage.	Combined effort between the ESB and appointed contractor
Tree Protection Plan	To provide schematic details of how protective fencing will be installed and any other pre-planned targeted tree protection measures.	As part of the detailed design stage, in conjunction with the site-specific AMS.	Combined effort between the ESB and appointed contractor
On-site monitoring	To ensure protection measures and the site-specific AMS are being implemented correctly.	At agreed intervals before and during the Construction Phase of the Proposed Development.	The ESB

Impacts to the trees, as outlined within the body of this General AMS, have the potential to alter with any changes to the current design proposals. Tree impacts will therefore be reviewed as the design process progresses with all relevant parties informed of the changes, where appropriate.

1.2 Arboricultural Method Statement

1.2.1 Introduction

The most important and effective process, in terms of preventing damage to trees on a construction site, is the timely erection of tree protection fencing. This will be erected as the first operation on-site, for example, before access track construction, before the appointed contractor's site cabins, and before trenching for service runs.

However, it is noted that the fencing provides an unnecessary and potentially dangerous restriction to essential tree works, and therefore, tree works can be carried out before fencing is erected.

To protect retained trees and hedges correctly throughout the Construction Phase, tree protection measures will be removed in the exact opposite order and methodology they were installed so that one of the last actions on-site is the removal of the tree protection measures.

1.2.2 General

This AMS is generic, and once the final development plans are finalised, it will be reviewed so that it is tailored specifically to the final Proposed Development. An AMS will always be supported by a detailed Tree Protection Plan, which will indicate the alignment of Tree Protection Fencing, Construction Exclusion Zones and other specific site methodologies.

1.2.2.1 Phasing

An indicative phasing programme is detailed below which must be followed by the contractor throughout the life of the Proposed Development to ensure that trees are protected in accordance with the AMS.

1.2.2.1.1 Phase 1 – Enabling Works

- Install Tree Protection Fencing as required;
- Install ground protection measures as required; and
- Carry out approved tree removal and pruning.

1.2.2.1.2 Phase 2 – Development / Construction Phase

- Establish site compound - location for cabins, car park and the storage of materials;
- Carry out initial ground works and services installations; and
- Undertake main development construction.

1.2.2.1.3 Phase 3 – Post-Development

- Carry out soft landscaping (e.g. proposed replanting, grass reinstatement etc.);
- Remove protective fencing as required;
- Remove ground protection as required; and
- Carry out ground decompaction and reinstatement.

1.2.3 Pre-Commencement

A Pre-Commencement Site Meeting will be held with contractors who are responsible for operating machinery on-site. The meeting will firstly highlight the potential for damage occurring to tree crowns, but thereafter ensure that extra care is applied when manoeuvring any machinery within close proximity of retained trees to prevent any contact with the tree and consequent damage to crown, stem or roots.

For clarity, prior to any construction or development work proceeding, the alignment of the protective fencing and the RPAs of any individual trees to be retained which are not able to be protected by fencing will be marked out using the distances provided by the Project Arboriculturalist. Marking out will be completed or approved by a person with arboricultural expertise, as individual trees will have root zones that may be affected by local conditions, and allowances will need to be made to accommodate this.

1.2.4 Access Facilitation Pruning

It is expected necessary to operate a wide or tall load, plant bearing booms, jibs and counterweights or other such equipment, as part of construction works and / or traffic on the construction access tracks. Such equipment has the potential to cause injurious contact with crown material (i.e., low branches and limbs, of retained trees within, or without, the Root Protection Area (RPA) fencing). It is best advised that appropriate, but limited tree pruning, be carried out beforehand to remove any obvious problem branches. This is classed as 'Facilitation Pruning' within BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012).

The Facilitation Pruning Works specification will be prepared by an arboriculturalist and submitted to the Local Planning Authority for approval before construction or fencing operations commence on-site.

All tree works will be carried out in accordance with BS 3998:2010 Tree Works- Recommendations (BSI 2010).

The Facilitation Pruning will be carried out on site by a suitably qualified and experienced arborist before construction operations commence on-site. The Facilitation Pruning can run concurrently with operations to erect tree protection fencing, as long as this can be co-ordinated, such that neither presents a hazard to the other.

Trees on-site which are not to be retained can be removed as part of the Facilitation Pruning (or earlier if the appropriate planning consent is confirmed). To avoid mistakes, the individual trees to be removed will be identified and marked by a person with arboricultural expertise.

Any access facilitation pruning will not have a significant adverse impact on the tree's physiology or amenity value. In some cases, a suitable working space may be provided by temporarily tying back tree branches.

Pruning will generally occur after the leaves have 'flushed' and hardened (i.e., late spring through summer). There are some exceptions, however, as some species such as Birch, Walnut and Maples, will 'bleed' sap and risk losing valuable sugars in the process if pruned in early spring. Therefore, the pruning of these trees will be carried out when this risk is low (i.e., summer or mid-winter).

Hornbeam trees have two growth phases each year. One during the spring and the other in summer. The best time to prune them is therefore in September after the summer flush and before the leaves change colour and drop. This is also outside of the bird nesting season which usually runs from March to August (inclusive). Alternatively, they can be pruned in mid-winter.

Species belonging to the genus Prunus, such as Cherry, partially rely on the production of a resin or gum to aid in the defence against wound related pathogens, and therefore, pruning will occur in the summer. In general, pruning will avoid periods where the exposed wood will be left open to severe conditions such as drought, frost, and periods of fungal sporulation (autumn).

Any tree works undertaken must take account of all protected species of flora and fauna and comply with all appropriate legislation. This includes Number 39 of 1976 - Wildlife Act, 1976 (as amended) and S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) which provides statutory protection to birds, bats and other species that inhabit trees. All tree work operations are covered by these provisions and advice from an ecologist will be obtained before undertaking any works that might constitute an offence.

It is recommended that any trees that require removal or significant canopy works, will be checked in advance of works by an ecologist to ensure that there is no possibility of any disturbance to nesting birds or roosting bats.

1.2.5 Tree Protection Fencing and the Construction Exclusion Zone

The development design prepared for the site indicates that a number of trees within the Planning Application Boundary are being retained. In addition, there are numerous trees within influencing distance of the construction activity. The majority of these trees will need to be protected from all construction operations by a protective barrier which creates a sacrosanct Construction Exclusion Zone (CEZ).

The alignment of the protective barrier is based on the calculated extent of the RPA which has been generated as a maximum and minimum based on spatial measurements taken from the National Tree Map (BlueSky International dataset (Bluesky International Ltd. 2023) and in accordance with BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012). The detailed alignment of tree protection fencing will be decided by the Project Arboriculturalist and indicated on a Tree Protection Plan.

In principle, protective fencing will be erected before any construction operations start on-site and will be removed only on completion of all construction works on-site. In a phased development, there may be a need to alter or remove / reposition fencing as the project progresses. The planning of these works will be carried out in consultation with the Project Arboriculturalist and no tree will be left unprotected during the Construction Phase.

Site hoarding is an acceptable alternative. It may be appropriate on some sites to use temporary site offices as components of the protection barriers, on the understanding that they will remain in-situ for the duration of the construction works and their removal will be planned to ensure that the appointed contractor's co-ordinated withdrawal from site away from the trees rather than towards them.

Clause 6.2.2.3 of BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations specifies an alternative protective barrier where site circumstances and associated risk of damage incursion into the RPA do not necessitate the default level of protection. In this Proposed Development, it is proposed that the construction corridor easement fencing will provide the tree protection fencing. In places, this will consist of agricultural stockproof fencing. Elsewhere, the corridor will be delineated by wooden posts with a topping rope. Where this corresponds with the need to indicate the CEZ, the posts will have high viability orange site netting attached. If there is no post and rope fencing (for example in an area behind the earth bund), the orange netting will be mounted on wooden posts. This fencing will be erected before construction activities commence.

All weather notices will be placed on fencing to indicate that operations are not permitted within the high visibility fenced area, for example 'CONSTRUCTION EXCLUSION ZONE – NO ACCESS', or similar.

Once set up, fences will not be removed or altered without prior consultation with the Project Arboriculturalist.

The presence of long grass and other vegetation in the 'Construction Exclusion Zone' is a welcome indicator that the protected area has been left undisturbed. However, on occasion, and certainly towards the end of the Construction Phase, it is acceptable to cut the vegetation by handheld strimmer or scythe taking care not to work within 300mm (millimetres) of the tree trunk (to avoid damaging the bark). Vegetation within 300mm of the trunk can be cut with non-mechanised shears.

1.2.6 Temporary Ground Protection

Where unmade ground within the RPA of trees, but outside the protective barrier, is exposed to construction damage and / or soil compaction, temporary ground protection will be installed immediately following the erection of tree protection fencing and prior to starting work on-site.

The ground protection will be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012) suggests temporary ground protection will 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 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 2t (tonnes), proprietary (EuroMat or similar), interlinked ground protection boards placed on top of a compression-resistant layer (e.g., 150mm depth of woodchip) laid onto a geotextile membrane; and

C) For wheeled or tracked construction traffic exceeding 2 tonnes 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. It may be that a cellular confinement system, such as Presto Geoweb or similar, laid on geotextile membrane and over filled with angular clean stone is more appropriate.

Existing hard surfaces offer good ground protection, and as far as possible, will remain in-situ as temporary ground protection during site works. Upon completion of works, the surface can be carefully lifted if not required or used as a sub-base as appropriate.

Following completion of construction works, the ground protection will be removed and the ground reinstated without soil disturbance.

1.2.7 Installation of Power Supply and Services

This Section refers to the need to run temporary utilities to compounds, ancillary structures etc., and not the main cable installation.

Any underground power supplies and services routed through the RPA will be installed in accordance with Clause 7.7.2 of BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI 2012) and National Joint Utilities Group (NJUG) Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees (NJUG 2007). The preference is for all excavations to be completed by hand within an RPA. If this is not possible, then the smallest toothless bucket will be utilised removing small amounts of soil at each pass. If a root is encountered, then it will be exposed by hand and a suitable course of action agreed with the Project Arboriculturalist.

When roots between 10mm to 25mm in diameter are encountered, these will be retained undamaged wherever possible, and protected from desiccation / frost by damp hessian sacking or a similar protective material until the excavation is back filled. Roots below 10mm in diameter may be trimmed back neatly in line with the edge of the excavation trench using secateurs.

1.2.8 Construction Within RPA

The delivery, storage, mixing and discharge of concrete and all other cement-based materials will be carried out so that there is no runoff and spillage near the RPAs of retained trees. No substances that are potentially injurious to plant tissue (including diesel, bitumen, concrete, mortar and other phyto-toxic materials) will be stored, discharged, prepared or used, where direct contact, infiltration or runoff might reasonably be considered liable to harmfully affect existing root growth or other parts of retained trees.

Where chemicals are stored, it is now standard practice to have emergency spillage kits available to minimise the impacts of any accidental spillages to the local environment. All cement mixing, vehicle washing or any other activity where toxic chemicals are used will have the provision to contain any accidental spillage. This will be achieved using suitable soil bunding or using a supporting timber framework sealed with heavy duty plastic sheeting.

1.2.9 Excavation Within RPA

In areas where excavation is required within the root protection zone of retained trees located outside of the Planning Application Boundary, the use of vacuum excavation will be considered. The feasibility of use and specific methodology will be advised by the Project Arboriculturist, as appropriate. Where high pressure water is used to break up the soil prior to extraction, care will be taken to avoid high pressure water damage to significant roots as they are exposed. Any machinery used to carry out the process of excavation will be sited outside of the RPA, or will be located on suitable loadbearing temporary ground protection specified to avoid excessive ground compaction. Works will be carried out under appropriate supervision.

When roots between 10mm to 25mm in diameter may be encountered, these will be retained undamaged wherever possible, and protected from desiccation / frost by damp hessian sacking or a similar protective material until the excavation is back filled. Roots below 10mm in diameter may be trimmed back neatly in line with the edge of the excavation trench using secateurs. Once construction work commences on the Proposed Development, the implementation of specific methodologies that may be required around trees will be implemented to protect retained trees. This information will be contained within a site-specific AMS which will be compiled by a qualified arboriculturalist and will provide detailed measures, where required, once the detailed design is suitably mature.

1.2.10 Fence Construction Within RPAs

Where fence posts need to be installed within RPAs, excavations will be minimal and carried out using handheld tools. Fence posts will be erected at least 1m (metre) from trees and using metal post support spikes, or if using concrete mix, post holes will be lined with an impermeable membrane to prevent contact between tree roots and potentially damaging chemicals in the concrete.

The proposed fence alignment will allow for a minimum distance of 500mm between the tree stems and the fence, providing sufficient room for the future increase of the stem diameter and minimising the risk of potential conflicts between the fence structure and the tree stem.

1.2.11 Root Pruning

The specific need for root pruning has not been identified in any areas of the Proposed Development, though a number of retained trees have minor incursions into their theoretical RPA which means root severance may be required. In most cases, if tree roots are uncovered during excavation works, then they are most likely to belong to trees removed during the site clearance. If it is clear that an uncovered root is associated with a retained tree, then the following steps will be taken.

Minor roots (less than 25mm in diameter) will be cleanly severed with a sharp pruning saw, leaving as small a final cut wound as possible. Roots larger than 25mm diameter will be carefully exposed by hand. Once exposed the Environmental Clerk of Works or the Project Arboriculturalist will be contacted for advice on how to proceed. If it is considered that the removal of the root will not have a destabilising, or detrimental impact on the parent tree, then it can be cleanly severed with a sharp pruning saw. A photographic record of any root pruning will be taken, along with its location marked clearly on a site plan.

If it is considered an unacceptable risk to sever the root, then it will be reburied or wrapped in damp hessian to prevent desiccation, whilst the appointed contractor team work through options for dealing with the situation. In certain cases, this may require the removal of the parent tree.

1.2.12 Changes of Level Within RPAs

Generally, the levels within the RPA or protected area will not be changed. Typically between 90% and 99% of a tree's total root length occurs in the upper 1m of soil. Any excavation into this will remove part of the root system and will potentially affect the vigour or stability of the tree. Conversely, any additional material built up above ground level will compact the soil beneath it, potentially compacting all the air pores in the 600mm depth of soil that most roots are in, effectively suffocating the roots and affecting the vigour or stability of the tree.

On occasion, additional soil may be gently spread by hand within the RPA /protected area, for example, to marry levels in small areas between raised levels of no-dig construction and the existing levels. The maximum depth of this would be to 150mm, reducing to nil. However, it is not generally acceptable in large areas of the RPA / protected area to raise the level as a blanket. Any areas which will need to be raised will be agreed with the Local Planning Authority prior to the Construction Phase. Specifically, there will be no mechanical equipment within the RPA / protected area to spread, compact, or level out soil levels as this would compact the soil.

1.2.13 Permanent Surfacing (No-Dig Construction) in RPA

After scraping off the above soil vegetation layer, a geotextile will be laid out on top of the existing ground, and subsequently a three-dimensional Cellular Confinement System (CCS) will be pegged out, and infilled as manufacturer's recommendations. Infill materials will be no-fines aggregate (granular) which will interlock and will be free draining and allow gaseous exchange. When infilled, this structure will act as the sub-base. A separation geotextile

will be laid on top of this construction before any final wearing course is installed (unless machine laid bounded surface), or overfill by 40mm to 60mm to provide the wearing course.

The wearing course will be a permeable surface allowing gaseous exchange and the infiltration of water into the root zone.

Where existing hard surfaces are retained as temporary ground protection, new permanent hard surfacing will be built using the existing sub-base, and therefore, avoiding any excavations and changes in level. This will be carried out only on completion of the surrounding construction work.

Roots smaller than 25mm diameter may be pruned back, making a clean cut with a suitable sharp tool except where they occur in clumps. Roots occurring in clumps or of 25mm diameter and over will be severed only following consultation with an arboriculturalist, as such roots might be essential to the tree's health and stability.

Kerbs and edgings that require excavations will not be used. Where kerbing is required for light structures, above-ground peg and board edging might be acceptable. Where the use of standard kerbs is unavoidable in areas used by vehicular traffic, foundations will not be continuous where this would require cutting or severing of roots larger than 25mm diameter. Instead, the kerbs will be 'bridged' over the roots, leaving space that allows for future increase of the root diameter.

1.2.14 Excavations for Soft Landscaping

Where soft landscaping is proposed within the RPA of retained trees, excavations will be kept to the minimum depth required to provide adequate conditions for the establishment of new shrubs and trees. Excavations will be carried out carefully and by hand, avoiding the severance of any roots larger than 25mm diameter.

1.2.15 Removal of Existing Hard Standing

Where soft landscaping is proposed within the RPA in existing hard surfaces, the wearing course and its sub-base will be carefully lifted using handheld tools. If any roots are exposed in the process, they will be immediately wrapped or covered to prevent desiccation and to protect them from rapid temperature changes. Any wrapping will be removed prior to backfilling, which will take place as soon as possible.

Prior to backfilling, retained roots will be surrounded with topsoil or uncompacted sharp sand (other than builders' sand), or other loose inert granular fill, before soil or other suitable material is replaced.

1.2.16 Soil Improvements and Mulching

To compensate for root damage and stress caused by construction activities, it is recommended that the RPA of retained trees on-site will be mulched, where possible. The materials that may be used for mulching include coarsely divided plant matter, such as wood chip, pulverised bark, or leaf mould, any of which may be combined with well-rotted animal manure. The mulched area will extend over as much of the root system as can be allowed by other site-usage requirements. The depth of an organic mulch will not be so much as to inhibit aeration of the root system or to cause overheating of uncomposted material (normally no more than 80mm to 100mm). The mulch will be periodically replenished as it decomposes, so that it does not become depleted.

1.3 Arboricultural Site Supervision

Tree protection on development sites is an iterative process which does not end with the finalisation of Arboricultural reports.

The ESB will appoint an Arboricultural Clerk of Works (ACoW), also known as the Project Arboriculturalist. Their role is to adapt and update the AMS and Tree Protection Plan as the Proposed Development is delivered to provide pragmatic and deliverable tree protection on-site. As such, the AMS and Tree Protection Plan will be seen as live documents, which are subject to continual revision.

The Project Arboriculturalist will arrange to make regular visits to the site to attend pre-commencement meetings, at key stages of the development (such as checking the erection of tree protection fencing) and to resolve any issues arising on-site.

Records of any visits will be kept in the site diary and as brief site report documents. If requested, details of site visits will be made available to the Local Planning Authority.

If non-compliance is observed during site visits, the Project Arboriculturalist will have the ability to halt work until the issues can be rectified, and the relevant persons informed.

1.4 References

BlueSky International Ltd (2023). Purchased dataset from National Tree Map (NTM).

BSI (2010). BS 3998:2010. Trees Work – Recommendations. London: British Standards Institution. 3rd ed. [hard copy] London: British Standards Institution [Accessed 1 September 2023].

BSI (2012). BS 5837:2012. Trees in relation to design, demolition and construction – Recommendations. 4th ed. [ebook] London: British Standards Institution. [Online] Available at: https://beta.bathnes.gov.uk/sites/default/files/2020-01/BS5837%202012%20Trees.pdf [Accessed 1 September 2023].

NJUG (2007). Vol 4 Issue 2 – Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees [Accessed 1 September 2023].

Directives and Legislation

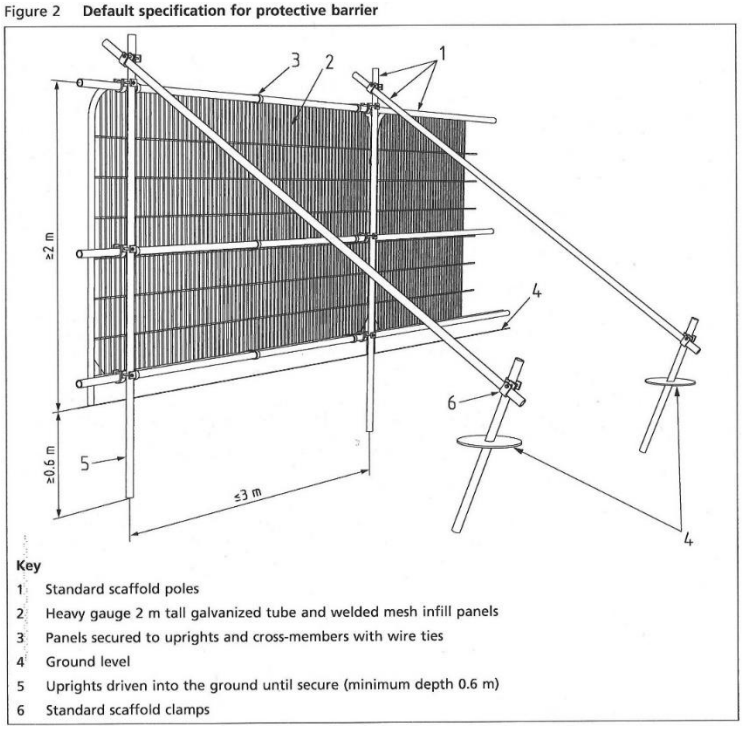
Number 39 of 1976 - Wildlife Act, 1976 (as amended)

S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended)

Appendix A. Suggested Tree Protection Specification

Default Tree Protection Specifications (taken from pages 20-21 of BS5837:2012 (BSI 2012)

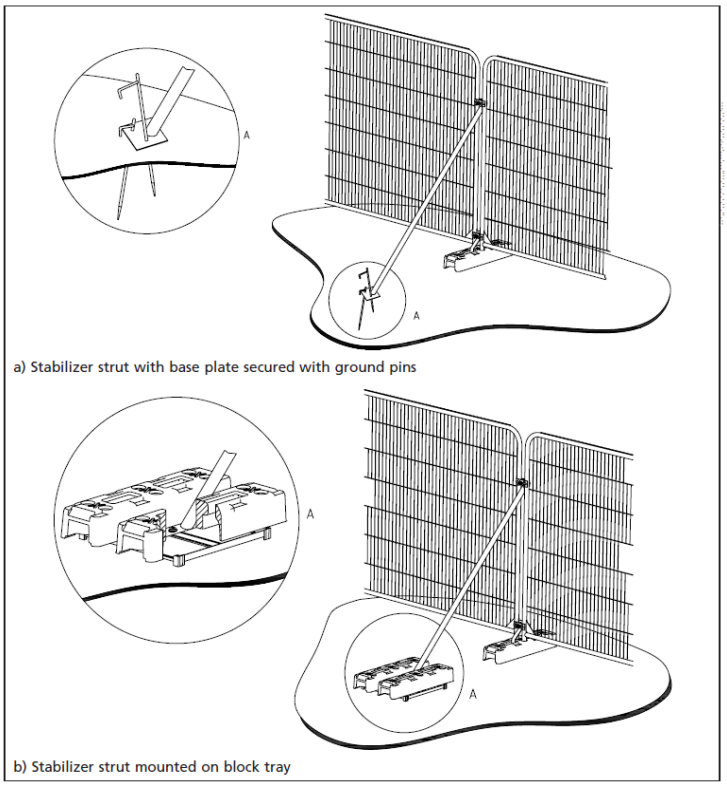
Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Figure 3 **Examples of above-ground stabilizing systems**



Appendix B. Suggested Tree Protection Signage