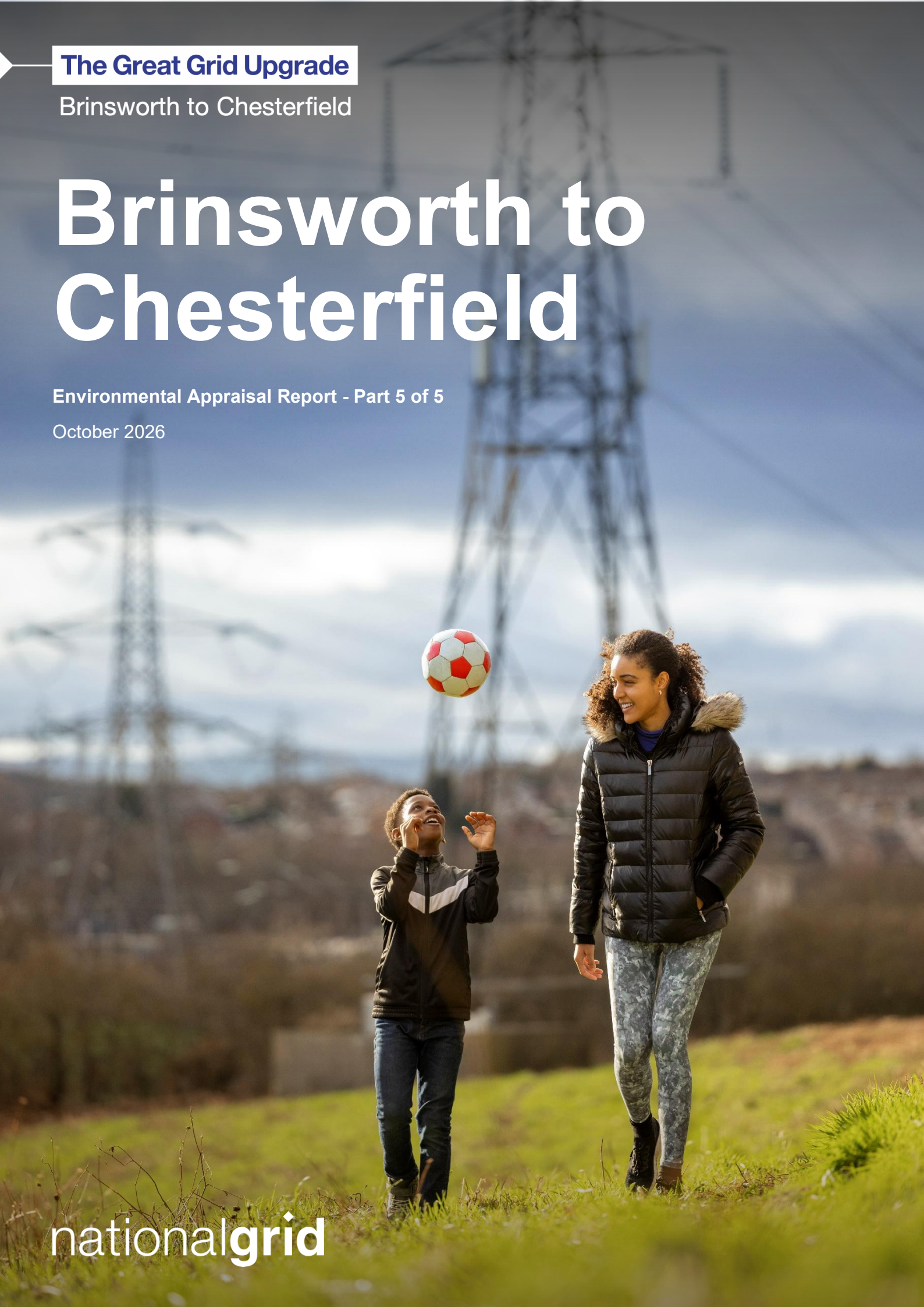
The Great Grid Upgrade

Brinsworth to Chesterfield

Brinsworth to Chesterfield

Environmental Appraisal Report - Part 5 of 5

October 2026



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Contents

Appendix H	Arboricultural Survey Report
Appendix I	Excerpts from Appendix F of the new 400kV Long Lane Substation Environmental Appraisal Report
Appendix J	Long Lane Breeding Bird Report
Appendix K	Flood Risk Assessment
Appendix L	Outline Soil Management Plan

Appendix H Arboricultural Survey Report

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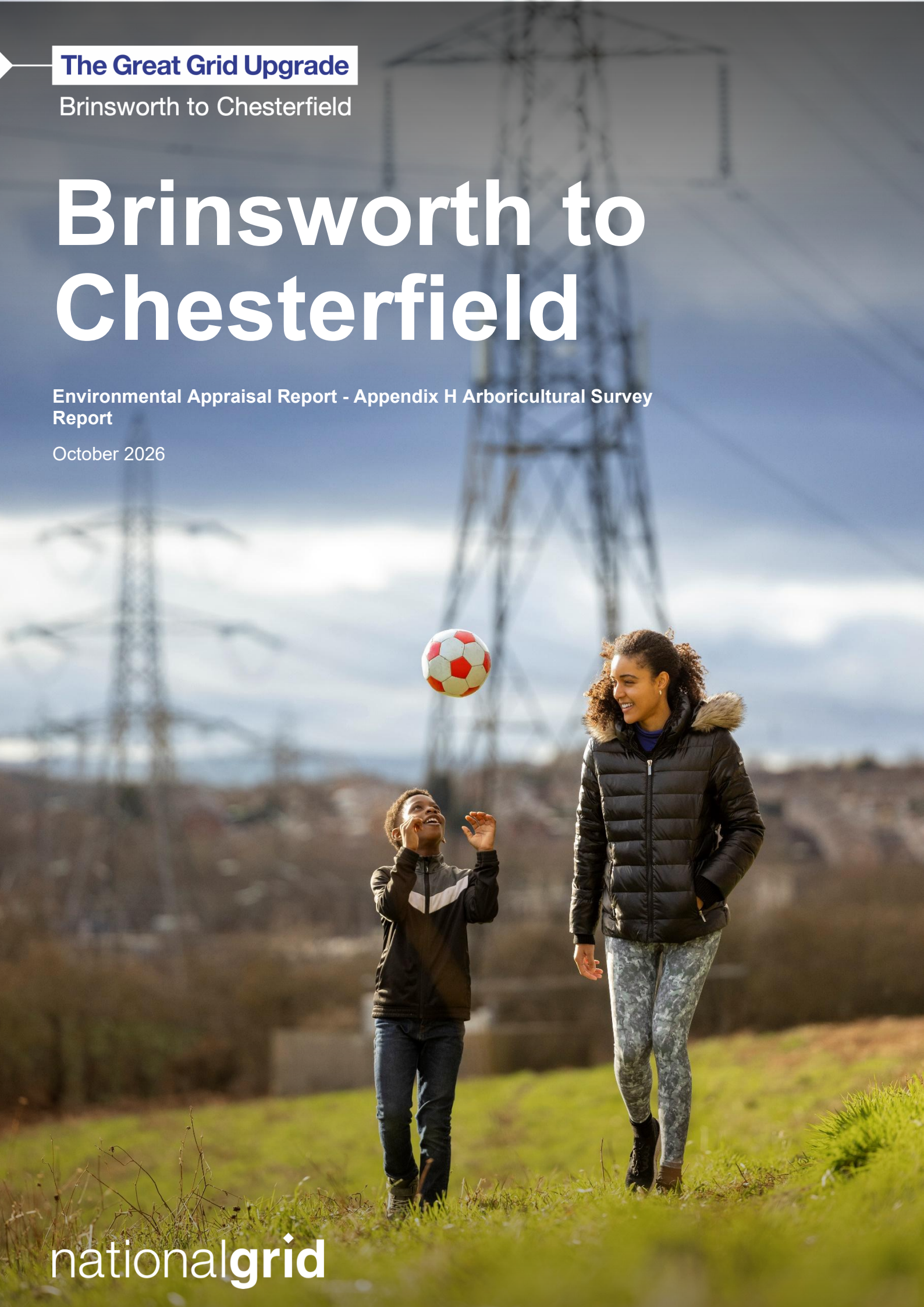
Environmental Appraisal Report - Appendix H Arboricultural Survey Report

October 2026



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Contents

1.	**Introduction**	**1**
1.1	Overview	1
2.	**Methodology**	**2**
2.1	Tree Survey Methodology	2
2.2	Study Area	2
2.3	Survey Access	2
2.4	Individual trees	3
2.5	Groups of trees	4
2.6	Hedgerows	4
2.7	Woodlands	4
2.8	Categorisation	4
2.9	Root Protection Area	4
2.10	Survey Limitations	5
2.11	Tree Constraints Check	5
3.	**Tree Survey Results**	**6**
3.1	Tree Assessment and Categorisation	6
3.2	Tree Species Diversity	6
3.3	Age Diversity	8
3.4	Tree Constraints Check	8
4.	**Trees and Planning**	**9**
4.1	The Planning Process	9
4.2	National Planning Policy Framework 2025	9
4.3	Local Planning Policy	10
5.	**Further Work**	**11**
6.	**Summary**	**12**
7.	**References**	**13**

Table 3.1	Tree Categories Recorded	6
Table 3.3	Tree Species Recorded	7
Table 3.4	Age Diversity	8

Image 2.1 Scheme Boundary (red line), Survey Boundary (blue line). Imagery © 2025 Infoterra Ltd & Bluesky 3

Annex A Explanation of Terms
Annex B Schedule of Trees
Annex C Preliminary Tree Protection Measures

1. Introduction

1.1 Overview

1.1.1 Arcadis Consulting (UK) Limited (Arcadis) was instructed by National Grid to undertake an Arboricultural Survey Report in line with British Standard BS 5837: 2012 Trees in relation to design, demolition and construction – Recommendations (British Standards Institution, 2012), henceforth referred to as BS 5837: 2012 in relation to the of proposed overhead line "Tie-In" works ('the land required to construct the Scheme') located to the east of Brinsworth and south east of Whiston.

1.1.2 The land required to construct the Scheme is located in Rotherham, South Yorkshire, centred on Ordnance Survey (OS) Grid Reference SK 44407 89530 and centred around the post code S60 4JJ. The land required to construct the Scheme is approximately 67.22ha in area and is predominantly comprised of agricultural fields, south-east of Brinsworth and South of Whiston. The land required to construct the Scheme extends to the existing Brinsworth Substation to the west. The scheme crosses a section of the M1 and extends south.

2. Methodology

2.1 Tree Survey Methodology

2.1.1 An Arboricultural Survey was undertaken by Barnes Associates Ltd on 23 June 2025 and updated in 2026 in accordance with BS 5837:2012.

2.1.2 The survey was based on partial topographical data, document reference: B2331B05-JAC-BR-ZZ-M3-G-92120 (Jacobs 2023).

2.1.3 Additional Surveys for accessible areas were undertaken by Arcadis in May 2026.

2.1.4 Observations were conducted from ground level, utilising the “Visual Tree Assessment” (VTA) system as outlined in The Body Language of Trees, A Handbook for Failure Analysis Research for Amenity Trees No.4 (Mattheck and Breloer, 1994) with the aid of binoculars.

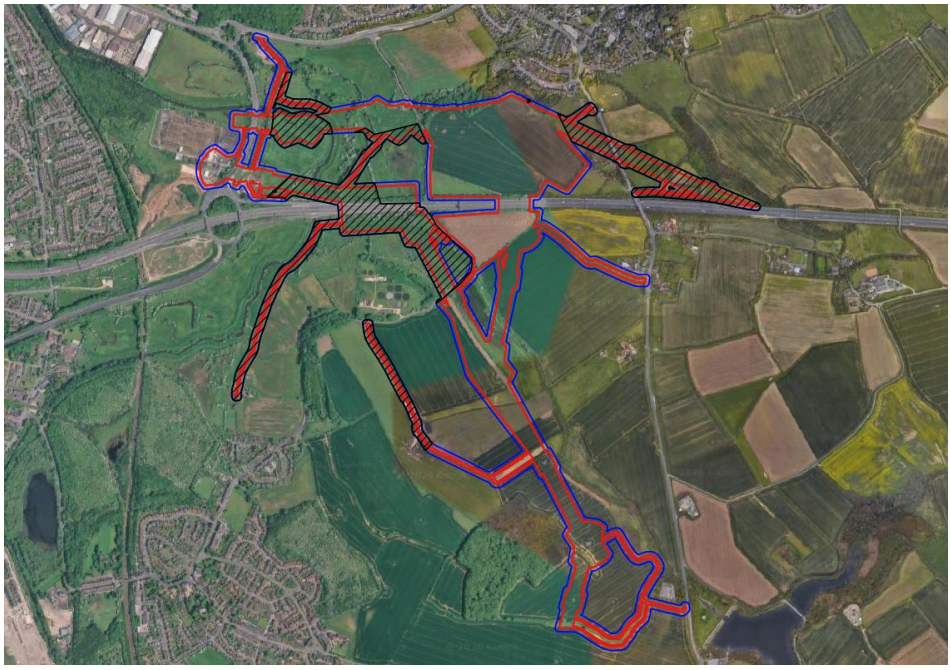
2.2 Study Area

2.2.1 The study area included the Site itself (boundary of land required to construct the Scheme), and any trees considered to be within influencing distance (15m). An aerial screen shot illustrating the Site location (red outline) and identified survey area (blue outline) and is presented in Image 1.

2.3 Survey Access

2.3.1 At the time of the survey access was restricted to certain parts of the study area. As a result, these areas could not be accessed and were therefore not covered by the survey. The locations of the un-surveyed areas are identified by black hatching on Image 2.1 below and Figure 1. Tree Constraints Plan (TCP).

Image 2.1 Scheme Boundary (red line), Survey Boundary (blue line). Imagery © 2025 Infoterra Ltd & Bluesky



2.4 Individual trees

2.4.1 For the purposes of BS 5837: 2012, only trees with a stem diameter greater than 75mm, (measured at 1.5m above ground level), were included within the survey.

2.4.2 For reference, individual trees are identified with the letter T and an associated unique number on the tree schedules and Figure 1. Tree Constraints Plan (TCP).

2.4.3 The stem diameter of the trees was recorded at 1.5m above ground level or following Annex C of BS 5837:2012, using a measurement from a diameter tape, recorded in millimetres rounded down to the nearest 5mm.

2.4.4 The height of trees was recorded in meters using a clinometer.

2.4.5 The maximum crown spread of each tree was measured from the centre of the trunk to the tips of the live lateral branches taken at four compass points (N-E-S-W) using a ground tape where safe and practical to do so. Crown spread measurements were recorded in metres.

2.4.6 Tree age was estimated from visual indicators (such as tree size and appearance of bark) which was taken as a provisional guide. Age estimates often need to be modified based on further information such as historical records and local knowledge.

2.4.7 If direct access to the tree was not possible, estimations from appropriate vantage points were taken, and any limitations or estimations are presented within the survey limitations section and noted in the associated schedules.

2.5 Groups of trees

2.5.1 Features that have been recorded as a group where they have been considered to form a cohesive arboricultural feature either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. wood pasture).

2.5.2 Groups of trees were identified with the letter G and number on the associated schedules and plans.

2.5.3 Crown spread was assessed by measuring the largest crown spread on each compass point (N-E-S-W). Groups have been plotted using aerial imagery. The stem diameter of tree groups has been calculated as an average stem diameter of trees within a group. Heights are displayed as the maximum height of the tallest tree within the group or displayed as a range of heights where two or more distinct height layers have been identified. (i.e. understorey trees/large woody shrubs).

2.6 Hedgerows

2.6.1 Hedgerows were identified with the letter H and number on the associated schedules and plans. A 30m section of hedgerow was surveyed for each hedgerow, recording the number of species, average stem diameter, lateral spread and the maximum height. Any individual trees present within the hedgerow were recorded as individual trees.

2.7 Woodlands

2.7.1 Woodlands were identified with the letter W and number on the associated schedules and plans. A sample method for surveying woodlands has been used taking average measurements of stem diameter, crown spreads and heights from 100m2 sample areas.

2.8 Categorisation

2.8.1 Trees surveyed have been categorised according to their quality and value in compliance with Table 3.1 Cascade chart for tree quality assessment of BS 5837: 2012. A glossary of survey terms can be found in Annex A. Explanation of Terms and the full cascade chart for tree categorisation is displayed in Table B2 of Annex B. Schedule of Trees.

2.9 Root Protection Area

2.9.1 The Root Protection Area (RPA) of a tree is described in section 3.7 of BS 5837: 2012 as the ‘minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree’s viability, and where the protection of the roots and soil structure is treated as a priority. It should be recognised that the calculated RPA may not entirely encompass all of the tree’s rooting material.

2.9.2 RPAs were calculated in accordance with Section 4.6.1 in BS: 5837:2012 using the measurement of the stem diameter at 1.5m above ground level or at ground level if the tree is multi-stemmed. The shape and size of an RPA can be amended in accordance with Section 4.6.3 of BS: 5837:2012.

2.9.3 Tree RPAs are recorded in the Schedule of Trees (Annex B. Schedule of Trees) and shown as a pink shaded area on the initial Figure 1 Tree Constraints Plan and form the initial Construction Exclusion Zone (CEZ) to protect the trees within and adjoining the land required to construct the Scheme.

2.9.4 Where RPAs have been calculated for tree groups, hedgerows or woodlands, they have been represented as an offset (in meters) from the plotted canopy line of the feature in question when detailed in Annex B. Schedule of Trees.

2.9.5 No soil assessment or above/below ground investigations into the true extent of a tree's rooting area were undertaken as they are beyond the scope of this report.

2.10 Survey Limitations

2.10.1 At the time of the survey partial topographic information for the Site was available. As such, some tree locations are based on GPS tracking, line of sight with existing features, aerial imagery and OS base mapping.

2.10.2 Only trees with the potential to be affected by development within or adjacent to the land required to construct the Scheme as determined by the survey boundary displayed in Image 1 have been included within this report. Any additional trees in the vicinity of the Scheme have been deemed to not be affected by the proposals and have not been included.

2.10.3 Trees are living organisms and as such their health and condition are naturally subject to change over time. Unforeseen future circumstances such as neglect, wilful damage or severe/extreme weather conditions may affect the future health and condition of the trees included in this report.

2.10.4 At the time of survey and writing this report, there were land access restrictions for certain portions of the Site. These areas will require survey in order to enable a full assessment of potential arboricultural impacts.

2.11 Tree Constraints Check

2.11.1 The following constraints checks were undertaken for the Site on 30 June 2026:

- A tree constraints check was performed using the Rotherham Metropolitan Borough Council planning portal map (Rotherham Metropolitan Borough Council 2026);
- The Multi-Agency Geographical Information for the Countryside (MAGIC) website was used to search for statutory designated sites of nature conservation value and areas of ancient woodlands listed on the Ancient Woodland Inventory (DEFRA 2026); and
- A check for catalogued Ancient and Veteran trees using the Woodland Trust Ancient Tree Inventory (Woodland Trust 2026).

2.11.2 The results of which are provided in Section 3 of this report.

3. Tree Survey Results

Full details of the survey data are presented within Annex B. Schedule of Trees and within Figure 1. Tree Constraints Plan.

3.1 Tree Assessment and Categorisation

3.1.1 A total of 173 arboricultural features were recorded within the study area, these were recorded as 99 individual trees (T), 43 groups of trees (G), 27 hedgerows (H) and four woodlands (W).

3.1.2 Each arboricultural feature was assigned to one of four categories, as listed in Table 3.1.

Table 3.1 Tree Categories Recorded

Tree Category	No. of Individual Trees	No. of Groups of Trees	No. of Hedgerows	No. of Woodland Groups
Category A (trees of high quality)	4	2	-	2
Category B (trees of moderate quality)	29	8	7	1
Category C (trees of low quality)	63	33	20	1
Category U (trees of poor quality unsuitable for retention)	3	-	-	-
Totals	**99**	**43**	**27**	**4**

3.2 Tree Species Diversity

3.2.1 A total of 15 individual tree species were recorded during the survey and are represented throughout the survey area. A summary of the species surveyed can be found within the tree schedules in Annex B. Schedule of Trees and also provided in Table 3.2. A number of mixed species arboricultural features were also recorded, the composition of which are presented in the accompanying survey schedule provided in Annex B. Schedule of Trees.

Table 3.2 Tree Species Recorded

Tree Species	Individual Trees	Tree Groups	Hedgerows	Woodlands
Alder (*Alnus glutinosa*)	8	2	-	-
Ash (*Fraxinus excelsior*)	13	-	-	-
Common Lime (*Tilia x europaea*)	14	-	-	-
Elder (*Sambucus nigra*)	1	-	-	-
Goat Willow (*Salix caprea*)	-	1	-	-
Hawthorn (*Crataegus monogyna*)	30	6	-	-
Hazel (*Corylus avellana*)	-	2	-	1
Horse-chestnut (*Aesculus hippocastanum*)	20	-	-	-
Lombardy Poplar (*Populus nigra Italica*)	2	-	-	-
Pedunculate Oak (*Quercus robur*)	-	29	27	3
Sweet Chestnut (*Castanea sativa*)	5	2	-	-
Sycamore (*Acer pseudoplatanus*)	1	-	-	-
White Willow (*Salix alba*)	2	-	-	-
Wild Cherry (*Prunus avium*)	-	1	-	-
Wych Elm (*Ulmus glabra*)	4	-	-	-
Mixed species – See Annex B for detail	1	-	-	-
Totals	**99**	**43**	**27**	**4**

3.3 Age Diversity

3.3.1 All arboricultural features surveyed within the study area were assessed to be within the Semi Mature to Mature age classifications set by BS 5837: 2012. as illustrated in Table 3.3.

Table 3.3 Age Diversity

Age Class	Trees	Groups	Hedgerows	Woodlands
Young	1	3	1	-
Semi-mature	13	15	2	1
Early mature	35	16	14	2
Mature	50	9	10	1
Totals	**99**	**43**	**27**	**4**

3.4 Tree Constraints Check

3.4.1 It was confirmed by Rotherham Metropolitan Borough Council that no trees surveyed are subject to Tree Preservation Orders or Conservation Area restrictions.

3.4.2 It was confirmed that one group of trees G38 forms part of a replanted ancient woodland referenced as Burnt Wood, ID 1105146 and as such is considered irreplaceable habitat under National Planning Policy. In line with Natural England and Forestry Commission standing advice, a 15m buffer zone has been developed around G38 which is displayed as a teal hatch in Figure 1: Tree Constraints Plan.

3.4.3 No veteran trees were identified during the walkover survey.

4. Trees and Planning

4.1 The Planning Process

4.1.1 LPAs in the UK have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a TPO or other statutory designation) is a material consideration in determining a planning application.

4.1.2 BS 5837: 2012 provides a framework which sets out how trees should be considered in the planning process and also explicitly applies to development where planning consent is not required.

4.1.3 BS 5837: 2012 recommends that a tree survey is undertaken to identify the quality and benefits of trees and the spatial constraints associated with them. This information is then used to produce a Figure 1. Tree Constraints Plan (TCP) illustrating the above and below ground constraints associated with trees RPA. The TCP is intended to be used to inform the design process and to identify those trees considered to be a constraint to development due to the quality and value (in a non-fiscal sense).

4.1.4 Following the production of the final scheme design, an Arboricultural Impact Assessment (AIA) is produced to identify the likely direct and indirect impacts of the proposed development, along with a Tree Impact and Protection Plan to identify trees to be removed and retained and to illustrate the protection of retained trees. An Arboricultural Method Statement (AMS) is also often required as a condition of planning consent to detail how sensitive operations are to be undertaken in close proximity to retained trees.

4.1.5 These documents and plans are considered the minimum requirement for arboricultural matters within a planning application and are intended to ensure both a long term sustainable and harmonious relationship between existing trees and the Scheme.

4.2 National Planning Policy Framework 2025

4.2.1 The National Planning Policy Framework (NPPF 2025) seeks to ensure that new development is sustainable and underlines the importance of green infrastructure, of which trees form an integral part. This includes recognition of the importance of trees in relation to the management of air, soil and water quality along with other associated ecosystem services and climate change adaption. The NPPF also seeks to achieve the protection and enhancement of landscapes and a net gain in biodiversity. Finally, it specifically identifies veteran and ancient trees and woodland as a highly valuable and irreplaceable habitat.

4.2.2 At the heart of the National Planning Policy Framework (NPPF) is a presumption in favour of sustainable development, and specifically states that for decision making, the LPA should be approving development proposals that accord with the development plan without delay.

4.2.3 Section 15 of the NPPF recognises the importance of conserving and enhancing the natural environment and specifically acknowledges the role of trees and woodland in the provision of natural capital and ecosystem services.

4.2.4 It further acknowledges the importance of ancient woodlands and veteran trees for habitats and biodiversity and requires that planning consent should be refused where development schemes require the removal of such features unless there are wholly exceptional reasons, stating that:

"development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists." (Paragraph 193, C)"

4.2.5 Where the LPA does not have a development plan or the development plan is out of date, the LPA should grant planning consent insofar as the development proposals do not breach the NPPF.

4.3 Local Planning Policy

4.3.1 Rotherham Metropolitan Borough Council Local Plan Core Strategy (Rotherham Metropolitan Borough Council 2014) further acknowledges the importance of ancient woodlands and veteran trees for habitats and biodiversity and requires that planning consent should be refused where development schemes require the removal of such features unless there are wholly exceptional reasons, stating that:

4.3.2 Rotherham Metropolitan Borough Council Local Plan Core Strategy - Policy CS 20: Biodiversity and Geodiversity

4.3.3 "The Council will conserve and enhance Rotherham's natural environment. Biodiversity and geodiversity resources will be protected, and measures will be taken to enhance these resources in terms of nationally and locally prioritised sites, habitats and features and protected and priority species. Priority will be given to:

4.3.4 Conserving and enhancing sites and features which have demonstrable biodiversity and geodiversity value, including woodland, important trees, hedgerows, watercourse, caves, crags and structures, but which are not included in designated sites.

4.3.5 Conserving and enhancing populations of protected and identified priority species by protecting them from harm and disturbance and by promoting recovery of such species populations to meet national and local targets."

5. Further Work

5.1.1 At the time of survey and writing this report, there were land access restrictions for certain portions of the Site. These areas will require survey in order to enable a full assessment of potential arboricultural impacts.

5.1.2 Should any future proposed development require tree removals or RPA incursions within RPAs of the retained trees an Arboricultural Impact Assessment (AIA) will be required.

5.1.3 A review of any proposed development should be undertaken to ensure that there are no additional trees within the zone of influence of the development that require surveying. For example, parking requirements often extend the zone of influence.

5.1.4 For arboricultural survey data detailed in this report and associated Tree Constraints Plan to be used as a means of informing development proposals, or to be taken forward for use in an Arboricultural Impact Assessment compliant with BS5837:2012, topographic data must be used to accurately plot above and below ground tree constraints. The topographic data collected must comply with section 4.2.4 of BS 5837: 2012.

5.1.5 If required, the AIA should state the trees to be removed due to the design and access requirements and any proposed tree facilitation pruning works. This should also be accompanied by an assessment of the likely impacts due to construction activity on the trees to be retained. Indicative arboricultural mitigation measures should be provided which would include recommendations for tree re-provisioning. The AIA should be accompanied by an updated Tree Constraints Plan and a Tree Impact and Protection Plan based on the proposed design.

5.1.6 If required, the AIA should also include a Tree Replacement Strategy which should take into consideration the landscape character, local treescape and biodiversity features of the immediate and adjoining areas. The species, number, size, type of stock, location and planting aids for the compensating planting should be chosen for landscape, wildlife and arboriculture values. To ensure that appropriate and sustainable planting is achieved advice should be sought from an ecologist and arboriculturist. Furthermore, liaison with the LPA Tree Officer may be necessary during the consenting process to agree an approved tree compensation and or landscape scheme plan.

5.1.7 All new tree planting should be in accordance with British Standard 8545: Trees: From Nursery to Independence in the Landscape – Recommendations, 2014 and all tree works must be carried out by a qualified contractor in accordance with BS3998:2010: Tree Work – Recommendations.

5.1.8 This document encloses details of Preliminary Tree Protection Measures (Annex C) to be implemented on site prior to the commencement of demolition or construction works. A bespoke Arboricultural Method Statement may be required pre-construction and when the construction details are known to protect any retained trees within and adjoining the site.

6. Summary

6.1.1 A total of 173 arboricultural features were recorded within the study area, these were recorded as 99 individual trees (T), 43 groups of trees (G), 27 hedgerows (H) and four woodlands (W).

6.1.2 Each arboricultural feature was assigned to one of four categories, as listed below:

- Category A features: four individual trees, two tree groups and two woodlands have been identified as Category A (trees of high quality) as part of this survey;
- Category B features: 29 individual trees, eight groups of trees, seven hedgerows and one woodland have been identified as Category B (trees of moderate quality) as part of this survey;
- Category C features: 63 individual trees, 33 groups of trees, 20 hedgerows and one woodland have been identified as Category C (trees of low quality) as part of this survey;
- Category U features: three individual trees have been identified as Category U (trees of poor quality unsuitable for retention) as part of this survey.

6.1.3 It was confirmed by the Rotherham Metropolitan Borough Council that no trees surveyed are subject to Tree Preservation Orders or Conservation Area restrictions.

6.1.4 It was confirmed that one group of trees G38 forms part of a replanted ancient woodland referenced as Burnt Wood ID 1105146 and as such is considered irreplaceable habitat under National Planning Policy. In line with Natural England and Forestry Commission standing advice, a 15m buffer zone has been developed around G38 which is displayed as a teal hatch in Figure 1: Tree Constraints Plan.

6.1.5 At the time of survey and writing this report, there were land access restrictions for certain portions of the Site. These areas will require survey in order to enable a full assessment of potential arboricultural impacts.

6.1.6 Should any future proposed development require tree removals or RPA incursions within RPAs of the retained trees an Arboricultural Impact Assessment (AIA) will be required.

6.1.7 A review of any proposed development should be undertaken to ensure that there are no additional trees within the zone of influence of the development that require surveying. For example, parking requirements often extend the zone of influence.

6.1.8 This document encloses details of Preliminary Tree Protection Measures (Annex C). Due to the nature of the proposed works, once further detail is known as to the construction process, a site-specific Arboricultural Method Statement (AMS) will be required to protect trees to be retained over the course of the works.

7. References

Ref 1 British Standards Institution (2010) BS 3998:2010, Tree Work Recommendations.

Ref 2 British Standards Institution (2012) BS 5837: 2012 Trees in relation to design, demolition and construction – Recommendations.

Ref 3 British Standards Institution (2014) BS 8545:2014 Trees: From nursery to Independence in the Landscape – Recommendations.

Ref 4 DEFRA (2026) Magic Map: https://magic.defra.gov.uk/MagicMap.aspx [Accessed June 2026]

Ref 5 Mattheck, C. and Breloer, H (1994) The Body Language of Trees: A Handbook for Failure Analysis Research for Amenity Trees No.4. HMSO.

Ref 6 National Planning Policy Framework 2025. England. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed June 2026]

Ref 7 Rotherham Metropolitan Borough Council Planning Map (2026). Available at: https://maps.rotherham.gov.uk/mapping/ [Accessed June 2026]

Ref 8 Rotherham Metropolitan Borough Council Local Plan Core Strategy (2014) Available at: https://www.rotherham.gov.uk/downloads/file/307/adopted-rotherham-core-strategy [Accessed June 2026]

Ref 9 The Town and Country (Tree Preservation) (England) Regulations 2012. England. Available at: https://www.legislation.gov.uk/uksi/2012/605/contents/made [Accessed June 2026]

Ref 10 The Town and Country Planning (General Permitted Development) Order 1995. England and Wales. Available at: https://www.legislation.gov.uk/uksi/1995/418/article/2/made [Accessed June 2026]

Ref 11 Town and Country Planning Act 1990. England and Wales. Available at: https://www.legislation.gov.uk/ukpga/1990/8/contents [Accessed June 2026]

Ref 12 Woodland Trust (2026). Ancient Tree Inventory. [online] Available at: https://ati.woodlandtrust.org.uk/ [Accessed June 2026].

Figure 1
Tree Constraints Plan

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Annex Explanation of Terms

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Annex A
Explanation of Terms

Age Class

- Young (Y) – Establishing tree that could be transplanted without specialist equipment.
- Semi-mature (SM) – Fully established but has not reached its ultimate height and has significant growth potential.
- Early-mature (EM) – A tree reaching its ultimate potential height, growth rate is slowing, will still increase in DBH.
- Mature (M) – A mature specimen with limited potential for any significant increase in size.
- Over Mature (OM) – A senescent or moribund specimen with a limited safe useful life expectancy.
- Veteran (V) – A specimen of high value due to either its age, size, or ecological significance. Can be identified by the presence of specific characteristics.

Stem Diameter

The diameter of the stem measured in millimetres (mm) at a height of 1.5m above ground level

Crown Spread

Average measured in metres using a ground tape where possible

Physiological Condition

- Good – Healthy tree with no signs of ill health and signs of good extension growth for species
- Fair – Trees with signs of disease, minor defects and decreased life expectancy due to physical damage
- Poor – Trees with significant disease, significantly reduced life expectancy and/or under major physiological stress
- Dead – Dead tree or trees with over 70% crown dieback

Structural Condition

- Good – Trees with no significant defects
- Fair – Trees with remedial defects which require minor tree surgery works
- Poor – Trees with remedial defects which require significant tree surgery works or felling
- Dead – Trees which require felling

BS 5837 Retention Category

Each tree, group of trees or hedge is assigned to a retention category. Category A trees of high quality and amenity value. Category B trees of moderate quality and amenity value. Category C trees of low quality or amenity value. Category U trees of very low quality or requiring immediate removal due to health and safety concerns

British Standards BS 5837:2012 recommends that these categories may be further broken down into sub-categories A1 A2 A3 pertaining to Arboricultural, Landscape or Cultural values respectively.

Deadwood

- Minor – <70mm diameter
- Moderate – >70mm and <150mm diameter
- Major – >150mm diamete

Annex B
Schedule of Trees

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Document Reference Number 30184504-ARC-XX-XX-SCH-ARB-001

BS 5837: 2012 Schedule of Trees

Project: 30184504

Surveyor: Barnes Associates / Arcadis

APPENDIX B. Schedule of Trees

Client: National Grid

Survey date: May-26

Table B1 Tree Schedule

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T1	*Horse-chestnut (Aesculus hippocastanum)*	17	780	8	8	8	8	3	3	-	9.4	275.2	M	Good	Fair	No access to base of tree. No significant defects identified.	20+	B2
T2	*Pedunculate Oak (Quercus robur)*	10	410	5	6	6	6.5	2	2	-	4.9	76.0	SM	Good	Good	Oak situated on edge of junction no access to base of tree	40+	C2
T3	*Horse-chestnut (Aesculus hippocastanum)*	16	680	7	6	6	7	3	3	-	8.2	209.2	M	Good	Fair	Ivy clad main stem extending to 9m into crown.	20+	B2
T4	*Common Lime (Tilia x europaea)*	9	100x8	2.5	3	3	1.5	0.5	0.5	-	3.4	36.2	Y	Fair	Fair	-	10+	C2
T5	*Horse-chestnut (Aesculus hippocastanum)*	13	680	6	7	6	7	1	1	-	8.2	209.2	M	Fair	Fair	Ivy clad main stem extending to 8m into crown.	20+	B2
T6	*Horse-chestnut (Aesculus hippocastanum)*	13	720	7	6	6	7	1	1	-	8.6	234.5	M	Fair	Fair	Ivy clad main stem extending to 8m into crown.	20+	B2
T7	*Common Lime (Tilia x europaea)*	11	610	6	6	8	7	0.5	0.5	-	7.3	168.3	EM	Poor	Fair	Dieback in the top of the crown roughly 20% lost in crown. Good vigour in lower canopy	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T8	*Common Lime (Tilia x europaea)*	13	680	6	6	5	4	1	1	-	8.2	209.2	M	Fair	Fair	Ivy clad main stem extending to 8m into crown.	20+	C2
T9	*Horse-chestnut (Aesculus hippocastanum)*	16	800	7	7	7	7	1	1	-	9.6	289.5	M	Good	Fair	Ivy clad main stem extending to 9m into crown.	20+	B2
T10	*Horse-chestnut (Aesculus hippocastanum)*	13	590	6	5	6	6	2	2	-	7.1	157.5	M	Fair	Fair	Ivy clad main stem extending to 8m into crown.	20+	C2
T11	*Horse-chestnut (Aesculus hippocastanum)*	16	750	7	7	8	9	1	1	-	9.0	254.5	M	Good	Fair	Ivy clad main stem extending to 10m into crown.	20+	B2
T12	*Common Lime (Tilia x europaea)*	7	350, 100	4	4	4	4	0.5	0.5	-	4.4	59.9	EM	Poor	Poor	Ganoderma bracket at base of tree. Central leader is decaying with dysfunction present. Woodpecker hole south at 6..	10+	C2
T13	*Horse-chestnut (Aesculus hippocastanum)*	13	790	7	6	7	7	2	2	-	9.5	282.3	M	Good	Fair	Asymmetrical crown due to competition with adjacent trees. Active bird nest 1.5m south on main stem. Multiple un occluded pruning wounds north at 5m. Historic branch tear out s at 5m.	20+	B2
T14	*Horse-chestnut (Aesculus hippocastanum)*	16	1090	7	7	7	8	2	2	-	13.1	537.5	M	Good	Fair	Ivy clad main stem extending to 12m into crown.	20+	B2
T15	*Common Lime (Tilia x europaea)*	12	500	3.5	4	3.5	4	1	1	-	6.0	113.1	M	Fair	Fair	Mature lime next to road. Survey data estimated due to epicormic growth around base and up stem obscuring visibility.	20+	C1

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T16	*Horse-chestnut (Aesculus hippocastanum)*	10	700	6.5	7.5	7	8	1	1	-	8.4	221.7	M	Fair	Fair	Heavily ivy clad main stem. Asymmetrical crown due to competition with adjacent trees.	20+	C2
T17	*Horse-chestnut (Aesculus hippocastanum)*	14.5	750	7.1	6.5	7.6	7	3	3	-	9.0	254.5	M	Fair	Fair	Inaccessible large mature horse chestnut on roadside. Large open crown. Dense ivy cover up stem and throughout crown. Minor wound on stem base to west. Reasonable vigour and overall condition.	20+	B2
T18	*Common Lime (Tilia x europaea)*	8	500	6	4	4.5	5	-	-	-	6.0	113.1	M	Fair	Fair	Inaccessible lime. Epicormic growth obscuring visibility. Ivy clad crown. Suppressed between two mature horse chestnuts.	20+	C2
T19	*Horse-chestnut (Aesculus hippocastanum)*	18	1395	10	10	12.6	11.1	5	5	-	15.0	706.9	M	Good	Good	Large mature horse chestnut on edge of access track to paddocks. Good form. Good unions. Minor defects including; ivy growth on stem and into canopy and missing bark likely squirrel damage on one of the leaders at approx. 3.5m AGL.	20+	A3
T20	*Hawthorn(Crataegus monogyna)*	4.5	150	7	4	2	4	1.5	1.5	-	1.8	10.2	EM	Fair	Poor	-	10+	C2
T21	*Ash(Fraxinus excelsior)*	18	400	7	7	7	7	4	4	-	4.8	72.4	M	Good	Good	-	20+	B2
T22	*Ash(Fraxinus excelsior)*	14	250	5	5	5	5	0	0	-	3.0	28.3	EM	Good	Good	-	20+	B2
T23	*Ash(Fraxinus excelsior)*	15	400, 450, 250, 200	6	7	7	7	1.5	1.5	-	8.2	210.4	M	Poor	Fair	-	<10	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T24	*Hawthorn(Crataegus monogyna)*	1.5	100	3	3	3	3	0	0	-	1.2	4.5	EM	Fair	Good	-	10+	C2
T25	*Alder(Alnus glutinosa)*	14	400, 400	7	7	7	7	1	1	-	6.8	144.8	M	Good	Good	-	20+	B2
T26	*Ash(Fraxinus excelsior)*	15	600	9	13	8	7	2	2	-	7.2	162.9	M	Good	Fair	-	20+	B2
T27	*AlderAlnus glutinosa*	5	80x4	3.5	3.5	3.5	3.5	1	1	-	1.9	11.6	SM	Fair	Fair	-	10+	C1
T28	*Alder(Alnus glutinosa)*	5	80x4	2.5	2.5	2.5	2.5	1	1	-	1.9	11.6	SM	Fair	Fair	-	10+	C1
T29	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T30	*Alder(Alnus glutinosa)*	5	80x4	2.5	2.5	2.5	2.5	1	1	-	1.9	11.6	SM	Fair	Fair	-	10+	C1
T31	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T32	*Horse-chestnut (Aesculus hippocastanum)*	14.5	750	7.1	6.5	7.6	7	1	1	-	9.0	254.5	M	Good	Fair	Inaccessible large mature horse chestnut. Large open crown. Good vigour and overall condition.	20+	B2
T33	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C1
T34	*Alder(Alnus glutinosa)*	5	100	2	2	2	2	1	1	-	1.2	4.5	SM	Good	Good	-	20+	C2
T35	*Hawthorn(Crataegus monogyna)*	5	100	2	2	2	2	1	1	-	1.2	4.5	EM	Good	Good	-	10+	C1
T36	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T37	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T38	*Hawthorn(Crataegus monogyna)*	4.5	150	5	5	5	5	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	B2
T39	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T40	*Ash(Fraxinus excelsior)*	13	300x2	4	4	4	4	1.5	1.5	-	3.6	40.7	EM	Fair	Fair	-	20+	B2
T41	*Hawthorn(Crataegus monogyna)*	3.5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T42	*Wild Cherry (Prunus avium)*	8	200, 75, 80, 80	3	3	3	3	2	2	-	2.9	26.4	EM	Fair	Fair	Cherry growing along fenceline in dense vegetation at the base of highway verge.	20+	C2
T43	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T44	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C1
T45	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T46	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T47	*Hawthorn(Crataegus monogyna)*	5	200	3	3	3	3	0.5	0.5	-	2.4	18.1	EM	Poor	Poor	-	20+	B2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T48	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T49	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C2
T50	*Alder(Alnus glutinosa)*	8	300	3	2.5	1	3	2	2	-	3.6	40.7	EM	Fair	Fair	-	10+	C2
T51	*Common Lime (Tilia x europaea)*	14	750	5.5	5	5.8	5.6	1	1	-	9.0	254.5	M	Good	Fair	Large mature lime next to paddock fenceline. Survey data estimated due to epicormic growth around base and up stem obscuring visibility. Minor deadwood seen in crown. Reasonable vigour and overall condition.	20+	C1
T52	*Wild Cherry (Prunus avium)*	7	180	3.5	3.5	3	3	1.5	1.5	-	2.2	14.7	EM	Fair	Fair	-	20+	C2
T53	*Hawthorn(Crataegus monogyna)*	5	150	3	3	3	3	0.5	0.5	-	1.8	10.2	EM	Fair	Fair	-	20+	C1
T54	*Horse-chestnut (Aesculus hippocastanum)*	10	520	3.5	4	4	4	1	1	-	6.2	122.3	EM	Poor	Poor	Large mainstem cavity with dysfunction and decay present reaction wood present on edge of wound. Minor deadwood throughout crown with approximately 50% of the crown lost or displaying poor vitality.	<10	U
T55	*Common Lime (Tilia x europaea)*	9.5	110x9	5	5	5	4.5	1	1	-	4.0	49.3	M	Fair	Fair	Multi stem mature lime next to field fenceline. Survey data estimated due to epicormic growth and vegetation around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T56	*Common Lime (Tilia x europaea)*	9.5	110x9	5	5	5	4.5	1	1	-	4.0	49.3	M	Fair	Fair	Multi stem mature lime next to field fenceline. Survey data estimated due to epicormic growth and vegetation around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1
T57	*Hawthorn (Crataegus monogyna)*	5.5	65x6	3.5	1.5	3	3	0.5	0.5	-	1.9	11.5	EM	Fair	Fair	Multiple stems from 1.0m	20+	C2
T58	*Common Lime (Tilia x europaea)*	4.5	750	2	2.5	2	2.5	0	0	-	9.0	254.5	M	Poor	Poor	Mature lime stump on paddock fenceline. Large decaying wound on SW side of stump. Low arboricultural potential. Regrowth likely a stress reaction as well as a species characteristic.	10+	U
T59	*Hawthorn (Crataegus monogyna)*	5	55x12	2.5	1	2	3	0.5	0.5	-	2.3	16.4	SM	Fair	Fair	Multiple stems on shared root plate.	20+	C2
T60	*Common Lime (Tilia x europaea)*	13.5	750	5.5	5	5.8	5.6	1	1	-	9.0	254.5	M	Good	Fair	Large mature lime next to paddock fenceline. Survey data estimated due to epicormic growth around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1
T61	*Hawthorn (Crataegus monogyna)*	4	50x9	2.5	1	2	2	0.5	0.5	-	1.8	10.2	SM	Fair	Fair	-	20+	C2
T62	*Horse-chestnut (Aesculus hippocastanum)*	10	600	5	2	6	5	-	-	-	7.2	162.9	M	Fair	Poor	Large mature horse chestnut in decline next to roadside. Crown loss of approx. 40%. Historical limb loss high in crown. Large branch snap outs and wounding. Bark missing from branches and stem on eastern side of tree. Reasonable vigour in rest of crown.	10+	C3
T63	*Common Lime (Tilia x europaea)*	13.5	750	5.5	5	5.8	5.6	1	1	-	9.0	254.5	M	Good	Fair	Large mature lime next to paddock fenceline. Survey data estimated due to epicormic growth around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T64	*Common Lime (Tilia x europaea)*	14	750	5.5	5	5.8	5.6	1	1	-	9.0	254.5	M	Good	Fair	Large mature lime next to paddock fenceline. Survey data estimated due to epicormic growth around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1
T65	*Horse-chestnut (Aesculus hippocastanum)*	14	770	5.5	5	5.8	5.6	1	1	-	9.2	268.2	M	Good	Fair	Large mature horse chestnut next to roadside. Some historical wounding and snap outs. Large wound (approx. 2.5 above ground level) on eastern side of stem, exposed sapwood. Reasonable vigour and overall condition.	20+	C1
T66	*Common Lime (Tilia x europaea)*	14	750	5.5	5	5.8	5.6	1	1	-	9.0	254.5	M	Good	Fair	Large mature lime next to paddock fenceline. Survey data estimated due to epicormic growth around base and up stem obscuring visibility. Reasonable vigour and overall condition.	20+	C1
T67	*Horse-chestnut (Aesculus hippocastanum)*	13	710	6.3	5	6.5	5.6	1	1	-	8.5	228.0	M	Fair	Fair	Large mature horse chestnut next to paddock. Reasonable woody form and unions. Wide open crown. Reasonable vigour and overall condition.	20+	C1
T68	*Horse-chestnut (Aesculus hippocastanum)*	10	700	5	4	4	4	-	-	-	8.4	221.7	M	Poor	Poor	Large mature horse chestnut in severe decline next to paddock. Crown loss of approx. 75-80%. Lower branch and leaf flush/growth likely a stress reaction.	<10	U
T69	*Horse-chestnut (Aesculus hippocastanum)*	13	710	5.7	5.5	5.3	4.4	1	1	-	8.5	228.0	M	Fair	Fair	Large mature horse chestnut next to paddock. Reasonable woody form and unions. Uneven crown due to historical snap outs. Reasonable vigour and overall condition.	20+	C1
T70	*Wild Cherry (Prunus avium)*	13	10, 170, 330, 420	6.3	5.3	6.4	6.4	1.5	1.5	-	6.7	142.2	M	Fair	Poor	Large mature multistem cherry growing on roadside verge. Included unions from stem base. Large wounding on all stems on northern side of tree. Fungal fruiting body (unknown) noted in fused union on southern side of tree. Good vigour and reasonable overall condition.	10+	C1
T71	*Wild Cherry (Prunus avium)*	7.5	250	3	3	3	3	0.5	0.5	-	3.0	28.3	EM	Fair	Fair	Cherry growing on highways verge, halfway up slope north of underpass.	20+	C1

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T72	*Horse-chestnut (Aesculus hippocastanum)*	14.5	850	7.1	6.5	7.6	7	1	1	-	10.2	326.9	M	Good	Fair	Large mature horse chestnut next to paddock. Lower branches growing with tighter unions and rubbing branches. Good vigour and overall condition.	20+	B2
T73	*Hawthorn(Crataegus monogyna)*	8	100	3	3	3	3	1	1	-	1.2	4.5	EM	Fair	Fair	-	10+	C2
T74	*Ash(Fraxinus excelsior)*	4	150	1.5	1.5	1.5	1.5	2	2	-	1.8	10.2	SM	Good	Good	-	10+	C1
T75	*Hawthorn(Crataegus monogyna)*	5	100	4	4	4	4	0	0	-	1.2	4.5	EM	Good	Good	-	20+	C2
T76	*Ash(Fraxinus excelsior)*	4.5	150	1.5	1.5	1.5	1.5	2	2	-	1.8	10.2	SM	Good	Good	-	10+	C1
T77	*Hawthorn (Crataegus monogyna)*	5.5	200	2.5	2.5	2	2.5	1	1	-	2.4	18.1	M	Good	Good	-	40+	B2
T78	*Hawthorn (Crataegus monogyna)*	7	120x6	3	3	2	3	0.5	0.5	-	3.5	39.1	M	Fair	Good	Fine hawthorn growing at base of slope of highways embankment.	40+	B2
T79	*Ash (Fraxinus excelsior)*	16	730	2	5.5	6	6	3	3	-	8.8	241.1	M	Fair	Fair	-	10+	B2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T80	*Hawthorn (Crataegus monogyna)*	6	100	1.5	1.5	1.5	1.5	0	0	-	1.2	4.5	M	Fair	Fair	-	40+	C1
T81	*Pedunculate Oak (Quercus robur)*	1	70	2	2	2	2	2	2	-	0.8	2.2	SM	Good	Good	-	20+	C1
T82	*Wych Elm (Ulmus glabra)*	8	330	4	1	3	4	1	1	-	4.0	49.3	EM	Good	Good	Only Elm on site in boundary verge.	20+	B2
T83	*Lombardy Poplar (Populus nigra Italica)*	30	1010	4	1	4	5	3	3	-	12.1	461.5	M	Good	Fair	Codominant grown. Landmark tree adjacent to road.	20+	B2
T84	*Lombardy Poplar (Populus nigra Italica)*	30	1210	4	5	4	1	3	3	-	14.5	662.3	M	Good	Fair	Codominant grown. Landmark tree adjacent to road.	20+	B2
T85	*Hawthorn (Crataegus monogyna)*	6	300	4	4	4	4	0	0	-	3.6	40.7	EM	Good	Good	-	40+	B1
T86	*Sycamore (Acer pseudoplatanus)*	6	210	2.5	2.5	2	2	0.5	0.5	-	2.5	20.0	SM	Fair	Fair	-	20+	C2
T87	*Alder (Alnus glutinosa)*	6.5	350	3	2.5	3	3.5	1	1	-	4.2	55.4	EM	Fair	Fair	Alder along watercourse in boundary.	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m^2) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T88	*Alder (Alnus glutinosa)*	12	1000	3	4	4	4	0	0	-	12.0	452.4	M	Fair	Fair	-	20+	B3
T89	*Sweet Chestnut (Castanea sativa)*	8	600	4	4	4	4	3	3	-	7.2	162.9	EM	Fair	Fair	Offsite behind wall	20+	B2
T90	*Pedunculate Oak (Quercus robur)*	8	250	3	3	3	3	4	4	-	3.0	28.3	SM	Good	Good	Good form no visible defects	40+	B1
T91	*Hawthorn (Crataegus monogyna)*	4.5	90x8	2	3	2	1.5	0.5	0.5	-	3.1	29.3	M	Good	Good	-	40+	C2
T92	*Hawthorn (Crataegus monogyna)*	4.5	80x16	2	2	2	1	0.5	0.5	-	3.8	46.3	M	Good	Good	Multi stem from base, shared root plate of multiple hawthorn stems. Flailed west towards field.	20+	C2
T93	*Sycamore (Acer pseudoplatanus)*	6	120	2.5	2	2	2	1.5	1.5	-	1.4	6.5	SM	Fair	Fair	Deer browsing damage from base to 1m	20+	C2
T94	*Ash (Fraxinus excelsior)*	14	830	8	6	7	7	1	1	-	10.0	311.7	M	Poor	Poor	Main stem has significant decay and dysfunction present reaction wood present around cavities . Upright tearout wound south at 3.5m. Numerous large cavities on main stem south at 3m. 50-75% crown dieback. Chicken of the woods bracket found on ground west	10+	C3
T95	*Ash (Fraxinus excelsior)*	14	1180	10	12	9	10	2	2	-	14.2	629.9	M	Fair	Fair	Evidence of previous pruning works in crown under ohl cables. Situated on drainage ditch bank. Good crown density. Minor deadwood throughout crown.	40+	A2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m^2) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
T96	*Ash (Fraxinus excelsior)*	14	1000	9	10	9	10	1	1	-	12.0	452.4	M	Fair	Fair	Evidence of precious pruning works in crown under ohl cables. Situated on drainage ditch bank. Good crown density and seed pod output. Burl on main stem at 3m nw.	20+	B2
T97	*Elder (Sambucus nigra)*	5	60x6	2	2	3	2	1	1	-	1.8	9.8	M	Fair	Poor	Existing flail damage to tree present. Minor and moderate deadwood present in lower crown	10+	C2
T98	*Pedunculate Oak (Quercus robur)*	10	420, 600, 510	8	7	8	6	1	1	-	10.7	360.3	M	Good	Good	Situated on edge of drainage ditch. Multiple stems from 1m. Ivy clad main stem limits inspection. Minor deadwood in crown.	40+	A2
T99	*Pedunculate Oak (Quercus robur)*	12	700	7	7	8	7	1	1	-	8.4	221.7	M	Good	Good	Mature oak situated in field margin, moderate deadwood east at 4m. Limited access to main stem due to land access. Epicormic on main stem to 3m. Pruning wounds north at 4m	40+	A2
G1	*Mixed species (Mixed sp)*	5	81	2	2	2	2	0.5	0.5	-	1.0	1.0	SM	Fair	Fair	-	20+	C2
G2	*Mixed species (Mixed sp)*	15	200	3	3	3	3	-	-	-	2.4	1.0	EM	Fair	Fair	Ivy clad tree group growing next to bridge and watercourse.	20+	C2
G3	*Mixed species (Mixed sp)*	15	200	3	3	3	3	-	-	-	2.4	1.0	EM	Fair	Fair	Ivy clad tree group growing next to bridge and watercourse. Track access to horse paddocks and public footpath also adjacent.	20+	C2
G4	*Mixed species (Mixed sp)*	14	528	4	4	4	4	1	1	-	6.3	2.3	EM	Fair	Fair	Oak and ash group situated on banks of river.	20+	B2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
G5	*Mixed species (Mixed sp)*	4	91	2	2	2	2	0.5	0.5	-	1.1	1.0	SM	Fair	Fair	-	20+	C2
G6	*Mixed species (Mixed sp)*	3.5	60	2	2	2	2	0.5	0.5	-	0.7	1.0	Y	Fair	Fair	-	20+	C2
G7	*Mixed species (Mixed sp)*	14	300	6	6	6	6	0.5	0.5	-	3.6	1.0	M	Fair	Fair	Mature group situated on embankment and edge of river.	20+	B2
G8	*Mixed species (Mixed sp)*	11	175	5	5	5	5	-	-	-	2.1	1.0	SM	Fair	Fair	Inaccessible group growing in roadside verge. Trees directly under OHL are regularly managed.	20+	C3
G9	*Mixed species (Mixed sp)*	7	84	3	3	3	3	0.5	0.5	-	1.0	1.0	SM	Fair	Fair	Group situated on roadside embankment.	20+	C2
G10	*Mixed species (Mixed sp)*	5	75	2.5	2.5	2.5	2.5	0.5	0.5	-	0.9	1.0	EM	Fair	Fair	-	20+	C2
G11	*Mixed species (Mixed sp)*	10	250	3.5	3.5	3.5	3.5	-	-	-	3.0	1.0	EM	Fair	Fair	Multi stem sycamore in verge next to field access track.	20+	C2
G12	*Mixed species (Mixed sp)*	4	110	2	2	2	2	0.5	0.5	-	1.3	1.0	EM	Fair	Fair	-	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
G13	*Mixed species (Mixed sp)*	5	62	2	2	2	2	0.5	0.5	-	0.7	1.0	SM	Fair	Fair	-	20+	C2
G14	*Mixed species (Mixed sp)*	12	174	3	3	3	3	0.5	0.5	-	2.1	1.0	EM	Fair	Fair	Dominated by large coppice of lime.	20+	C2
G15	*Mixed species (Mixed sp)*	10	123	3	3	3	3	0.5	0.5	-	1.5	1.0	SM	Fair	Fair	Northern group dominated by scrub species and southern group dominated by willow and cherry trees.	20+	C2
G16	*Mixed species (Mixed sp)*	16	300	5	5	5	5	2	2	-	3.6	1.0	EM	Fair	Fair	Limited inspection due to access. Growing in a group. Owned by neighbour. A typical group for the location. A group of similar aged trees. Inspection limited or not possible due to visibility.	20+	B2
G17	*Mixed species (Mixed sp)*	3.5	58	1.5	1.5	1.5	1.5	0.5	0.5	-	0.7	1.0	Y	Fair	Fair	-	20+	C2
G18	*Mixed species (Mixed sp)*	4.5	80	1.5	1.5	1.5	1.5	0	0	-	1.0	1.0	SM	Fair	Fair	-	20+	C2
G19	*Mixed species (Mixed sp)*	35	63	1.6	1.6	1.6	1.6	-	-	-	0.8	1.0	Y	Fair	Fair	-	10+	C2
G20	*Mixed species (Mixed sp)*	5	74	2	2	2	2	0.5	0.5	-	0.9	1.0	SM	Fair	Fair	Roadside embankment scrub group limited access due to land restrictions	10+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
G21	*Mixed species: Ash (Fraxinus excelsior), Hawthorn (Crataegus monogyna), Hazel (Corylus avellana)*	15	300	3.5	3.5	3.5	3.5	4	4	-	3.6	1.0	EM	Fair	Good	Limited inspection due to vegetation. Limited inspection due to access. Growing in a group. Growing close to footpath/highway Growing on a bank. Growing on a verge. Assumed to be highways trees and responsibilities. Buttress obscured by shrubbery. Inspection limited or not possible due to visibility. Single stem. Limited	20+	B2
G22	*Mixed species (Mixed sp)*	18	217	5	5	5	5	0.5	0.5	-	2.6	1.0	M	Fair	Fair	No access to group due to horses in the field, surveyed from a distance, check Google street view for species.	20+	B2
G23	*Hawthorn (Crataegus monogyna)*	3.5	60	1	1	1	1	0	0	-	0.7	1.0	SM	Fair	Fair	-	40+	C2
G24	*Hawthorn (Crataegus monogyna)*	18	340	4	4	4	4	2	2	-	4.1	1.0	SM	Fair	Fair	-	10+	C2
G25	*Hawthorn (Crataegus monogyna)*	5	200	2	2	2	2	0	0	-	2.4	1.0	EM	Good	Good	Open grown scattered scrub with mixed roses and bramble at eastern end	20+	C2
G26	*White Willow (Salix alba)*	21	406	4	4	4	4	-	-	-	4.9	1.0	M	Fair	Fair	Highway boundary group. Moderated dieback upper canopies. Ms bases throughout.	20+	C2
G27	*Mixed species (Mixed sp)*	4	200	2	2	2	2	0	0	-	2.4	1.0	EM	Fair	Fair	Heavily reduced, topped by flail.	20+	C2
G28	*Hawthorn (Crataegus monogyna)*	4	200	2	2	2	2	0	0	-	2.4	1.0	EM	Fair	Fair	Heavily reduced, topped by flail.	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
G29	*Hazel (Corylus avellana)*	3	100	1	1	1	1	9	9	-	1.2	1.0	EM	Fair	Fair	-	20+	B2
G30	*Mixed species (Mixed sp)*	8	167	2	2	2	2	3	3	-	2.0	1.0	SM	Fair	Fair	-	20+	C2
G31	*Mixed species (Mixed sp)*	6	250	2	2	2	2	1	1	-	3.0	1.0	SM	Fair	Fair	Mixed species river channel planting	20+	C2
G32	*Mixed species (Mixed sp)*	3.5	95	2	2	2	2	0.5	0.5	-	1.1	1.0	SM	Fair	Fair	-	20+	C2
G33	*Hawthorn (Crataegus monogyna)*	3	100	2	2	2	2	2	2	-	1.2	1.0	EM	Fair	Fair	-	20+	C2
G34	*Mixed species (Mixed sp)*	6	200	2	2	2	2	0	0	-	2.4	1.0	EM	Fair	Fair	Row of scattered alder with mixed hawthorn and single dead elm	10+	C2
G35	*Hazel (Corylus avellana)*	5	78	2	2	2	2	2	2	-	0.9	1.0	M	Fair	Fair	Wetland scrub	20+	C2
G36	*Alder (Alnus glutinosa)*	5	300	2	2	2	2	1	1	-	3.6	1.6	SM	Fair	Fair	Scattered individual alder trees	20+	C2

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Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
G37	*Mixed species (Mixed sp)*	9	209	4	4	4	4	-	-	-	2.5	1.0	M	Fair	Fair	-	20+	C2
G38	*Mixed species (Mixed sp)*	18	333	4	4	4	4	4	4	-	4.0	1.0	M	Good	Good	Ancient woodland site. Mixed species broadleaf and and conifer	40+	A3
G39	*Mixed species (Mixed sp)*	6	110	3	3	3	3	0.5	0.5	-	1.3	1.0	SM	Fair	Fair	Group of willow situated on grass bank of pond.	10+	C2
G40	*Pedunculate Oak (Quercus robur)*	11	306	4	4	4	4	1	1	-	3.7	1.0	M	Fair	Fair	Old boundary line.	20+	B2
G41	*Goat Willow (Salix caprea)*	6	102	3	3	3	3	0.5	0.5	-	1.2	1.0	EM	Fair	Fair	Self seeded willow scrub on edge of pond/ wetland	20+	C2
G42	*Pedunculate Oak (Quercus robur)*	15	849	7	7	7	7	3	3	-	10.2	3.2	M	Good	Fair	3 prominent oaks in boundary line, trees regularly pruned under overhead lines. 1x sycamore.	40+	A2
G43	*Alder (Alnus glutinosa)*	17	545	6	6	6	6	0.5	0.5	-	6.5	1.0	M	Good	Fair	Mature riparian group. Dominated by large alder ash and sycamore.	40+	B2
W1	*Mixed species (Mixed sp)*	10	270	4.5	4.5	4.5	4.5	0	0	-	3.2	1.0	EM	Good	Good	Woodland with limited access located next to field and watercourse. Trees of different ages, heights and conditions. Good woodland structure, well established. Trees directly under powerlines regularly pruned.	20+	B2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
W2	*Mixed species (Mixed sp)*	18	450	6	6	6	6	1	1	-	5.4	1.0	EM	Good	Good	Limited inspection due to vegetation. Limited inspection due to access. Growing in a group. Target - footpath. A typical group for the location. A group with good species diversity. A group with good age diversity. Typical group features included dead standing trees, and deadwood within the canopies. Inspection limited or not possible due to	40+	A2
W3	*Hazel (Corylus avellana)*	16	299	5	5	5	5	0	0	-	3.6	1.0	M	Good	Good	Mature woodland dominated by hazel coppice. Limited access due to land access restrictions.	40+	A2
W4	*Mixed species (Mixed sp)*	5	88	2	2	2	2	0	0	-	1.1	1.0	SM	Fair	Fair	-	10+	C2
H1	*Mixed species (Mixed sp)*	8	100	2	2	2	2	0	0	-	1.2	1.0	EM	Good	Good	An attractive broadleaf hedge. A typical agricultural hedge. The hedge requires management. Buttress obscured by epicormic growth.	20+	C2
H2	*Mixed species (Mixed sp)*	8	100	1.5	1.5	1.5	1.5	0	0	-	1.2	1.0	EM	Good	Good	Growing in an agricultural setting. Growing in a hedge. An attractive broadleaf hedge. A typical agricultural hedge. The hedge requires management. Inspection limited or not possible due to visibility.	20+	C2
H3	*Mixed species (Mixed sp)*	8	100	2	2	2	2	0	0	-	1.2	1.0	EM	Good	Good	Target - road. An attractive broadleaf hedge. A typical agricultural hedge. The hedge requires management. Inspection limited or not possible due to visibility.	20+	C2
H5	*Mixed species (Mixed sp)*	6	100	2	2	2	2	0	0	-	1.2	1.0	EM	Good	Good	Growing in an agricultural setting. An attractive broadleaf hedge. A typical agricultural hedge. Buttress obscured by shrubbery.	20+	C2
H6	*Mixed species (Mixed sp)*	2.5	50	0.5	0.5	0.5	0.5	0.5	0.5	-	1.2	1.0	EM	Fair	Fair	Limited inspection due to vegetation. Growing in a hedge. A sparse growing group. A typical group for the area. A sparse group.	10+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
H6	*Mixed species (Mixed sp)*	7	100	1.5	1.5	1.5	1.5	0	0	-	1.2	1.0	EM	Good	Good	Limited inspection due to vegetation. Growing in an agricultural setting. Target - footpath. An attractive broadleaf hedge. A typical agricultural hedge. The hedge requires management. Buttress obscured by shrubbery.	20+	C2
H7	*Mixed species (Mixed sp)*	1.5	100	0.6	0.6	0.6	0.6	0	0	-	1.2	1.0	M	Fair	Fair	Heavily gapped hedgerow. Historic boundary.	40+	C2
H8	*Mixed species (Mixed sp)*	1.5	100	0.6	0.6	0.6	0.6	0	0	-	1.2	1.0	M	Fair	Fair	Heavily gapped hedgerow. Historic boundary.	40+	C2
H9	*Mixed species (Mixed sp)*	2	60	1	1	1	1	0.5	0.5	-	0.7	1.0	M	Fair	Fair	Mature layered hedge. Hedgerow has gaps in some locations where trees have failed.	40+	C2
H10	*Mixed species (Mixed sp)*	1.5	100	0.6	0.6	0.6	0.6	0	0	-	1.2	1.0	M	Fair	Fair	Heavily gapped hedgerow. Historic boundary.	40+	C2
H11	*Mixed species (Mixed sp)*	1.5	100	0.6	0.6	0.6	0.6	0	0	-	1.2	1.0	M	Fair	Fair	Heavily gapped hedgerow. Historic boundary.	40+	C2
H12	*Mixed species (Mixed sp)*	3	100	1	1	1	1	0	0	-	1.2	1.0	M	Fair	Fair	Heavily gapped hedgerow. Historic boundary.	40+	C2
H13	*Mixed species (Mixed sp)*	4	200	1.5	1.5	1.5	1.5	0	0	-	2.4	1.0	M	Fair	Fair	Old hedgerow with ancient woodland indicators within boundary.	20+	B3

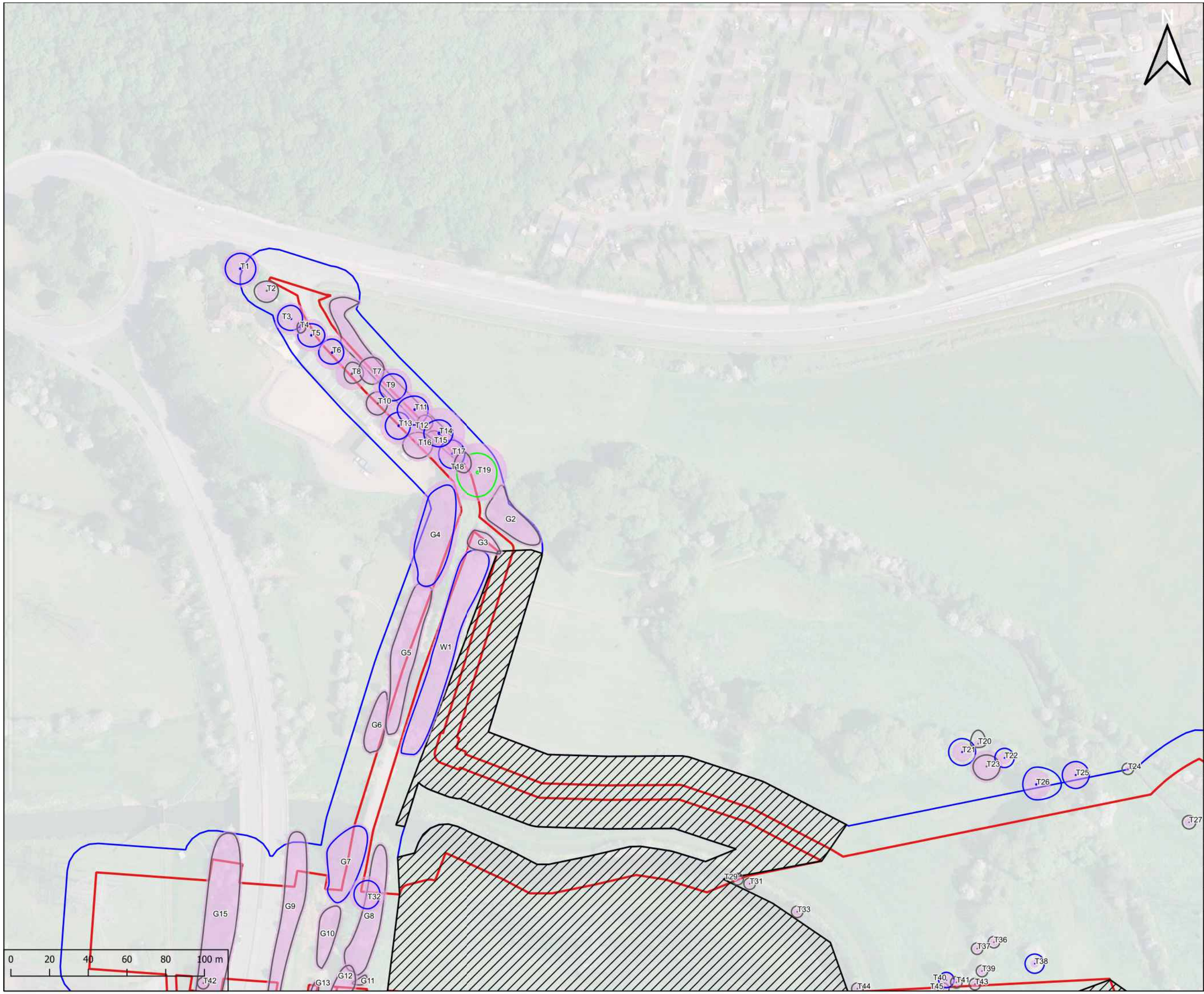
'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
H14	*Mixed species (Mixed sp)*	1	100	1	1	1	1	0	0	-	1.2	1.0	EM	Fair	Fair	Mixed hawthorn and bramble.	20+	C2
H15	*Mixed species (Mixed sp)*	2.5	50	1	1	1	1	0.5	0.5	-	0.6	1.0	Y	Fair	Fair	Offsite hedge growing through fence line	10+	C2
H16	*Mixed species (Mixed sp)*	3	70	1.5	1.5	1.5	1.5	0	0	-	0.8	1.0	EM	Fair	Fair	Offsite hedgerow growing through security fencing	20+	C2
H17	*Mixed species (Mixed sp)*	2.5	90	1	1	1	1	0.5	0.5	-	1.1	1.0	M	Good	Good	Mature field boundary hedgerow	40+	C2
H18	*Mixed species (Mixed sp)*	3	70	2	2	2	2	1	1	-	0.8	1.0	M	Fair	Fair	-	20+	C2
H19	*Mixed species (Mixed sp)*	2	75	1	1	1	1	0	0	-	0.9	1.0	EM	Good	Good	Well established hedgerow. Well managed	40+	B2
H20	*Mixed species (Mixed sp)*	2	75	1	1	1	1	0	0	-	0.9	1.0	EM	Good	Good	Well established hedgerow. Well managed	40+	B2
H21	*Mixed species (Mixed sp)*	1	59	0.5	0.5	0.5	0.5	0	0	-	0.7	1.0	SM	Fair	Fair	-	20+	C2

'#' Denotes Estimated Measurements

Tree ID	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)			RPA Radius (m)	RPA (m²) (T) / RPA Offset (m) (G,H, W)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W	Canopy Cl (m)	Branch Cl (m)	Branch Dir								
H22	*Mixed species (Mixed sp)*	2	75	1	1	1	1	0	0	-	0.9	1.0	EM	Good	Good	Well established hedgerow. Well managed	40+	B2
H23	*Mixed species (Mixed sp)*	2	100	1	1	1	1	0	0	-	1.2	1.0	EM	Fair	Fair	Managed mixed species boundary hedge.	20+	C2
H24	*Mixed species (Mixed sp)*	2	75	1	1	1	1	0	0	-	0.9	1.0	EM	Good	Good	Well established hedgerow. Well managed	40+	B2
H25	*Mixed species (Mixed sp)*	5	150	2	2	2	2	0	0	-	1.8	1	EM	Good	Fair	Historic boundary following drainage ditch	20+	B2
H26	*Mixed species (Mixed sp)*	2	60	1	1	1	1	0.5	0.5	-	0.72	1	SM	Fair	Good	-	20+	C2
H27	*Mixed species (Mixed sp)*	2	90	2	2	2	2	0.5	0.5	-	1.08	1	M	Good	Good	Mature hazel hedge comprising two large coppice stools extending out,	20+	B2

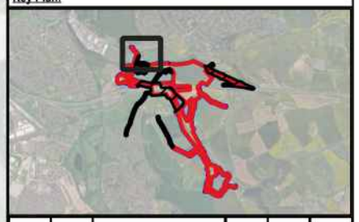
'#' Denotes Estimated Measurements



Legend:

- Site Boundary
- Survey Boundary
- Unsurveyed Areas
- Canopy extent of A Category Tree/Group
- Canopy extent of B Category Tree/Group
- Canopy extent of C Category Tree/Group
- Canopy extent of U Category Tree/Group
- BS 5837:2012 Root Protection Area (RPA)
- Ancient Woodland Buffer Zone

Key Plan:



Rev	Date	Description	Drawn	Check	Approv
P1	29/07/26	For information	JP	WG	BM

Client: National Grid

PROJECT: Brinsworth to Chesterfield: Long Lane New 400kV Substation Cables

ARCADIS

Registered office: Arcadis, 80 Fenchurch Street, London, EC3M 4BY

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TITLE:

FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 1 OF 12

Designed:	JP	Date: 29/07/26	Signed:
Drawn:	JP	Date: 29/07/26	Signed:
Checked:	WG	Date: 29/07/26	Signed:
Approved:	BM	Date: 29/07/26	Signed:
Scale:	1:1,750	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	00	Project Number:	30184504

Suitability Description:

FOR INFORMATION

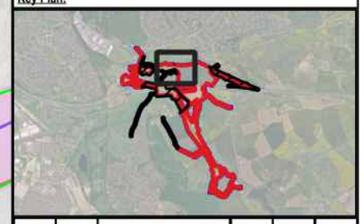
NOT TO BE USED FOR DESIGN OR CONSTRUCTION

Drawing Number:	Revision:
30184504-ARC-ARB-DR-06	P01

Legend:

- Site Boundary
- Survey Boundary
- Unsurveyed Areas
- Canopy extent of A Category Tree/Group
- Canopy extent of B Category Tree/Group
- Canopy extent of C Category Tree/Group
- Canopy extent of U Category Tree/Group
- BS 5837:2012 Root Protection Area (RPA)
- Ancient Woodland Buffer Zone

Key Plan:



Rev	Date	Description	Drawn	Check	Approv
P1	29/07/26	For information	JP	WG	BM

Client: National Grid

nationalgrid

PROJECT:

Brinsworth to Chesterfield: Long Lane New 400kV Substation Cables

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 2 OF 12

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Original Size:	A3	Grid:	OS
Suitability Code:	00	Project Number:	30184504

Suitability Description:

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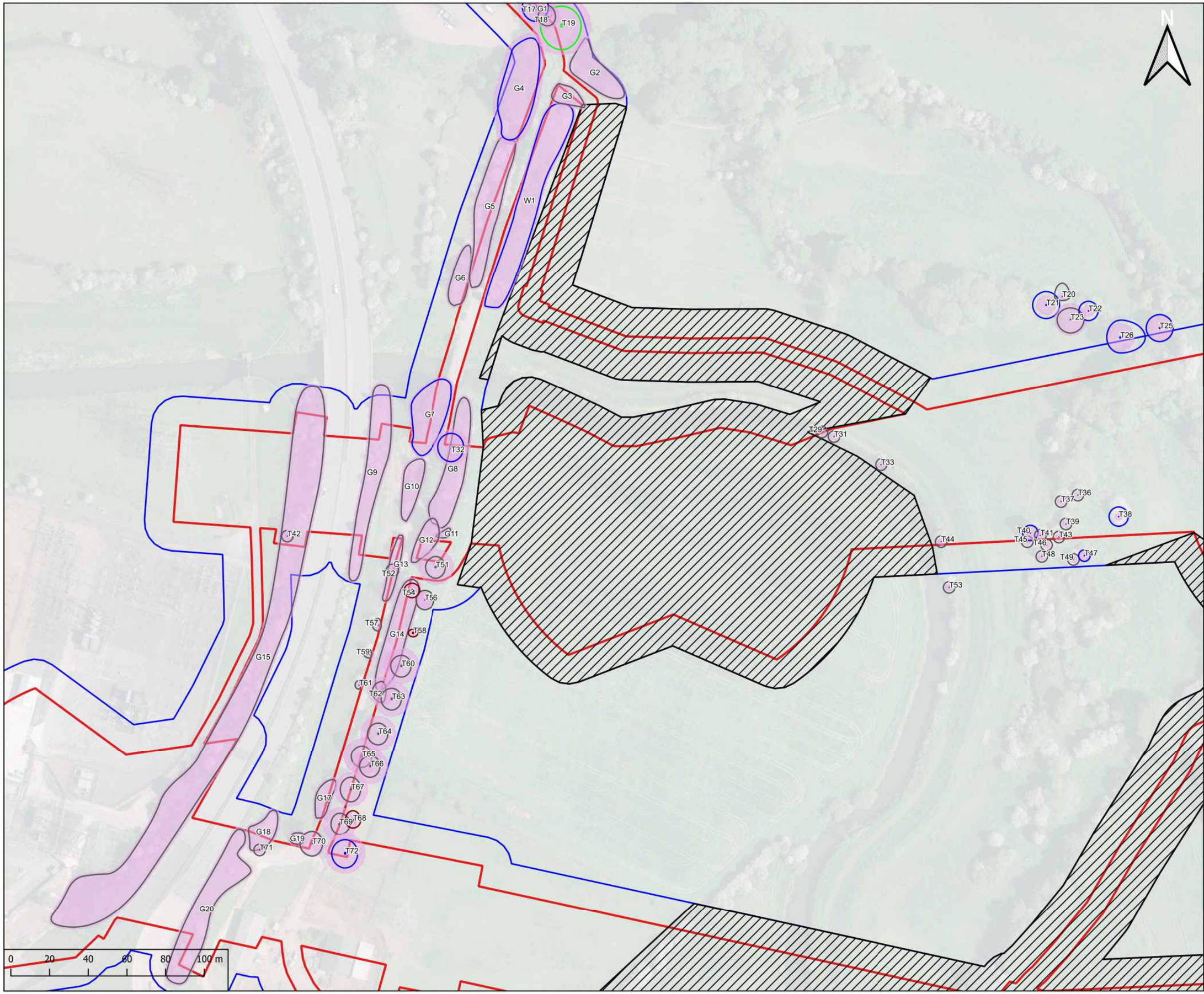
Drawing Number: 30184504-ARC-ARB-DR-06

Revision: P01



Legend:

- Site Boundary
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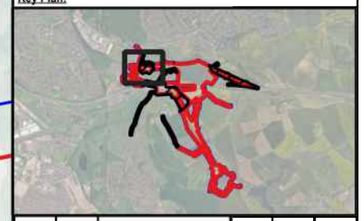
- Ancient Woodland Buffer Zone

Key Plan:



Rev	Date	Description	Drawn	Check	Approv
P1	29/07/26	For information	JP	WG	BM

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 3 OF 12

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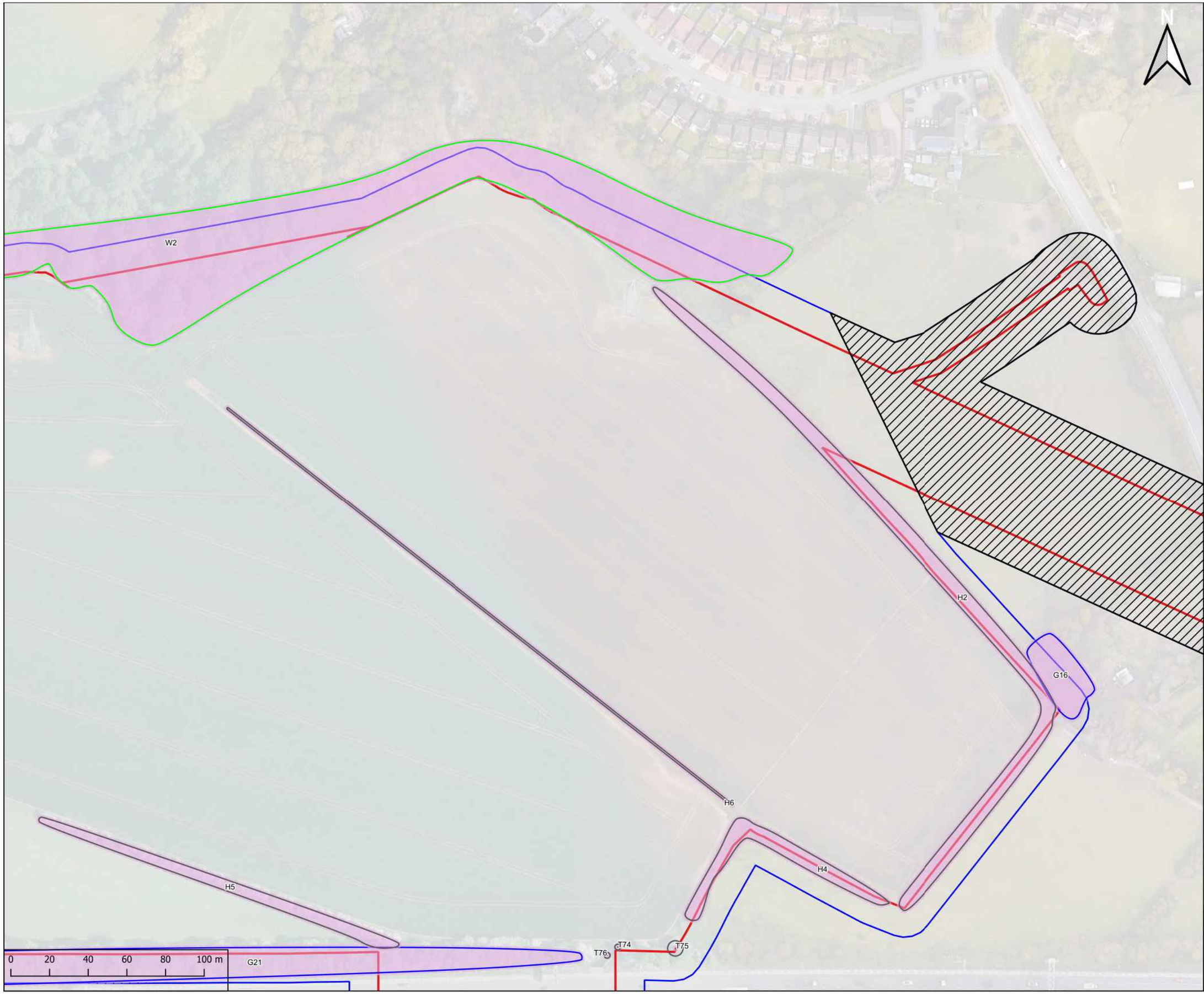
Drawing Number:	Revision:
30184504-ARC-ARB-DR-06	P01



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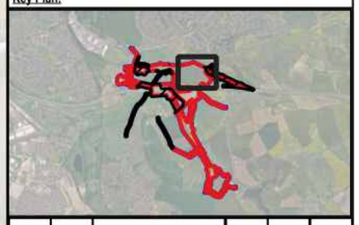

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FIGURE 1
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SHEET 4 OF 12

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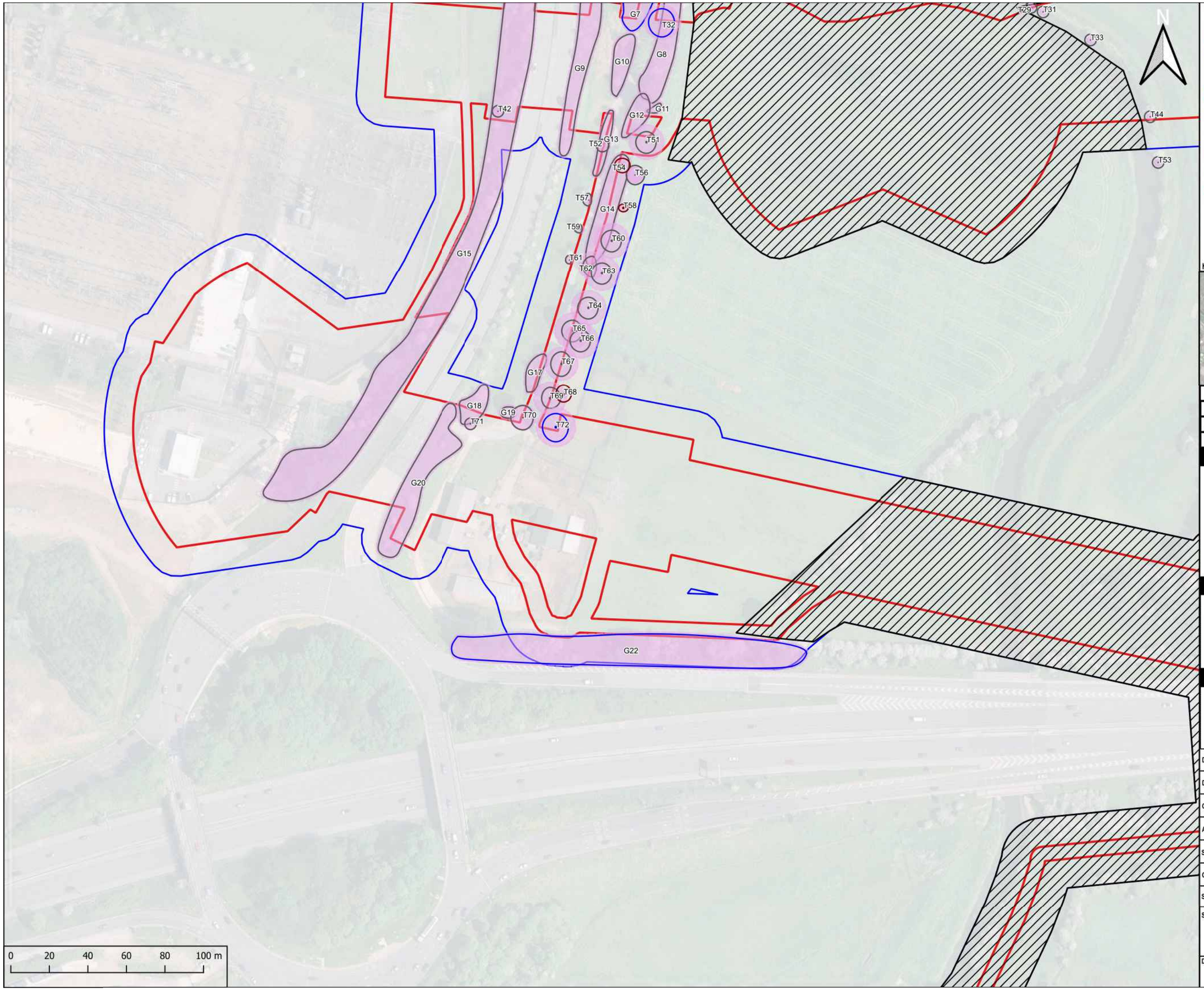

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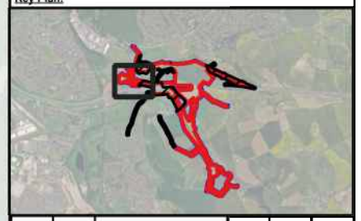

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FIGURE 1
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SHEET 5 OF 12

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Suitability Description:

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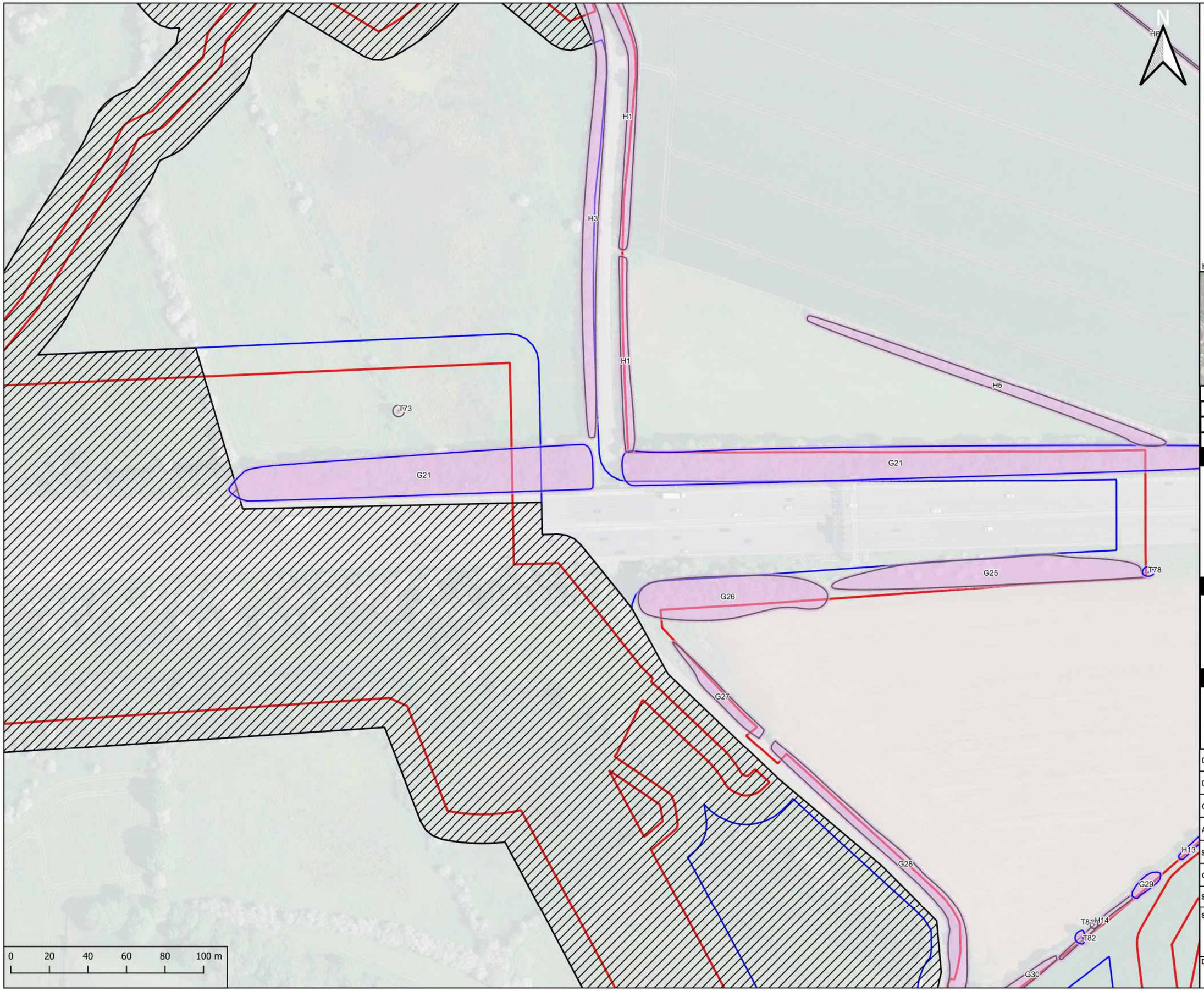
Revision: P01



Legend:

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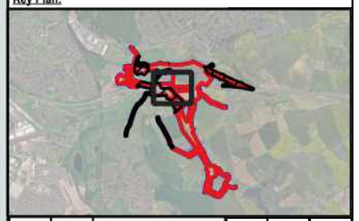

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P1	29/07/26	For information	JP	WG	BM

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 6 OF 12

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Suitability Description:

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Revision: P01

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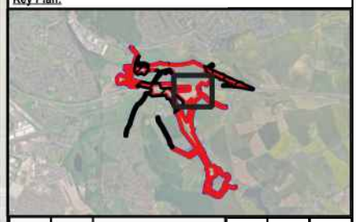

Rev	Date	Description	Drawn	Check	Approv
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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 7 OF 12

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Drawing Number:	Revision:
30184504-ARC-ARB-DR-06	P01

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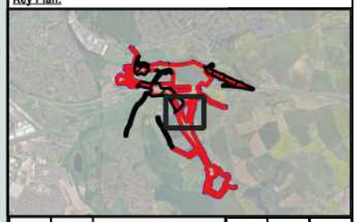

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 8 OF 12

Designed:	JP	Date: 29/07/26	Signed:
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Suitability Description:

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Revision: P01

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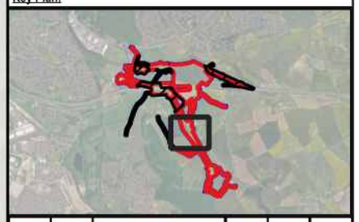

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 9 OF 12

Designed:	JP	Date: 29/07/26	Signed:
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Suitability Code:	00	Project Number:	30184504

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30184504-ARC-ARB-DR-06	P01

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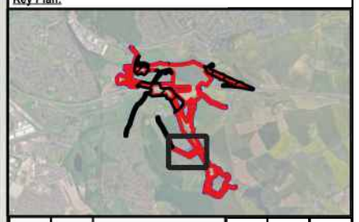

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 10 OF 12

Designed:	JP	Date: 29/07/26	Signed:
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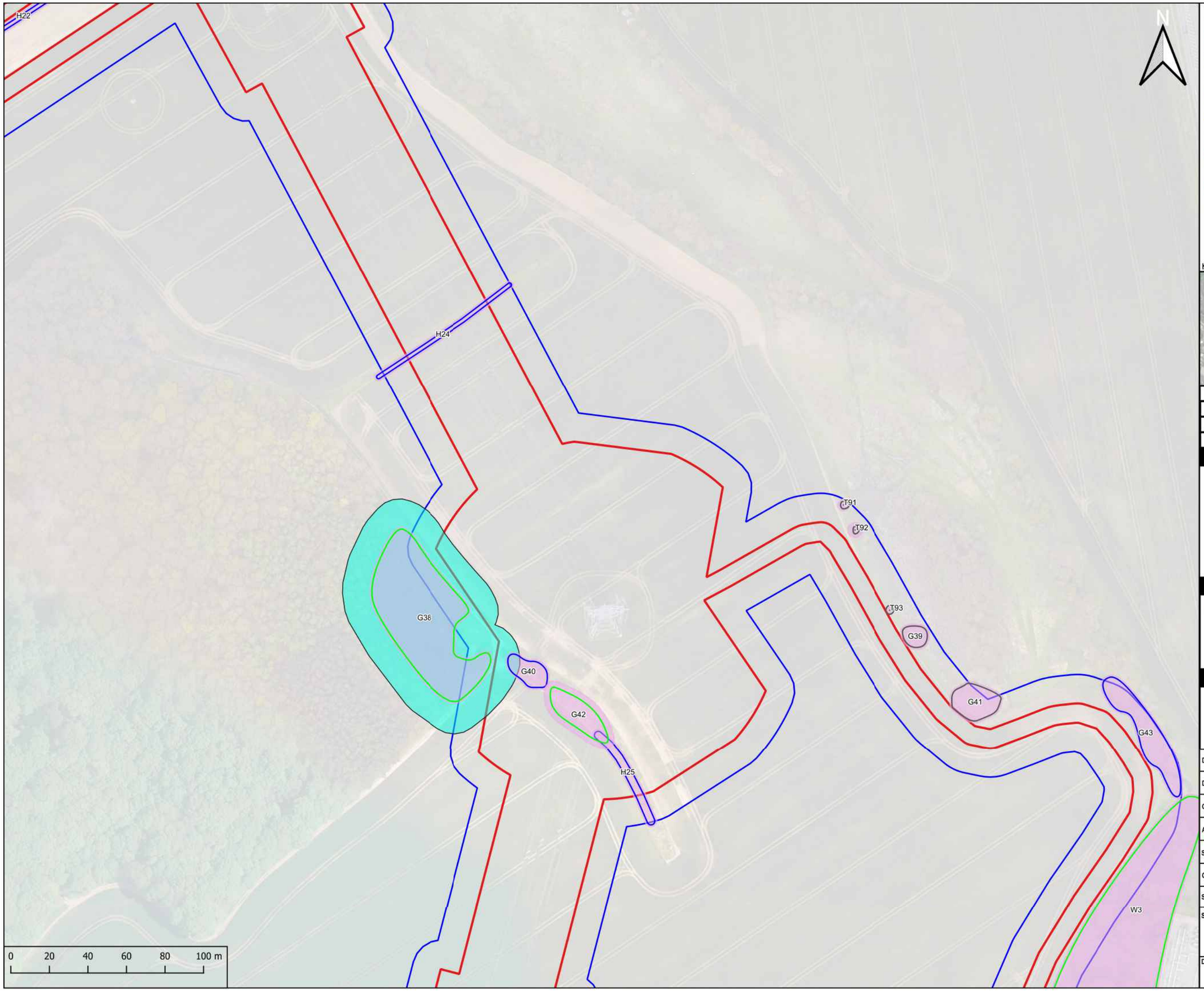

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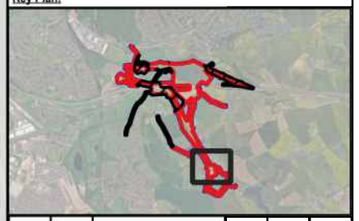

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FIGURE 1
TREE CONSTRAINTS PLAN

SHEET 11 OF 12

Designed:	JP	Date: 29/07/26	Signed:
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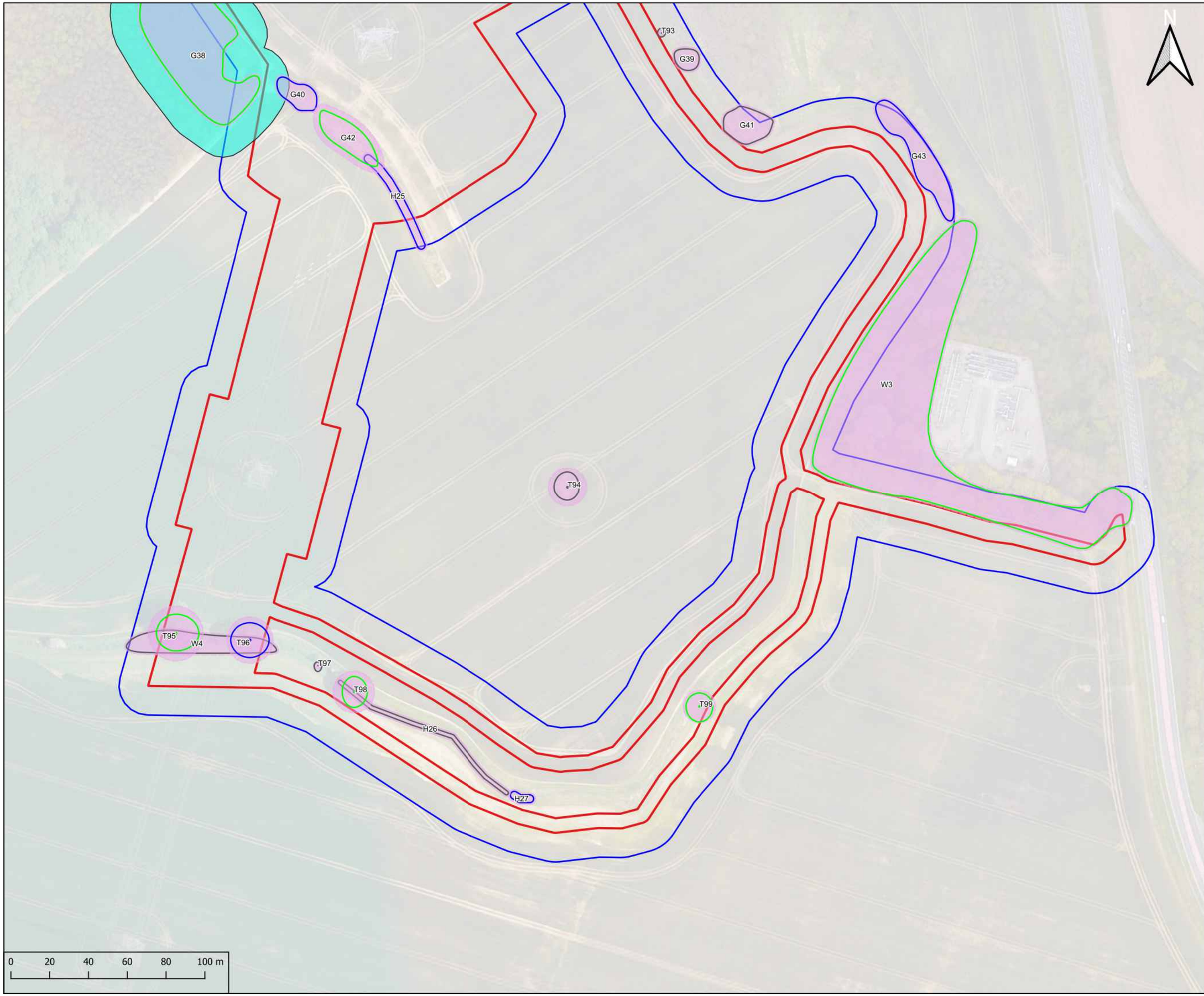

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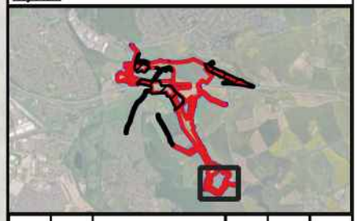

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FIGURE 1
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Annex C
Preliminary Tree Protection Measures

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Annex C Preliminary Tree Protection Measures

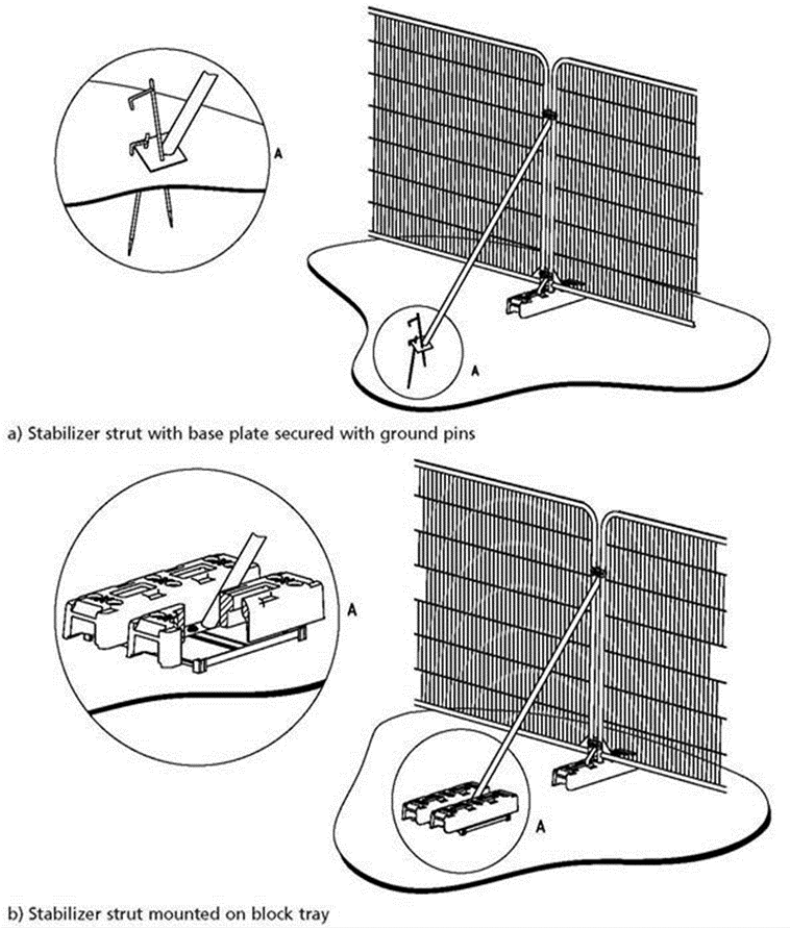
C.1 Overview

C.1.1 These Preliminary Tree Protection Measures provide generic best practice measures to be adopted in order to protect retained trees during the development process. It has been prepared in order to inform the consenting and the construction/ development process. Should a bespoke AMS be recommended by the suitably qualified arboriculturist, one should be drawn up in liaison with the contractor undertaking the works.

C.2 Protective Fencing

C.2.1 The purpose of this fencing is to provide protection to the RPAs of retained trees/groups and to protect trees and hedgerows prior to their translocation. The type of fencing used shall be appropriate to the level of adjacent construction activity and shall be agreed with the Local Authority tree officer. Weather-proof notices shall be attached to any protective fencing located adjacent to retained trees displaying the words “Construction Exclusion Zone” and listing restrictions which apply. All personnel must be made aware of these restrictions.

Figure C1 Tree protection fencing specification (extract from BS 5837: 2012)



a) Stabilizer strut with base plate secured with ground pins

b) Stabilizer strut mounted on block tray

C.3 Construction Exclusion Zone (CEZ)

C.3.1 The Construction Exclusion Zone (CEZ) is the area identified by a suitably qualified arboriculturist as the area to be protected during development, from site clearance and construction work through the use of barriers and/or ground protection to ensure the successful long-term retention of a tree. Fencing or ground protection shall not be taken down or relocated at any time without prior agreement and/or site supervision as recommended by the arboriculturist.

C.3.2 All areas excluded by protective tree fencing shall be treated as CEZs, and the following restrictions shall apply:

- No construction activity must occur within these areas.
- No works on trees unless agreed by a suitably qualified arboriculturist.
- No alterations of ground levels or conditions.
- No chemicals or cement washings.
- No excavation.
- No temporary structures*
- No storage of soil, rubble or other materials.
- No vehicles or machinery to be used or parked without appropriate ground protection measures as per BS5837 recommendations. This will require the use of a proprietary system of reinforced concrete slabs/steel road plates on a compressible layer, or side butting scaffold boards/ 18mm plywood sheets on a compressible layer. The type of ground protection used shall be appropriate for the likely loading applied.
- No fixtures (lighting, signs etc.) to be attached to trees.
- No fires within 10 metres of the canopies of any tree or hedgerow.

**Site huts, provided they are of the "Jack Leg" type, can be sited to act as ground protection for the duration of the construction.*

C.4 Temporary Ground Protection

C.4.1 New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil. The ground protection might comprise one of the following:

- For pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g.100 mm depth of woodchip), laid onto a geotextile membrane;
- For pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g.150 mm depth of woodchip), laid onto a geotextile membrane;
- For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs)

to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

C.5 New Permanent Surfacing Within RPAs

C.5.1 Any new surfacing is within the RPAs shall occur above ground level without soil stripping. New surfaces shall be constructed on a cellular confinement to prevent localised compaction of the rooting medium post development. Porous geotextile membranes shall be used both above and below the cellular confinement system to prevent mixing of materials with the binding layer or the soil. The new surface needs to be permeable to air and water (resin bound gravel or similar is recommended). This is to allow roots to respire without there being a build-up of carbon dioxide, and to ensure the roots continue to receive the moisture and oxygen they require to function. Traditional kerbing requires excavation to install and will therefore not be suitable within the root protection areas of retained trees. As an alternative, haunched kerbing, treated timber edging, aluminium L-shaped edging, galvanised metal edging or no fixed edging shall be used. Construction of the new surface will require access into the construction exclusion zone defined by the temporary ground protection. The ground protection shall not be removed until new surface is installed. The root protection areas should not be left exposed during construction.

C.6 General Canopy Protection

C.6.1 Since the canopies of retained trees may be in close proximity to areas of plant operation, the following restrictions will apply:

- All plant will be sited outside the defined RPAs of retained trees / groups, and the appointed contractor will ensure all relevant personnel shall be made aware of the location of branches and the need to avoid causing damage to them.
- Prior to the implementation of lifting operations, a representative from the equipment supply company shall visit the site and ensure all operations can be completed without causing damage to retained trees. A lifting plan will be prepared and submitted for approval prior to all lifting operations. The lifting plan will make provision for the potential for damage of retained trees.
- All lifting operations will be completed under the close direction of a qualified banksman, who will be briefed by the appointed contractor as to the need to avoid damage the stems and branches of retained trees.
- Should additional tree removal or pruning be required the Local Authority Tree Officer shall be contacted and the scope of works agreed in writing.

C.7 Hazardous Materials

C.7.1 Any mixing of cement-based materials is to take place outside the RPAs of all trees. Provision shall be made to ensure that the mixing area is contained so that no water runoff enters the RPAs of any trees. All mixers and barrows shall be cleaned within this dedicated mixing area.

C.7.2 All other chemicals hazardous to tree health, including petrol and diesel, are to be stored in suitable containers as specified by the Control of Substances Hazardous to Health (COSHH) Regulations (2002) (Ref 4), and kept away from the RPAs.

C.8 Example of Protective Fencing Signs

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Appendix I Excerpts from Appendix F of the new 400kV Long Lane Substation Environmental Appraisal Report

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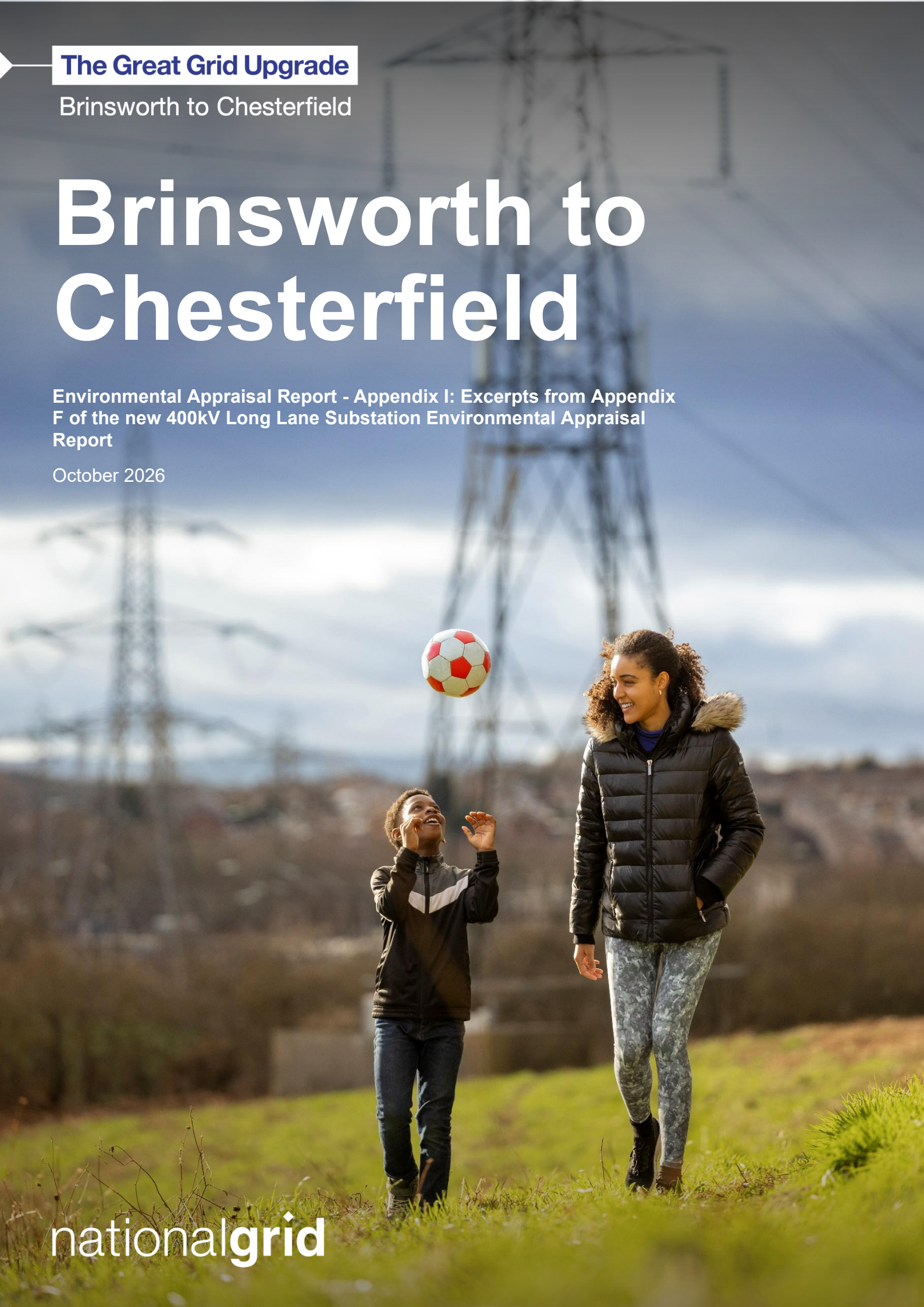
The Great Grid Upgrade

Brinsworth to Chesterfield

Brinsworth to Chesterfield

Environmental Appraisal Report - Appendix I: Excerpts from Appendix F of the new 400kV Long Lane Substation Environmental Appraisal Report

October 2026



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The text in this report comprises excerpts from Appendix F Ecology Report to the New 400kV Long Lane substation Environmental Appraisal Report. Where possible, the original paragraph, table and figure references have been retained to aid the reader.

Contents

Executive summary 1

2. Legislation 2

2.1 Bats 2

3. Methodology 3

Legislation and Guidance 3
Night-time Bat Walkover Survey 4
Protected Species Surveys 5

4. Results 6

4.1 Reporting Outline 6
Birds 6
Bats 6

5. Discussion 8

5.1 Overview 8

5.2 Recommendations 8
Birds 8
Bats 9

Table 4.6 Bat activity during NBW surveys 7
Table 5.1 UK Bat Mitigation Guidelines importance assessment of bat assemblage 10
Table B.1 Bat Activity Survey Details 1

Figure 1.1 Scheme Boundary 1
Figure A.2 NBW transect and bat activity map at Long Lane 2

References 12

Appendix A Figures
Appendix B Bat Activity Survey Details

Executive summary

….

Arcadis Consulting (UK) Limited was commissioned by National Grid to provide preliminary ecological advice in support of a new substation at a site near Brinsworth. A Preliminary Ecological Appraisal has been undertaken to assess the Site for potential ecological constraints and identify any requirements for further survey, mitigation or enhancement opportunities.

….

Figure 2.1 Scheme Boundary

2. Legislation

2.1 Bats

2.1.1 This section provides an overview of the legislation applicable to bats; for further information the source legislation should be reviewed.

2.1.2 All bat species are afforded full protection under UK and European legislation, including the Wildlife and Countryside Act (WCA) 1981 (as amended), the Countryside and Rights of Way Act (2000) and The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Together, this legislation makes it illegal to recklessly, intentionally or deliberately:

- take, kill or injure a bat;
- damage, destroy, or obstruct access to, a bat roost; and
- disturb a bat occupying a roost.

2.1.3 A bat roost is defined in the legislation as '*any structure or place which a bat uses for shelter or protection*'. Annex II bats are those species listed on Annex II of the Habitats Directive, which lists animal and plant species of Community interest whose conservation requires the designation of Special Areas of Conservation (SAC).

2.1.4 Bats are also protected by the Wild Mammals (Protection) Act 1996, which prohibits cruel treatment. The UK Post-2010 Biodiversity Framework (Joint Nature Conservation Committee and Defra, 2012) identifies 65 Priority Habitats and 150 Priority Species that are in need of protection. This list has been used to define Habitats and Species of Principal Importance in England (the Section 41 list) as required by the Natural Environment and Rural Communities (NERC) Act 2006 (as amended).

2.1.5 Noctule bat (*Nyctalus noctula*), Soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bat (*Plecotus auritus*) are bat species recorded within the Rotherham Metropolitan Borough Council (RMBC) area, which are listed as Species of Principal Importance (SPI) under the NERC Act 2006 (as amended). All planning decisions must have regard to the conservation of these species.

3. Methodology

Legislation and Guidance

3.1.1 This assessment has been undertaken in accordance with current national legislation, and national, regional and local plans and policies relating to biodiversity in the context of the Scheme. Relevant legislation and guidance are listed below:

- Council Directive 92/43/EEC of the European Parliament and of the Council of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) (Council of the European Communities, 1992);
- Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019, as amended ('Habitats Regulations');
- The WCA 1981 (as amended);
- Countryside and Rights of Way Act 2000;
- NERC Act 2006 (as amended);
- Wild Mammals Protection Act 1996;
- The Environment Act 2021;
- National Planning Policy Framework (NPPF) 2024 (Ministry of Housing, Communities and Local Government, 2021);
- Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019);
- BS 42020:2013. Biodiversity: Code of Practice for Planning and Development (BSI 42020: 2013);
- The Status of our Bird Populations: The Fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. (Stanbury et al., 2021);
- The Draft Bassetlaw Local Plan (Chesterfield Borough Council, 2020); and
- Rotherham Biodiversity Action Plan (BAP) (Rotherham Biodiversity Forum, 2012).

Night-time Bat Walkover Survey

3.1.2 A single NBW route was selected to incorporate features within the Site most likely to be used by foraging and commuting bats (such as woodland and scrub edges, long grassland and the river corridor). The transect route is shown on the Bat Activity Survey Map in Appendix A.

3.1.3 Following consultation with RMBC in January 2024, it was agreed that automated static surveys were not required.

3.1.4 Surveys were undertaken by suitably qualified and bat licenced ecologists, following The Bat Conservation Trust 'Good Practice Guidelines', including one survey visit per season as the Site was considered as low suitability. Details on weather and timings are provided within Appendix B. Surveys were undertaken on the following dates:

- 3 October 2023 conducted by Principal Ecologist Ben Mclean (CL18 bat licence) and Assistant Ecologist Andrea Lee;
- 25 April 2024 conducted by Principal Ecologist Nick Clayton (CL18) and Assistant Ecologist Andrea Lee; and
- 13 June 2024 conducted by Principal Ecologist Nick Clayton (CL18) and Assistant Ecologist Andrea Lee.

3.1.5 Dusk surveys commenced at sunset and ended two to three hours after sunset. The transect was walked once during the survey. At the starting point of the survey, surveyors listened for >30 minutes before starting the transect. Throughout the survey, surveyors included series of five minute 'Listening Stops'.

3.1.6 The start point and the direction in which the transect was traversed was varied between surveys. Bat activity was recorded using portable Anabat Scout 1 handheld full spectrum bat detectors and Echo Meter Touch 2 Pro with an iPad mini 5. Information on the following was recorded relating to observed bat activity:

- time of bat activity;
- species;
- behaviour (foraging, commuting, social);
- number of bats and passes; and
- where possible, additional information including direction of flight.

3.1.7 Although all habitats were sampled during the transect survey, the habitats that were identified as having moderate to high suitability for bats, such as hedgerows, were the main focus when undertaking the surveys.

3.1.8 Echolocation data was analysed using Kaleidoscope Pro Software, which assigned a species label/s to each recorded file based on call parameters or classified a file as "No ID" where the call parameters could not be identified by the software. Where possible, bat calls were identified to species level. However, species of the genus *Myotis* were grouped together and collectively referred to as *Myotis* species (sp.) because in most cases their call characteristics are too similar in structure and have overlapping call parameters to identify to species level. Similarly, *Pipistrellus* sp. and *Nyctalus* sp. were used to describe calls where it was not possible to distinguish between species within the respective genus.

3.1.9 The auto analysed files were then manually identified as part of the quality assurance process by a competent ecologist experienced in the use of the Kaleidoscope software. The calls were randomised, and then the following percentage of calls were subject to a quality assurance manual review:

- 5% of unidentified (NoID) files (if 50% of the 5% NoID files are bats then all NoID files to be manually reviewed);
- 10% *Myotis* sp. (below 90% confidence threshold); and
- 5% all other calls (below 90% confidence threshold).

Protected Species Surveys

3.1.10 The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors which affect the presence of species, such as weather conditions, movement patterns and behaviour.

Night-time Bat Walkover

3.1.11 The second survey on 25 April 2024 was undertaken in sub-optimal conditions, with the temperature being less than 10 degrees at the start of the survey, which was unusual for the time of year. However, as the Site was of low suitability for foraging and commuting bats and a bat was recorded commuting, the cold conditions were not considered to affect the results of the survey.

4. Results

4.1 Reporting Outline

4.1.1 The results of the desk study and field survey are described below… [All figures including the Phase 1 Habitat Survey Map, Bat Activity Map and Breeding Bird Map can be found within this report.]

Birds

4.1.2 The desk study returned records of 33 protected and/or notable birds within 2km of the Site, some of which are listed in the amber/red lists of Birds of Conservation Concern (BoCC) (Stanbury *et al*., 2021), under Schedule 1 of the WCA 1981 (as amended) or are SPIs under Section 41 of the NERC Act 2006 (as amended). The closest records were of redwing (*Turdus iliacus*) and kingfisher (*Alcedo atthis*) located within Whiston Meadows LWS, 10 to 20m north of the Scheme boundary. Peregrine falcon (*Falco peregrinus*) has also been recorded on a pylon approximately 1.25km west.

4.1.3 The hedgerows within the Site provided breeding habitat for shrub nesting birds such as dunnock (*Prunella modularis*) and song thrush (*Turdus philomelos*). The arable land and improved grassland are suitable for ground-nesting birds such as lapwing (*Vanellus vanellus*) and skylark (*Alauda arvensis*). The hedgerows, arable land and adjacent woodlands to the north and south of the Site also provide foraging opportunities for a range of birds. The pylons within and around the Scheme boundary provide suitable nesting opportunities for peregrine falcons.

4.1.4 The likelihood that the Site supports nesting birds is assessed as high.

Bats

4.1.5 The desk study returned 64 records of bats within 2km of the Site, including unidentified bat (Chiroptera), noctule bat (*Nyctalus noctula*), pipistrelle bat (*Pipistrellus* sp), common pipistrelle (*Pipistrellus pipistrellus*) and brown long-eared bat (*Plecotus auritus*). The closest record was of common pipistrelle located approximately 150m north east of the Scheme boundary. The closest record of a roost was of an unidentified bat located approximately 490m south east of the Scheme boundary.

4.1.6 All bat species in the UK are EPS under the Habitats Regulations 2021 (as amended) and are protected under Schedule 5 of the WCA 1981 (as amended) and the Wild Mammals (Protection) Act. Noctule bat and brown long-eared bat are listed as SPIs under Section 41 of the NERC Act 2006 (as amended).

4.1.7 The desk study identified three granted EPS licence application for common pipistrelle; the closest located approximately 610m south east of the Scheme boundary.

4.1.8 No trees, buildings or structures suitable for roosting bats were identified during the survey. The hedgerows and adjacent woodlands to the north and south of the Site are also likely to be used by foraging and/or commuting bats.

4.1.9 The likelihood that the Site supports commuting and/or foraging bats is assessed as high.

Night-time Bat Walkover

4.1.10 A summary of the NBW results is provided below. Three species were identified during the transect surveys:

- Common pipistrelle;
- Soprano pipistrelle; and
- *Myotis* sp.

4.1.11 Nearly all of the identified bats were common pipistrelle, with nine records of soprano pipistrelle calls and only one identification of Myotis through sound analysis. Bat activity was the highest during the June survey (dusk), with lowest activity levels in April (Table 6). As shown in Table 6, there were records of multiple passes by common and soprano pipistrelle between 10:08pm and 11:15pm.

4.1.12 The distribution of commuting and foraging bats across the survey area, as illustrated in Appendix A Figure A.2, reflects the routes that were followed by the surveyors on the transects. Bat activity recorded was fairly spread across the Site, with only one common pipistrelle recorded foraging. Commuting activity was widely dispersed throughout the survey area, with bats mainly found in areas where linear features were present, providing good connectivity between adjacent habitats. Such features included areas of the woodland edge and hedgerows.

Table 4.6 Bat activity during NBW surveys

Survey Dates	Time (PM)	Species	Number of passes total	Behaviour
3rd October 2023	19:39	*Common pipistrelle*	3	Commuting
	19:40	*Common pipistrelle*		
25th April 2024	21:37	*Common pipistrelle*	1	Commuting
13th June 2024	22:08 – 23:15	*Common pipistrelle*	27	Commuting and foraging
	22:08 – 22:15	*Soprano pipistrelle*		
	22:26	*Myotis* sp.		

5. Discussion

5.1 Overview

5.1.1 The following ecological features have been scoped in, meaning that adverse impacts are possible, and they need further consideration as the Scheme develops.

- Birds. The hedgerows, arable land and improved grassland within the Site provided nesting habitat for birds.
- Bats. The hedgerows within the Site and adjacent woodlands to the north and south of the Site were suitable for foraging and/or commuting bats.

…

5.2 Recommendations

5.2.1 The following recommendations are made on the understanding that any habitats within the Site have the potential to be impacted or removed. The requirement for further survey may reduce once the details of the Scheme are known.

Birds

5.2.2 If removal of any habitats identified as suitable for breeding birds is required, this should ideally be undertaken outside the nesting season (outside of 1 March to 31 August inclusive, weather dependent). If clearance works are required within the main nesting season, then a nesting bird check must be undertaken by a suitably qualified ecologist prior to any clearance works. If an active nest is found during the inspection, then an exclusion cordon must be put in place around the nest and remain in-situ until the chicks within the nest have fledged.

Bats

5.2.3 Three NBW surveys were undertaken following The Bat Conservation Trust 'Good Practice Guidelines', to understand the bat activity on the Site. The results show common pipistrelle, soprano pipistrelle and *Myotis* sp. were commuting or foraging on the Site in low numbers, particularly along the woodland LWS to the north and hedgerow edges, which provide suitable commuting habitat to the wider landscape.

5.2.4 The importance of the bat species assemblage recorded within the entire survey area to date was assessed in line with the UK Bat Mitigation Guidelines (Reason & Wray, 2023). To determine the maximum possible score any site could achieve, a score is assigned to each species that could be present where:

- Widespread in (almost) all geographies (score 1)
- Widespread in many geographies, but as abundant in all (score 2)
- Rarer or restricted distribution (score 3)
- Rarer Annex II species and very rare (score 4).

5.2.5 Once the score for each has been calculated and summed to determine the maximum theoretical score, the threshold score needed for any assemblage to meet each geographic level of importance, can be calculated:

- Assemblage score meets 45% of the maximum score: County importance
- Assemblage score meets or exceed 55% of the maximum score: Regional importance
- Assemblage score meets or exceeds 70% of the maximum score: National importance

5.2.6 The species assemblage recorded within the survey area to date scored 6 out of a possible 22 points for locations within the northern region, which is assessed as being of local importance (Table 5.1).

Table 5.1 UK Bat Mitigation Guidelines importance assessment of bat assemblage

Rarity Category	Central/ Midlands England	Score for the Site	Comments
Widespread all geographies [score 1]	*P.pip* *P.pyg* *P.aur*	2	Common and soprano pipistrelle and brown long-eared recorded.
Widespread in many geographies, but not as abundant in all [score 2]	*M.mys* *M.bra* *M.dau* *M.nat* *N.nyc*	4	*Myotis* species have been grouped during sonogram analysis. However, for the purposes of this assessment and given the landscape is dominated by arable (open landscape) and with the LWS to the north/north west with water courses and the River Rother as well as a few pockets of woodland in the wider landscape, it is assumed that whiskered and Daubenton's are present on Site.
Rarer or restricted distribution [score 3]	*Eser* *Nlei* *Pnat*	0	No records of Leisler's, Serotine or Nathusius's pipistrelle from the surveys or desk study.
Rarest Annex II species and very rare [score 4]	*Bbar*	0	No records of barbastelle from the surveys or desk study.
Total		**6**	
Importance		**Local**	

P.pip – Common pipistrelle

P.pyg – *Soprano pipistrelle*

P.aur – Brown long-eared bat

M.mys – Whiskered bat

M.bra – Brandt's bat

M.dau – Daubenton's bat

M.nat – Natterer's bat

N.nyc – Noctule

Eser – Serotine

Nlei – Leisler's bat

Pnat – Nathusius' pipistrelle

Bbar – Barbastelle

5.2.7 There were no suitable ecological features for roosting bats on Site.

5.2.8 Bat activity surveys will inform the design of a sensitive lighting strategy for the Scheme. Such lighting strategy should minimise impacts on bats during the construction phase and as part of the Scheme design. Bats are sensitive to lighting and therefore lighting should be designed to minimise spill and to target areas where lighting is considered essential. It is recommended that loss of habitats suitable for foraging bats is limited to areas necessary to construct the Scheme, based on detailed development plans.

...

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Appendix A
Figures

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Figure A.1 Phase 1 Habitats

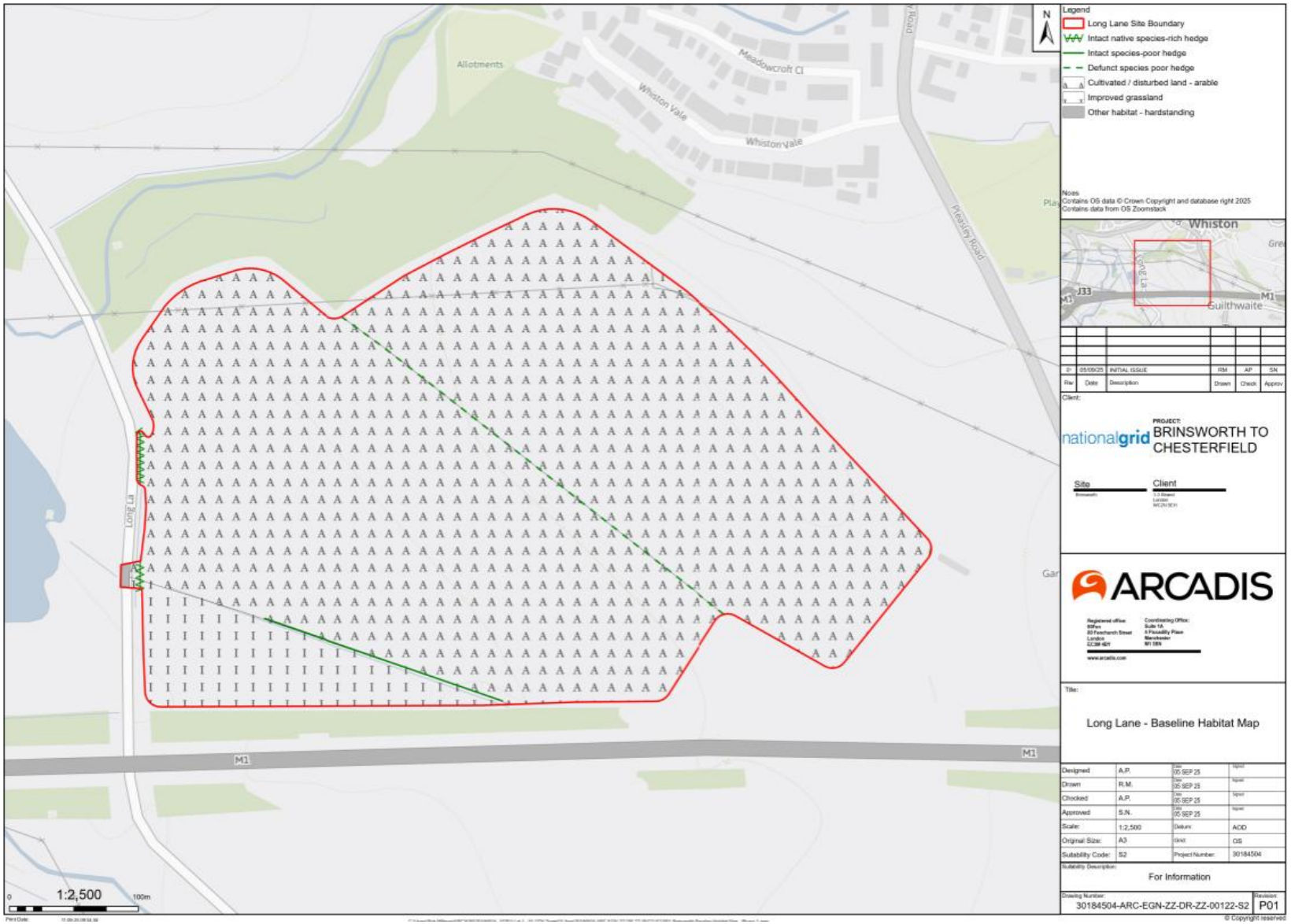
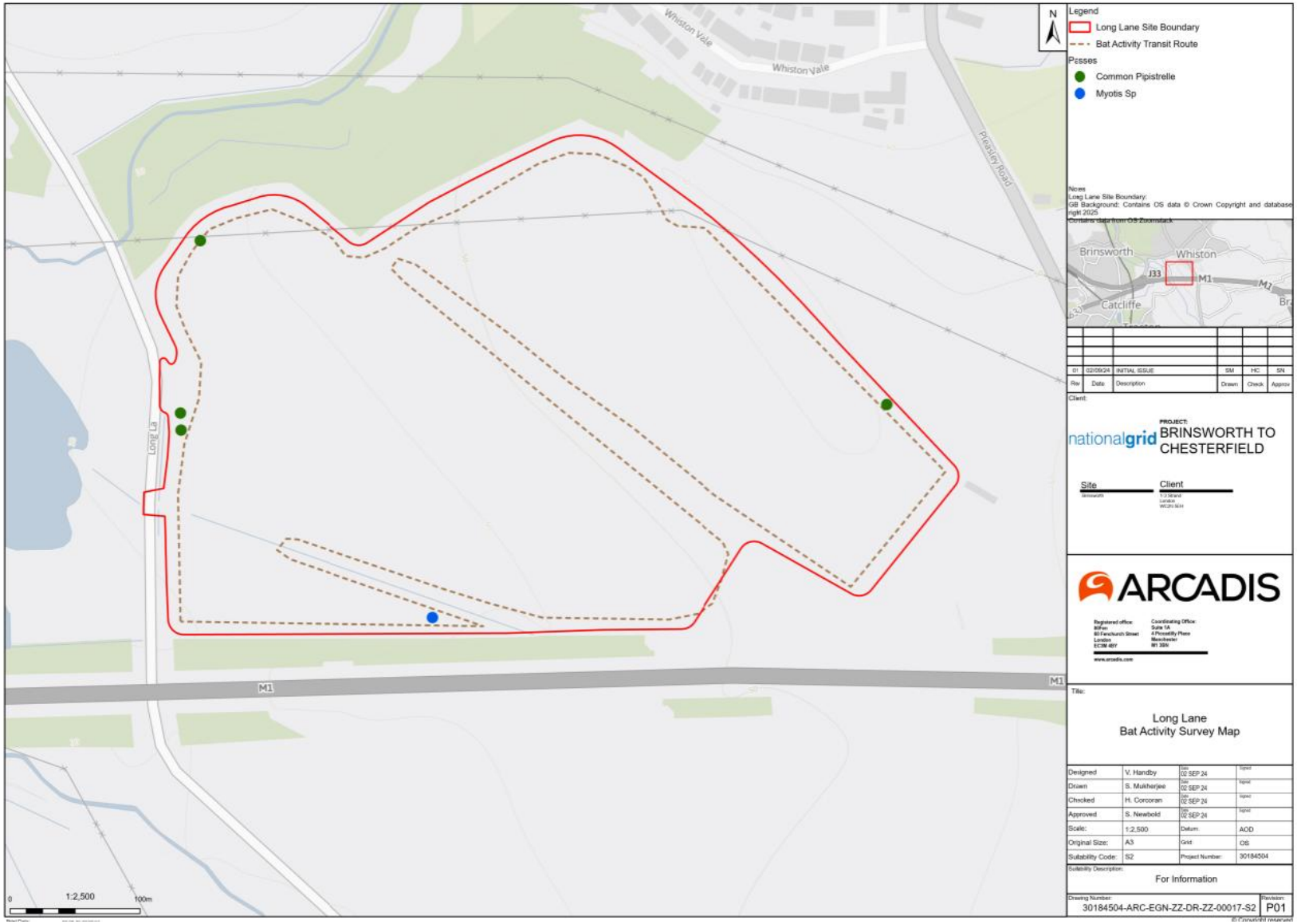


Figure A.2 NBW transect and bat activity map at Long Lane



Appendix B
Bat Activity Survey Details

Appendix B
Bat Activity Survey Details

Table B.1 Bat Activity Survey Details

Visit No.	Lead Surveyor / Assistant Surveyor	Dusk or Pre-dawn	Date	Sunset / Sunrise	Start Time	End Time	Weather at Start				Weather at End			
							Temperature (°C)	Rainfall	Cloud Cover	Windspeed (Beaufort)	Temperature (°C)	Rainfall	Cloud Cover	Windspeed (Beaufort)
1	Ben Mclean	Dusk	03/10/2023	Sunset	18:38	20:43	15.8	0	6	2	12.6	0	6	2
2	Nick Clayton	Dusk	25/04/2024	Sunset	20:25	22:26	8	0	2	1	2	0	1	0
3	Nick Clayton	Dusk	13/06/2024	Sunset	21:34	23:35	12	1	8	4	9	0	8	3

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Appendix J
Long Lane Breeding Bird Report

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Brinsworth to Chesterfield Ecology Report

Appendix E: Breeding Bird Report

18 May 2026

Brinsworth to Chesterfield Ecology Report

Appendix E: Breeding Bird Report

18 May 2026

Prepared By:
Arcadis Consulting (UK) Ltd

Prepared For:
National Grid Electricity Transmission PLC

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Revision Control

Revision	Date	Author	Reviewer	Approver	Changes
01	**18/05/2026**	MH	KM	**SJ**	

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Contents

Executive Summary 4
1 Introduction 5
1.1 Project Background and Site Location 5
1.2 Scope of Work 5
1.3 Legislation and Policy Compliance 5
2 Methodology 8
2.1 Desk Study 8
2.2 Field Survey 8
2.3 Limitations 8
3 Results 9
3.1 Desk Study 9
3.2 Field Survey 10
4 Discussion 13
5 Conclusion 14
6 References 15
Appendix A Weather Conditions 16
Appendix B Designated Sites 17
Appendix C Skylark Territory Maps 19

Tables

Table 1: Outline of BoCC traffic light criteria 6
Table 2: Summary of statutory sites identified within 10km of the Site with birds listed as a designating feature 9
Table 3: Red and Amber list species of birds recorded during the 2026 breeding bird surveys 11
Table 4: Non-priority species of birds recorded during the 2026 breeding bird surveys 11

Figures

Image 1: Aerial imagery of the Scheme boundary. 5

Appendices

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Figure 1: Designated sites of ornithological interest within 10km of the Site

Figure 2: Local Wildlife Sites within 2km of the Site

Figure 3: Skylark Territory Maps

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Executive Summary

This report presents the results of the breeding bird surveys undertaken in 2026 by Arcadis Consulting (UK) Ltd on behalf of National Grid Electricity Transmission PLC (NGET). The surveys are related to the proposed new 400kV Long Lane substation. The purpose of the surveys was to record any birds utilising the Site for breeding.

The desk study returned five statutory designated sites within 10km of the Site where birds are a designated feature. The data search from Rotherham Biological Records Centre (RBRC) returned records of 33 different bird species within 2km of the Site in the past 10 years.

During the surveys, 26 bird species were recorded on Site, of which 20 species were recorded as breeding or possibly breeding. Two red-listed species were breeding and two amber-listed Birds of Conservation Concern (BoCC) species were possible breeding.

There were an above average number of skylark territories on the Site, and the overall value of the Site to support breeding skylarks is deemed to be moderate to high. This is likely due to the land being unmanaged since changing ownership a year ago, leading to the classification of the land changing from arable farmland to set-aside/fallow and increasing the carrying capacity for skylark.

The proposed Scheme will cause the potential loss of up to seven possible skylark territories. Compensation of >10ha of natural grassland, which could support up to 5.36 skylark territories, as well as provide high-quality foraging habitat for skylarks nesting on the adjacent land located east and south of the site, is proposed. Furthermore, the provision of appropriate signage (stating that dogs must be kept on leads) on the Public Right of Way (PRoW) will reduce disturbance to breeding birds using the Site.

The overall value of the Site to support other breeding birds, particularly red/amber listed species, is deemed to be low due to the limited numbers of breeding bird species recorded during the surveys.

Mitigation plans, including signage, retention of open habitat to the east, planting of scrub, woodland, hedgerow and >10ha of quality neutral grassland will provide a mosaic of habitat for a wider range of bird species. It will increase both foraging and nesting opportunities on Site for birds and potentially increase carrying capacity for birds on land adjacent to the Site.

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Part of the Arcadis Group of Companies along with other entities in the UK. Regulated by RICS.

1 Introduction

1.1 Project Background and Site Location

1.1.1 Arcadis Consulting (UK) Limited was commissioned by National Grid Electricity Transmission plc (hereafter NGET) to undertake breeding bird surveys within the Scheme boundary. The Scheme comprises the construction of a new 400kV substation at Long Lane. The area defined within the Scheme boundary, as referenced in supporting figures, is hereafter referred to as 'the Site'.

1.1.2 The Scheme is located to the southeast of Rotherham, off Long Lane, Whiston, S60 4JJ (Grid Ref: SK 44421 89538). Image 1 below presents the Scheme boundary, outlined in red. The surrounding landscape is dominated by agricultural land to the east, west and south. A woodland bounds the site to the north, and residential properties within Whiston village are located to the northeast. Whiston brook runs approximately 50m north of the Scheme boundary. The M1 motorway bounds the Scheme boundary to the south and the associated embankment runs through the south of the Site.

Image 1: Aerial imagery of the Scheme boundary.

1.2 Scope of Work

1.2.1 The scope of work presented in this report for breeding birds comprises a desk study and three breeding bird surveys. This is to establish the breeding bird assemblage, presence of birds of conservation concern and breeding numbers, following a change in land management at the Site, in order to determine the potential impact of the Scheme on breeding birds.

1.3 Legislation and Policy Compliance

1.3.1 The following legislation concerning bird species is relevant to this ornithology baseline.

1.3.2 In the United Kingdom (UK), all wild bird species and their eggs are legally protected when nesting under the Wildlife and Countryside Act (WCA) 1981 (as amended) (HMG, 1981). In addition, there are several pieces of legislation or policy which afford certain species extra legal protection, or emphasise their conservation importance, as outlined below:

- Species that are specially protected when breeding under Schedule 1 Part 1 of the WCA 1981 (as amended).
- Species of Principal Importance listed under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act (HMG, 2006).
- Species that are of high nature conservation concern, listed as 'Red-List' and 'Amber-list' on the British Trust for Ornithology (BTO) list of Birds of Conservation Concern (BoCC) (BTO, 2021).This non-legislative system was derived from the review of the population status of bird species that are regularly found breeding within the UK, using data from national monitoring schemes by the leading governmental and non-governmental conservation organisations in the UK. A brief outline of the traffic light criteria is given below in Table 1.

1.3.3 The bird breeding season generally lasts from March to September for most species. All wild birds are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended) and the Countryside Rights of Way Act (CRoW) 2000. This legislation makes it illegal, both intentionally and recklessly to:

- Kill, injure or take any wild bird;
- Take, damage or destroy the nest of any wild bird while it is being built or in use;
- Take or destroy the eggs of any wild bird; and
- Possess or control any wild bird or egg unless obtained legally.

Table 1: Outline of BoCC traffic light criteria

Criteria	Status
Red	Globally threatened Historical population decline in UK during 1800–1995 Rapid (> or =50%) decline in UK breeding population over last 25 years Rapid (> or =50%) contraction of UK breeding range over last 25 years
Amber	Moderate (25-49%) decline in UK breeding population over last 25 years Moderate (25-49%) contraction of UK breeding range over last 25 years Moderate (25-49%) decline in UK non-breeding population over last 25 years Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern) Five-year mean of 1–300 breeding pairs in UK > or =50% of UK breeding population in 10 or fewer Sites, but not rare breeders > or =50% of UK non-breeding population in 10 or fewer Sites > or =20% of European breeding population in UK > or =20% of NW European (wildfowl), East Atlantic Flyway (waders) or European (others) non-breeding populations in UK
Green	No identified threat to the population's status

National Policy

1.3.4 The National Planning Policy Framework (HMG, 2024) sets out the Government's planning policies for England and how these are expected to be applied by Local Authorities within their Local Development

Frameworks (LDF). Section 15 covers habitats and biodiversity and provides direction as to what plans should include in order to enhance biodiversity, as well as a list of principles that Local Planning Authorities (LPAs) should apply when determining planning applications. These include:

- If significant harm to biodiversity cannot be avoided, adequately mitigated or as a last resort compensated for then planning permission should be refused;
- Developments likely to have an adverse effect on a Site of Special Scientific Interest (SSSI) should not normally be permitted;
- Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland, and ancient or veteran trees) should normally be refused; and
- Developments whose primary objective is to conserve or enhance biodiversity should be supported. Opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure net gains for biodiversity.

Local Policy

Rotherham Biodiversity Action Plan 2012

The Rotherham Biodiversity Action Plan (BAP) does not have any information pertaining to breeding or non-breeding birds in cropland habitats, however, the following priority habitats are associated with the following priority species:

Grasslands: Skylark (*Alauda arvensis*), European greater white-fronted goose (*Anser albifrons*), dark-bellied brent goose (*Branta bernicla bernicla*), stone-curlew (*Burhinus oedicnemus*), linnet (*Linaria cannabina*), twite (*Linaria flavirostris*), hen harrier (*Circus cyaneus*), corn crake (*Crex crex*), common cuckoo (*Cuculus canorus*), bewick's swan (*Cygnus columbianus bewickii*), yellowhammer (*Emberiza citrinella*), reed bunting (*Emberiza schoeniclus*), grasshopper warbler (*Locustella naevia*), wood lark (*Lullula arborea*), yellow wagtail (*Motacilla flava*), curlew (*Numenius arquata*), tree sparrow (*Passer montanus*), grey partridge (*Perdix perdix*), starling (*Sturnus vulgaris*), song thrush (*Turdus philomelos*), lapwing (*Vanellus vanellus*), tree pipit (*Anthus trivialis*), house sparrow (*Passer domesticus*), turtle dove (*Streptopelia turtur*).

Woodlands: Tree pipit, nightjar (*Caprimulgus europaeus*), lesser redpoll (*Acanthis cabaret*), hawfinch (*Coccothraustes coccothraustes*), common cuckoo, lesser spotted woodpecker (*Dryobates minor*), yellowhammer, reed bunting, grasshopper warbler, wood lark, spotted flycatcher (*Muscicapa striata*), tree sparrow, wood warbler (*Phylloscopus sibilatrix*), dunnock (*Prunella modularis*), bullfinch (*Pyrrhula pyrrhula*), turtle dove, starling, song thrush.

Wetlands: Bewick's swan, skylark, European greater white-fronted goose, dark-bellied brent goose, corn crake, common cuckoo, reed bunting, black-tailed godwit (*Limosa limosa*), grasshopper warbler, yellow wagtail, curlew, lapwing.

Orchards: Linnet, hawfinch, common cuckoo, lesser spotted woodpecker, yellowhammer, yellow wagtail, spotted flycatcher, willow tit (*Poecile montanus*), marsh tit (*Poecile palustris*), house sparrow, tree sparrow, grey partridge, dunnock, bullfinch, turtle dove, starling, song thrush.

Hedgerows: Tree pipit, lesser redpoll, linnet, common cuckoo, lesser spotted woodpecker, cirl bunting (*Emberiza cirlus*), yellowhammer, reed bunting, spotted flycatcher, willow tit, marsh tit, house sparrow, tree sparrow, grey partridge, dunnock, bullfinch, turtle dove, starling, song thrush.

Brownfields: Skylark, reed bunting, herring gull (*Larus argentatus*), wood lark, spotted flycatcher, willow tit, house sparrow, dunnock, bullfinch, starling, song thrush, lapwing.

2 Methodology

2.1 Desk Study

2.1.1 A desktop study was undertaken by Arcadis in February 2024 and updated in April 2025. Existing ecological information relating to the Site and its surroundings was obtained as part of the 2026 surveys. The following data sources were utilised:

- MAGIC (Multi-Agency Geographical Information for the Countryside) website was used to search for statutory designated sites of nature conservation value within 10km of the Site, designated for breeding bird populations.
- Data search from Rotherham Biological Records Centre (RBRC) of bird species within 2km of the Site;
- Ordnance Survey (OS) mapping (to identify potentially notable habitats); and
- Aerial photography (e.g. Google mapping)

2.2 Field Survey

2.2.1 Breeding bird surveys were carried out based on the guidelines in the British Trust for Ornithology (BTO) Common Bird Census methodology (Gilbert *et al.,* 1998). All birds present in the vicinity of the Site were mapped, noting their behaviour with priority given to breeding signs or species of high conservation value. Surveys began within the first hour after sunrise and lasted for approximately three hours. The route taken by the surveyor across the Site was varied between visits to optimise detection rate and minimise recording bias. The first two surveys were completed in optimum field conditions, for example with no wind or rain.

2.2.2 A total of three surveys were completed by suitably qualified ornithologists on the following dates:

- 26 March 2026
- 16 April 2026
- 07 May 2026

2.2.3 The weather data along with surveying times for each survey visit is presented in Appendix A.

2.2.4 Bird populations were recorded as the maximum number of each species seen per survey.

2.2.5 The density of skylark territories was assessed and calculated with support from CIEEM in practice prototype tool (Fox, 2022).

2.3 Limitations

2.3.1 Since the 2024 and 2025 desk studies were undertaken, the management of the land parcel has changed, leading to an increase in the suitability of the Site for breeding birds, particularly skylark.

2.3.2 The first survey took place during early breeding season, which, in isolation, may not provide an accurate picture as to the species present on site; however this visit was supplemented by two further visits. The third survey took place in suboptimal weather conditions; however this is not considered to have impacted the survey data, with multiple species recorded calling, singing and displaying.

2.3.3 Three surveys were carried out as opposed to the six typically recommended by the BTO in order assess skylark territories and inform mitigation and any further survey requirements. The three surveys were carried out during a time of peak activity so are considered to capture the skylark breeding potential for the Site.

3 Results

3.1 Desk Study

3.1.1 The desk study returned no statutory sites of international importance and 24 designated statutory sites of national importance within 10km of the Site.

3.1.2 Table 2 summarises statutory sites identified within 10km of the Site with birds (breeding and non-breeding) listed as a designating feature, as well as non-statutory sites of ornithological interest within 2km of the Site. These sites are shown in Appendix B, Figure 1.

Table 2: Summary of statutory sites identified within 10km of the Site with birds listed as a designating feature

Site Name and Designation	Distance and Direction	Reason for Designation
Statutory Sites		
Moss Valley SSSI	9.5km south	The SSSI is important for breeding birds. Species recorded from the site include: • Green woodpecker (*Picus viridus)* • Great spotted woodpecker (*Dendrocopos major)* • Tawny owl (*Strix aluco)* • Kingfisher (*Alcedo atthis)* • Grey wagtail (*Motacilla cinerea)*
Catcliffe Flash Local Nature Reserve (LNR)	1.8km southwest	The LNR provides relatively undisturbed areas for water birds.
Centenary Riverside LNR	3.1km northwest	The marshland lagoon contains 3 islands formed by retained slag piles, the islands provide habitat for nesting birds.
Woodhouse Washlands LNR	3.8km south	The site is important for breeding birds such as snipe (*Gallinago Gallinago)*, lapwing (*Vanellus Vanellus)*, skylark (*Alauda arvensis)* and reed bunting (*Emberiza schoeniclus)*. It is a regionally important bird migration route in the Rother Valley.
Gleadless Valley LNR	8.4km southwest	The site provides habitat for UK BAP species including song thrush (*Turdus philomelos).*

3.1.3 There are eight Local Wildlife Sites (LWS) with 2km of the Site. These sites have the potential to support wide range of breeding bird assemblages. The nearest LWS is Whiston Meadows which is adjacent to the Site to the north (Appendix B, Figure 2).

3.1.4 The desk study returned 33 records of protected and/or notable birds within 2km of the Site. The closest records were of redwing (*Turdus iliacus)* and kingfisher (*Alcedo atthis)* located within Whiston Meadows

LWS, 10-20m north of the Scheme boundary. Peregrine falcon (*Falco peregrinus)* has also been recorded on a pylon approximately 1.25km west.

3.2 Field Survey

3.2.1 A total of 26 bird species were recorded on Site, of which 20 species were recorded as breeding, or possibly breeding. All species recorded during the surveys, including their breeding status, are presented in Tables 3 and 4.

3.2.2 For the purpose of this report, a 'breeding' species includes all those meeting the 'confirmed breeding' and 'probable breeding' criteria according to the BTO Breeding Evidence guidance. Species described as 'possible' breeding or 'non-breeding' are however consistent with the BTO guidance.

3.2.3 Four red-listed BoCC species were recorded during the surveys, two of which were breeding: skylark and linnet. Both species were named on the Rotherham BAP. Territory maps for skylarks are provided in Appendix C, Figure 3.

3.2.4 Ten amber-listed BoCC species were recorded, of which six were breeding and two were possible breeding. Those recording as breeding were dunnock, meadow pipit (*Anthus pratensis*), song thrush, stock dove, woodpigeon and wren. Possible breedings were common whitethroat (*Sylvia communis*) and willow warbler (*Phylloscopus trochilus*).

3.2.5 Using the CIEEM in Practice skylark mitigation metric tool, the skylark territory density was calculated as 0.53 territories/hectare for confirmed territories, and 0.82 territories/hectare for confirmed and possible territories (Fox, 2022). This was interpreted against two habitat classifications. The area was assessed as mixed-use arable based on historical records of cereal cropping and temporary grass/clover leys (the average density for this habitat is 0.28/hectare proposed by Fox, 2022) and also compared to set-aside/fallow (average density for this habitat is 0.39/hectare proposed by Fox 2022) to reflect that the land has been unmanaged for almost a year following ownership transfer. The number of skylark territories on site is above average distribution for either habitat condition.

Table 3: Red and Amber list species of birds recorded during the 2026 breeding bird surveys

Common Name	Scientific Name	Maximum Count of Birds Recorded	Breeding Status	Conservation Status
Dunnock	*Prunella modularis*	4	Probable Breeding	Amber List, NERC41, Rotherham BAP
Lapwing	*Vanellus vanellus*	2	Non-Breeding	Red List, NERC41, UK BAP, Rotherham BAP
Linnet	*Linaria cannabina*	6	Probable Breeding	Red List, NERC41, UK BAP, Rotherham BAP
Mallard	*Anas platyrhynchos*	3	Non-Breeding	Amber List
Meadow Pipit	*Anthus pratensis*	5	Probable Breeding	Amber List
Rook	*Corvus frugilegus*	1	Non-Breeding	Amber List,
Skylark	*Alauda arvensis*	22	Probable Breeding	Red List, UK BAP, Rotherham BAP
Song Thrush	*Turdus philomelos*	3	Probable Breeding	Amber List, NERC41, UK BAP, Rotherham BAP
Stock Dove	*Columba oenas*	7	Probable Breeding	Amber List,
Common Whitethroat	*Sylvia communis*	1	Possible Breeding	Amber List, NERC41, UK BAP
Willow Warbler	*Phylloscopus trochilus*	1	Possible Breeding	Amber List,
Woodpigeon	*Columba palumbus*	11	Confirmed Breeding	Amber List
Wren	*Troglodytes troglodytes*	4	Probable Breeding	Amber List
Yellowhammer	*Emberiza citrinella*	2	Non-Breeding	Red List, NERC41, UK BAP, Rotherham BAP

Table 4: Non-priority species of birds recorded during the 2026 breeding bird surveys

Common Name	Scientific Name	Maximum Count of Birds Recorded	Breeding Status	Conservation Status
Blackbird	*Turdus merula*	2	Probable Breeding	Green List
Blue Tit	*Cyanistes caeruleus*	16	Probable Breeding	Green List
Great Tit	*Parus major*	2	Probable Breeding	Green List

Carrion Crow	*Corvus corone*	5	Probable Breeding	Green List
Chiffchaff	*Phylloscopus collybita*	3	Probable Breeding	Green List
Goldfinch	*Carduelis carduelis*	1	Probable Breeding	Green List
Jackdaw	*Corvus monedula*	1	Non-Breeding	Green List
Magpie	*Pica pica*	2	Possible Breeding	Green List
Robin	*Erithacus rubecula*	4	Probable Breeding	Green List
Pheasant	*Phasianus colchicus*	1	Possible Breeding	Not Assessed
Red-legged partridge	*Alectoris rufa*	2	Possible breeding	Not Assessed
Swallow	*Hirundo rustica*	1	Non-Breeding	Green List

4 Discussion

4.1.1 The above average number of skylark territories on the Site is likely due to the low disturbance and lack of management of the habitat on site since ownership transfer, leading to the development of higher quality nesting and foraging sites since the 2024 and 2024 desk studies were undertaken. The current structure of the vegetation on site is weedy and consists of mixed sward heights, leading to complex mosaic habitats, which are optimal for skylark. This supports the assessment that the land on site should now be classed as set-aside/fallow. The number of possible and confirmed skylark territories recorded (14) is likely to be higher than in previous years since the once managed arable crop has been left as set aside and undergone no management in 2026 allowing more nests to become established and remain undisturbed.

4.1.2 The Scheme proposes the delivery of over 10ha of other neutral grassland. This grassland is intended to be managed for ground nesting birds, including phased cutting strategies to diversify sward height and maximise nesting potential. There will be a large portion to the east of the site which will be open habitat without hedgerow planting, in order to optimise suitability for skylark territories within the Site.

4.1.3 Per the CIEEM In Practice approach (Fox, 2022) and looking at the distribution of territories on site (Figure 3), there will be up to seven confirmed skylark territories directly impacted by the development footprint on site. The In Practice metric recommends either the provision of entirely new habitat, or the enhancement of existing habitat to increase the carrying capacity of mitigation land. Directly replacing the territories would require onsite compensation of 26ha of natural grassland (where 1ha has an average density of 0.27 territories, per Fox, 2022). However, when using the current average number of confirmed skylark territories from the site, the compensation area could reasonably support around 5.36 skylark territories. This would be a net loss of 1.64 territories. However, the alternative mitigation metric by Fox 2022 outlines that “where the development site will retain or create sufficient grassland foraging habitat for skylarks, territories close to the edges of the development may benefit through increased breeding productivity… provided sufficient nesting habitat is present on adjacent land to absorb them.”

4.1.4 The proposed mitigation of >10ha of grassland could reasonably support a minimum of 2.7 skylark territories, or more likely >5 territories (5.36), based on the baseline skylark density findings. This is because similar densities would be expected to what is currently on-site with the proposed grassland planting as through appropriate management, results would likely be similar to current set aside/fallow. It must be noted that this does not account for increased activity in bordering fields to the east of the site, which will benefit from an increased carrying capacity due to the higher quality foraging habitat created on site. Additionally the calculation tool does not take into account local densities of skylark, rather only averages results from a larger collection of data.

4.1.5 In line with the alternative mitigation approach outlined by Fox (2022), the proposed grassland creation and management is considered likely to increase the functional value of the surrounding landscape for offsite skylark territories by creating high-quality foraging areas for skylark, even if it does not represent a direct one-for-one replacement of territories within the Site itself. This is particularly true for capacity of arable habitat to the east of the site, which is well connected and open, and therefore considered optimal for breeding skylark. Additionally, there is a vast amount of habitat available in the wider area to absorb any loss of territories within the site.

4.1.6 Furthermore, the mosaic planting scheme of scrub, hedgerows and woodland elsewhere on the Site will further increase suitability of foraging and nesting habitat for a range of bird species using the Site.

There are also two proposed ponds within the Site, in the north-west corner, which will increase foraging potential for birds and other species on site.

5 Conclusion

5.1.1 The desk study results show a range of species within 2km of the Site. There are also records of the species associated with the international and national designated sites within 10km of the Site. The Site does not support breeding numbers of the species associated with the designated sites. Furthermore, given the distance, breeding bird populations within the designated sites are unlikely to be affected by the Scheme.

5.1.2 A total of 26 bird species were recorded on site, of which 20 species were recorded as breeding or possibly breeding. Blue tit, woodpigeon and skylark were the most numerous birds on Site. Several species of conservation concern were present, including red-listed possible breeders of skylark and linnet, and amber-listed possible breeders of dunnock, meadow pipit, reed bunting, song thrush, stock dove, woodpigeon, willow warbler and wren. The overall value of the Site to support breeding birds, particularly red/amber listed species, is deemed to be low due to the limited numbers of breeding bird species recorded during the surveys. However, the value of the site to support skylark is deemed to be moderate to high due to the high density of identified skylark territories. The suitability of the Site to support skylark breeding is likely to have increased in the past year, since landownership of the Site has changed and it has since been left unmanaged.

5.1.3 The CIEEM In Practice article by Fox (2022) is a useful tool for calculating skylark territory density but cannot be used alone as it is considered to be a prototype and has not been recognised in any guidance documents. It has several admissions, including a lack of supporting data.

5.1.4 Using a pragmatic approach, with reference to the document, the bespoke compensation strategy of >10ha of natural grassland is appropriate for the site considered suitable to support up to 5.36 skylark territories. The land will be managed specifically for ground nesting birds and will be protected from disturbance (i.e. using dogs on leads signage on the current public right of way to reduce current disturbance levels). The proposed neutral grassland and other habitats on site will increase the invertebrate foraging provision for skylark which they rely upon during the breeding season. The prototype tool calculations do not account for increased capacity of foraging for neighbouring skylark territories located on land east and south of the site. It is considered highly likely that the increase in optimal foraging provision on site will potentially increase not only the carrying capacity of offsite habitat but also increase the breeding success rate. Furthermore, it should be noted that though skylark is a red listed species, they are still quite common in the UK, with a recent upward trend in numbers according to BTO.

5.1.5 The addition of proposed scrub, woodland, grassland and pond habitat creates a diverse mosaic of habitat for a range of bird species. This will increase overall foraging and nesting potential for a range of birds using the site and overall will create a net increase in quality habitat for birds.

6 References

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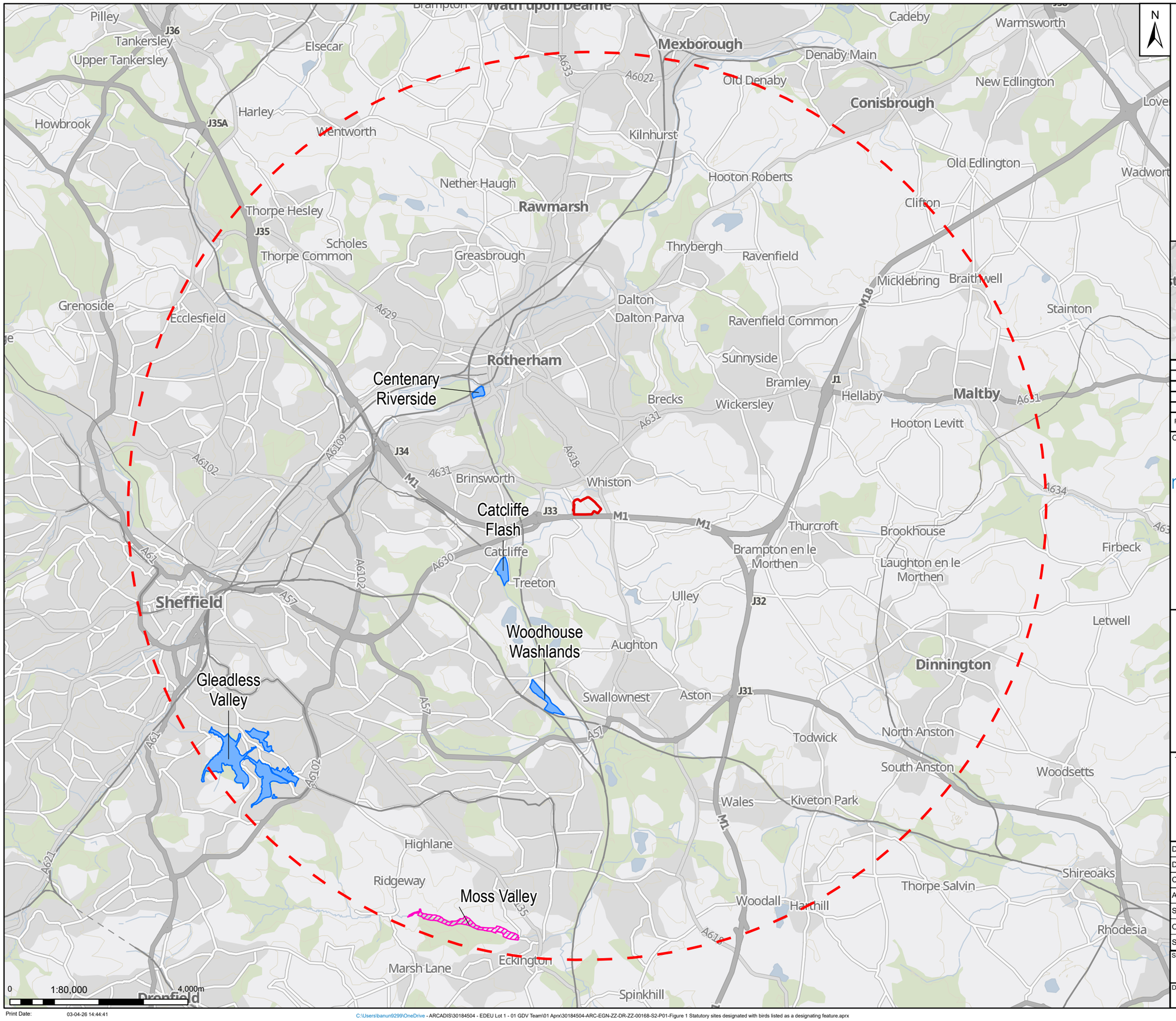
Appendix A Weather Conditions

Date	Sunrise	Start Time	End Time	Weather Conditions (start - finish)
26/03/2026	05:59	05:50	07:10	Rain: 0 Cloud: 1/8 Cloud Height: >500m Visibility: Excellent Wind: Calm
16/04/2026	06:10	06:00	07:15	Rain: 0 Cloud: 2/8 Cloud Height: >500m Visibility: Excellent Wind: Gentle Breeze
07/05/2026	5:18	5:50	8:20	Rain: 0 Cloud: 4/8 Cloud Height: >500m Visibility: Excellent Wind: Light breeze

Appendix B Designated Sites

Figure 1: Designated sites of ornithological interest within 10km of the Site



Rev	Date	Description	Drawn	Check	Approv
01	03/04/26	INITIAL ISSUE	NB	JF	SN

Client:

nationalgrid

PROJECT:
BRINSWORTH TO CHESTERFIELD

Site
Brinsworth

Client
1-3 Strand
London
WC2N 5EH

ARCADIS

Registered office:
80Fen
80 Fenchurch Street
London
EC3M 4BY

Coordinating Office:
Suite 1A
4 Piccadilly Place
Manchester
M1 3BN

www.arcadis.com

Title:

Figure 1
Statutory sites designated with birds listed as a designating feature

Designed	J.F.	Date: 03 APR 26	Signed
Drawn	N.B	Date: 03 APR 26	Signed
Checked	J.F.	Date: 03 APR 26	Signed
Approved	S.N.	Date: 03 APR 26	Signed
Scale:	1:80,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	S2	Project Number:	30184504

Suitability Description:
For Information

Drawing Number: 30184504-ARC-EGN-ZZ-DR-ZZ-00168
Revision: P01

Print Date: 03-04-26 14:44:41

C:\Users\banur9299\OneDrive - ARCADIS\30184504 - EDEU Lot 1 - 01 GDV Team\01 Aprx\30184504-ARC-EGN-ZZ-DR-ZZ-00168-S2-P01-Figure 1 Statutory sites designated with birds listed as a designating feature.aprx

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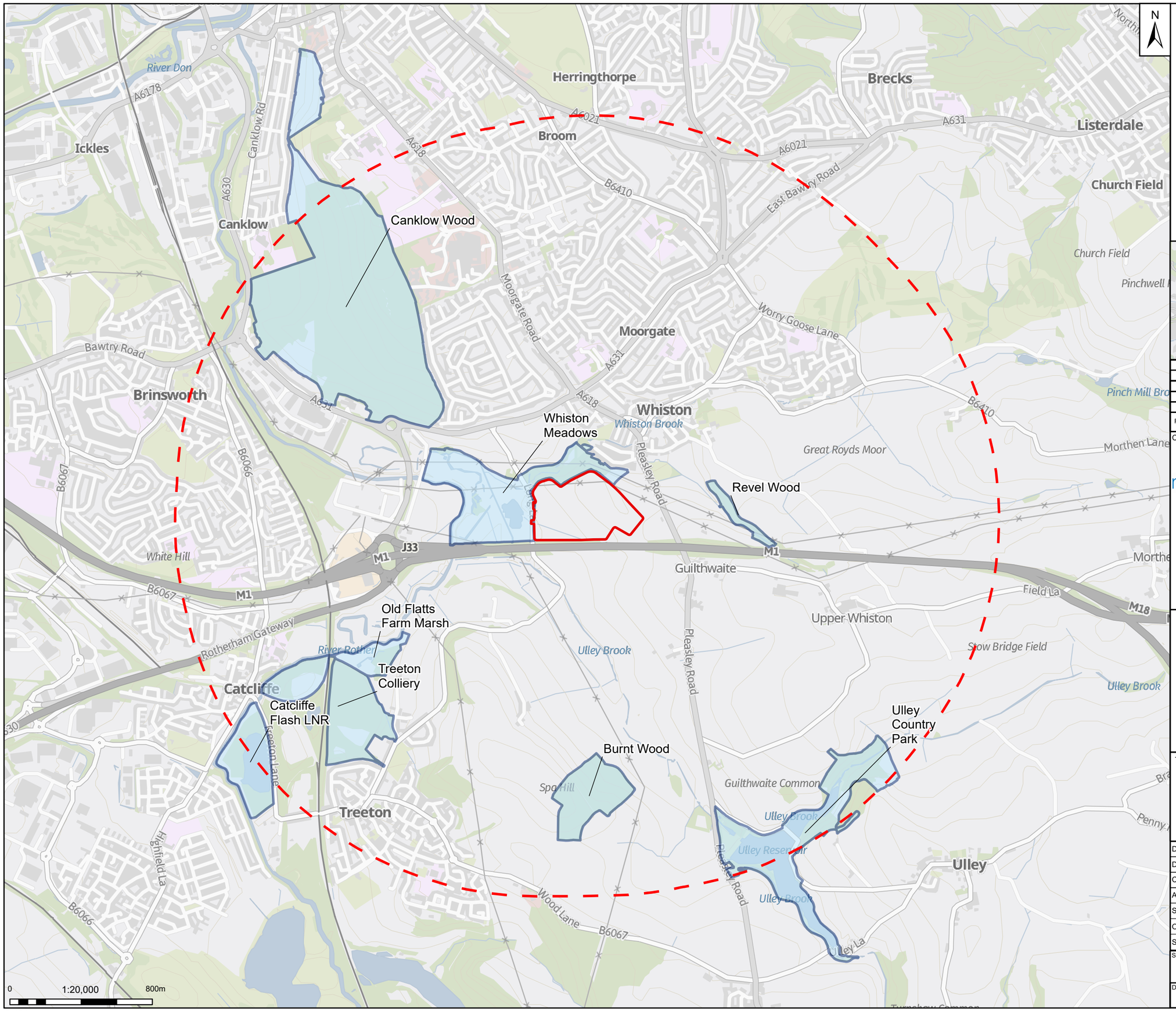
Figure 2: Local Wildlife Sites within 2km of the Site



Legend

- Site Boundary
- 2km buffer
- Local Wildlife Sites

Notes
Contains OS data © Crown Copyright and database right 2026.
Contains data from OS Zoomstack

Rev	Date	Description	Drawn	Check	Approv
01	03/04/26	INITIAL ISSUE	NB	JF	SN

Client:

nationalgrid

PROJECT:
BRINSWORTH TO CHESTERFIELD

Site
Brinsworth

Client
1-3 Strand
London
WC2N 5EH

ARCADIS

Registered office:
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Coordinating Office:
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Title:

Figure 2
Local Wildlife Sites within 2km of the site

Designed	J.F.	Date: 03 APR 26	Signed
Drawn	N.B	Date: 03 APR 26	Signed
Checked	J.F.	Date: 03 APR 26	Signed
Approved	S.N.	Date: 03 APR 26	Signed
Scale:	1:20,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	S2	Project Number:	30184504

Suitability Description:
For Information

Drawing Number: 30184504-ARC-EGN-ZZ-DR-ZZ-00169
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Appendix C Skylark Territory Maps

Figure 3: Skylark Territory Maps

N

Legend

Site Boundary

Breeding Bird Territories

Skylark territories

Possible Skylark territories

Notes

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nationalgrid

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Figure 1
Skylark Breeding Territories

Designed	M.H.	Date 23 APR 26	Signed
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Scale:	1:3,000	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	S2	Project Number:	30184504

Suitability Description:
For Information

Drawing Number: 30184504-ARC-EGN-ZZ-DR-ZZ-00170-S2
Revision: P01

Print Date: 11-05-26 13:53:02

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Appendix K
Flood Risk Assessment

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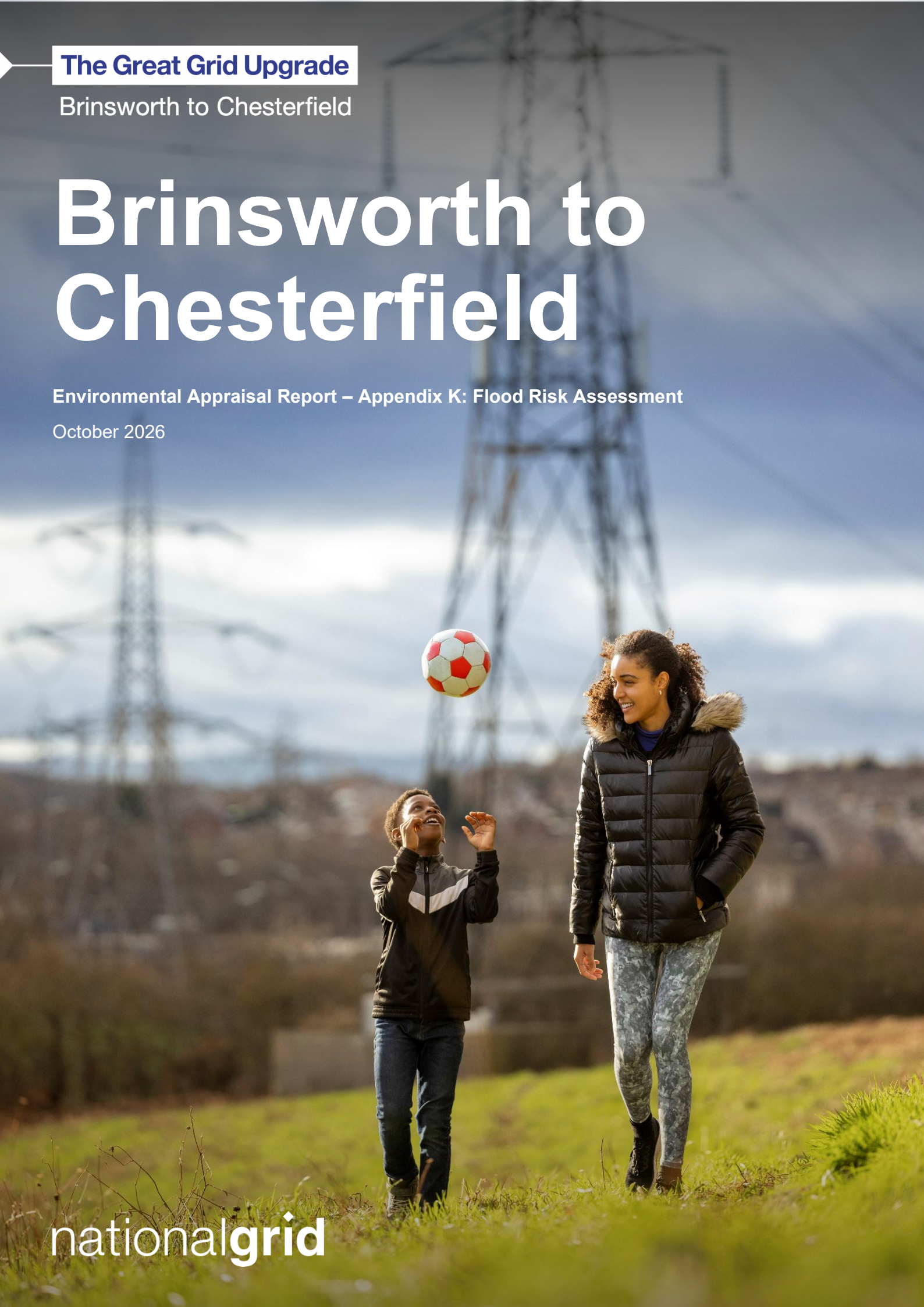
The Great Grid Upgrade

Brinsworth to Chesterfield

Brinsworth to Chesterfield

Environmental Appraisal Report – Appendix K: Flood Risk Assessment

October 2026



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Contents

1.	**Introduction**	**1**
1.1	Introduction	1
1.2	Proposed Development	1
1.3	Aims and Objectives	1
1.4	Terminology	2
1.5	Limitations	2
2.	**Background**	**3**
2.1	Overview	3
2.2	Topography	4
2.3	Catchment Description	4
3.	**Planning Policy Context**	**6**
3.1	NPPF and Flood Risk	6
3.2	The Sequential and Exception Test	6
3.3	Flood Zone Classification	7
3.4	Application of the Sequential Test and Exception Test	8
4.	**Potential Sources of Flooding**	**10**
4.1	Overview	10
4.2	Flood Defences	10
4.3	Historic Flooding	11
4.4	Flooding from Rivers and the Sea	12
	Present Day Flood Risk	13
	Future Flood Risk	14
4.5	Flooding from Surface Water	15
4.6	Flooding from Groundwater	17
4.7	Flooding from Sewers	18
4.8	Flooding from Reservoirs, Canals and other Artificial Sources	18
5.	**Proposed Scheme Flood Risk and Mitigation**	**20**
5.2	Fluvial Flood Risk	20
	Construction Phase	20
	Operational Phase	20
5.3	Surface Water Flood Risk	21
	Construction Phase	21
	Operational Phase	21

5.4 Groundwater Flood Risk 21
Construction Phase 21
Operational Phase 21
5.5 Satisfaction of the Exception Test 22
6. Conclusions 23
6.1 Flood Risk Summary 23
6.2 Proposed Mitigation 23
6.3 Conclusions 23

Table 3.1 Flood Zones (PPG, Flood Risk and Coastal Change, Table 1) 6
Table 3.2 Flood Risk Vulnerability Classifications (PPG, Flood Risk and Coastal Change, Table 2) 7
Table 4.1 Sources of flooding 10

Figure 2.1 Site Overview 3
Figure 2.2 Topography 4
Figure 2.3 Catchment Overview 5
Figure 3.1 Environment Agency Flood Map for Planning – Flood Zones 2 and 3 8
Figure 4.1 Environment Agency Flood Defences 11
Figure 4.2 Historical Flooding 12
Figure 4.3 Risk of Flooding from Rivers and Sea 14
Figure 4.4 Risk of Flooding from Rivers and Sea – Climate change extents 15
Figure 4.5 Risk of Flooding from Surface Water 16
Figure 4.6 Flood Map for Planning Surface Water Extents including climate change 17
Figure 4.7 Risk of Flooding from Reservoirs 19

1. Introduction

1.1 Introduction

1.1.1 Arcadis Consulting (UK) Limited was commissioned by National Grid ('the client') to undertake a Flood Risk Assessment (FRA) for the proposed overhead line (OHL) tie in works associated with the proposed new 400kV substation at Long Lane, South Yorkshire, S60 5LW. The new substation does not form part of the assessment scope. A separate FRA has been produced for the substation (Ref: B2441B05-JAC-HM-XX-RP-C-02316, dated: 9th May 2025). The OHL works are herein referred to as 'the Scheme'.

1.1.2 This FRA has been prepared to support an application for Section 37 consent under the Electricity Act 1989 (as amended). This FRA assesses the risk of flooding from all sources in accordance with the National Planning Policy Framework (NPPF) and the associated Flood Risk and Coastal Change Planning Practice Guidance (PPG). The scope of the assessment is to provide an overview of risk from all sources of flooding.

1.1.3 In addition to assessing flood risk associated with the permanent development, this FRA also outlines the flood risk considerations and mitigation measures required during the construction phase, as detailed in Section 5.

1.2 Proposed Development

1.2.1 The Scheme is composed of a number of elements, set out below, to enable the connection of a new 400kV substation at Long Lane to the wider network. This will comprise the installation of short stretches of overhead lines between the new 400kV Long Lane substation and existing OHL network, as well as the removal of some existing stretches of OHL, together with the temporary works (such as temporary masts) required to make the proposed permanent changes.

1.3 Aims and Objectives

1.3.1 The aim of this FRA is to address the requirements of national and local planning policy with respect to flood risk and demonstrate that the Scheme is compliant with relevant planning policy and flood risk requirements, so that Section 37 consent can be granted.

1.3.2 FRAs should be prepared to a level of detail proportionate to both the risk of flooding and the scale of the proposed development. Specific objectives of this FRA are to:

- Assess the proposed development against the requirements of the NPPF;
- Demonstrate that the proposed development does not increase the risk of flooding to third party land;
- Discuss the risk of flooding to the proposed development from all sources, demonstrating how the development will remain safe from flooding over its lifetime; and
- Demonstrate how flood risk will be managed during construction phase.

1.4 Terminology

1.4.1 Flood risk is a product of both the likelihood and consequences of flooding. Throughout this document, flood events are defined according to their likelihood of occurrence. Floods are described according to an ‘annual chance’, meaning the chance of a particular flood occurring in any one year. This is directly linked to the probability of a flood. For example, a flood with an annual chance of 1 in 100 (a 1 in 100 chance of occurring in any one year), has an annual probability of 1%. This may also be referred to as a 1% annual probability (AP).

1.5 Limitations

1.5.1 This report has been compiled from a number of sources which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time of writing. Additional information may become available in the future which may have a bearing on the conclusions of this report and for which Arcadis cannot be held responsible.

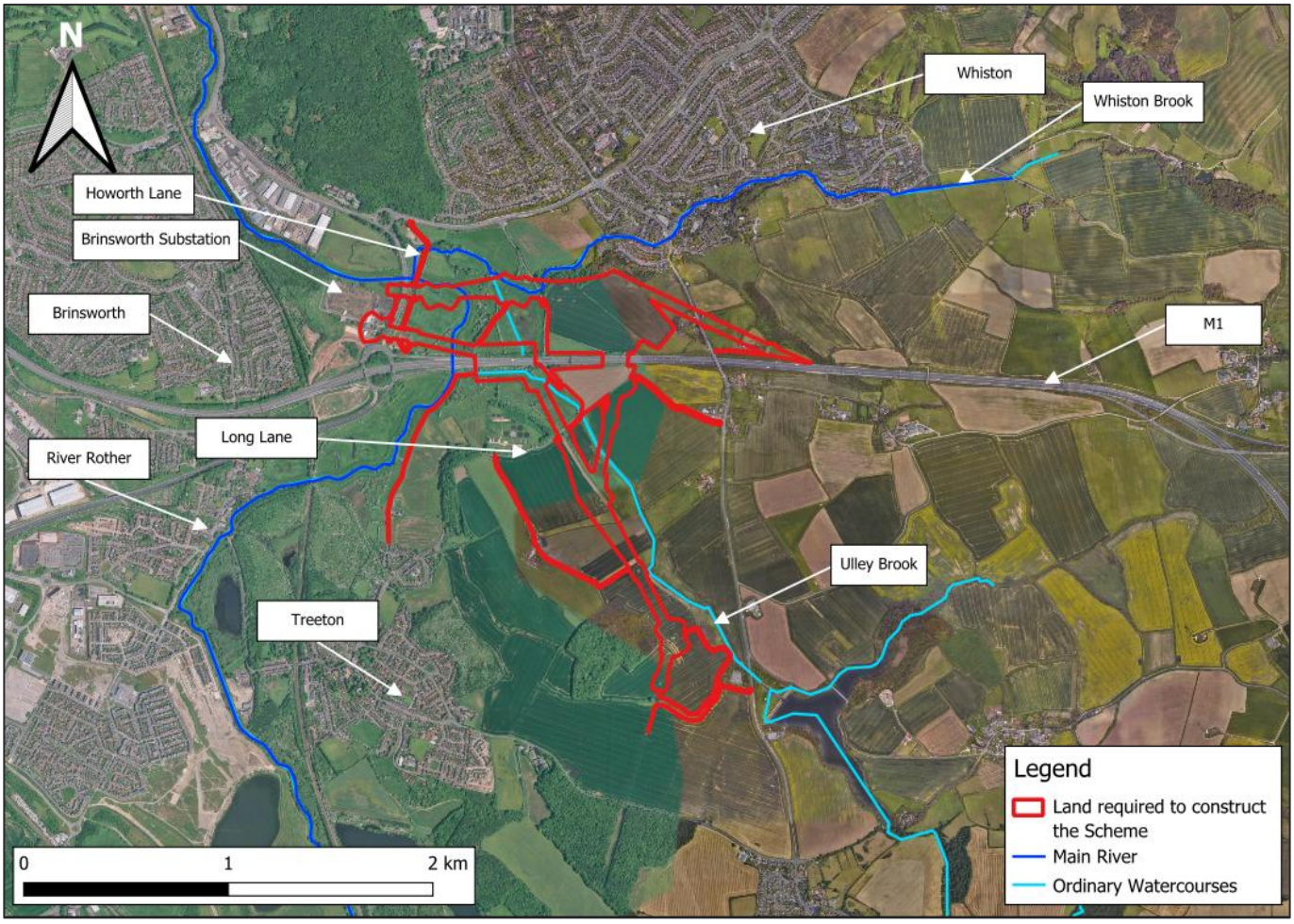
2. Background

2.1 Overview

2.1.1 The Scheme is located east of Brinsworth, south of Rotherham in South Yorkshire, at approximate national grid reference SK 43340 89281. The red line boundary in Figure 2.1 (herein referred to as 'the Site') shows the extent of the land required to construct the Scheme.

2.1.2 Currently, the Site is predominantly comprised of agricultural fields. The Site is bound to the north by woodland and Whiston Brook, with agricultural fields and residential development beyond. The Site extends to the existing Brinsworth Substation to the west. The Scheme crosses a section of the M1 and extends south. The Site is predominantly surrounded by agricultural land, the M1, Brinsworth to the west and Whiston to the north east.

Figure 2.1 Site Overview



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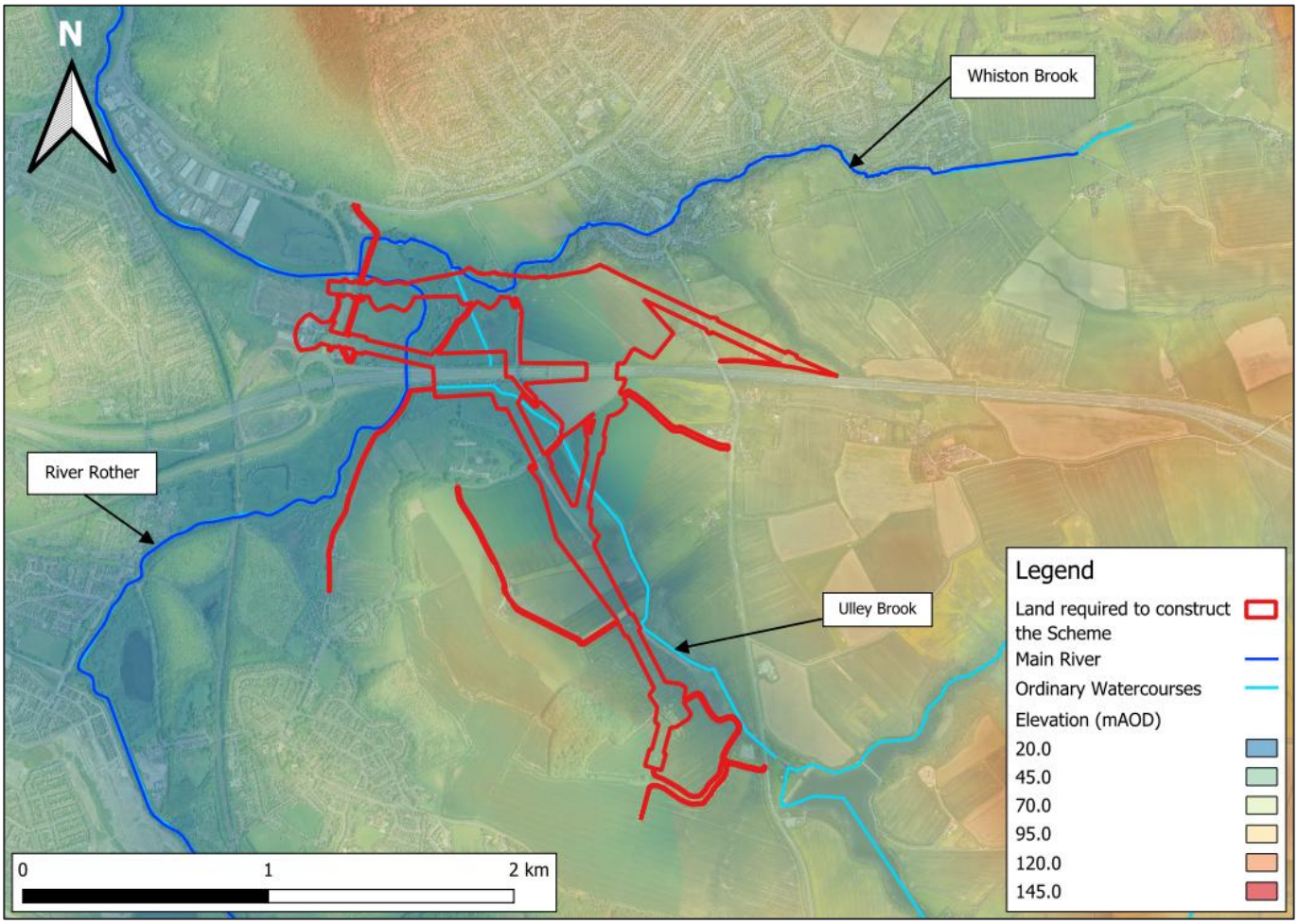
2.2 Topography

2.2.1 Elevations across the Site range from 24.8m Above Ordnance Datum (AOD) in the northwest to 74.7mAOD in the northeast. Elevations across the Site typically slope from areas of higher ground in the east and south towards the river valleys in the north and west, as shown in Figure 2.2.

2.2.2 Across the wider area, ground levels slope downwards from the east to west towards the River Rother river valley.

Figure 2.2 Topography



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2.3 Catchment Description

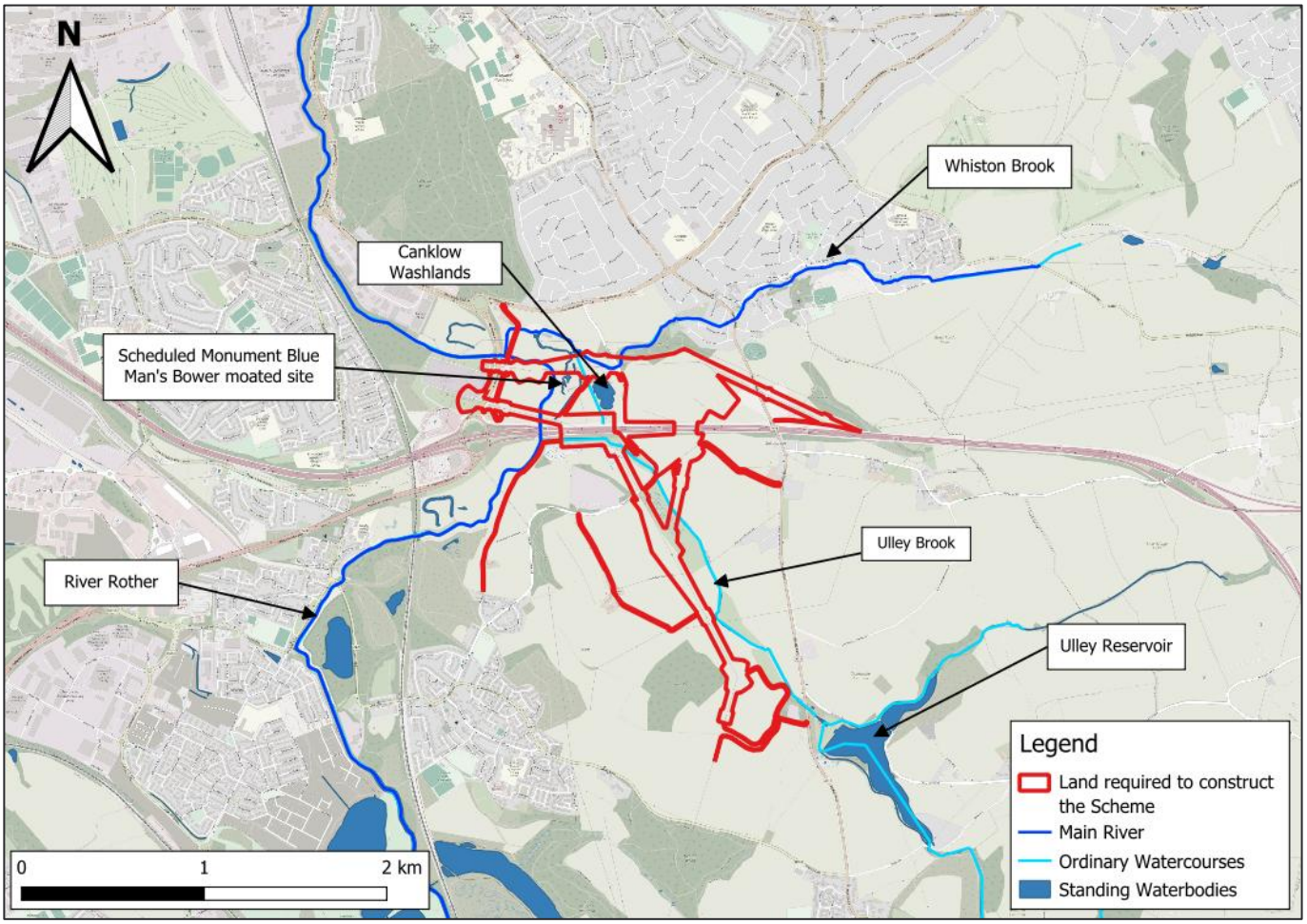
2.3.1 The Environment Agency Catchment Data Explorer shows that the Scheme is located in the Don and Rother Management Catchment, within the wider Humber River Basin District.

2.3.2 The River Rother, an Environment Agency designated main river, flows in a general south to north direction through the western part of the Site, as shown in Figure 2.3. Whiston Brook, an Environment Agency designated main river, flows in a general westerly direction from the area of higher ground to the east of the Site to its confluence with the River Rother on the western edge of the Site boundary. Nearby

ordinary watercourses include Ulley Brook which flows parallel to the Site in a general south to north direction to its confluence with the River Rother in the west of the Site.

2.3.3 Ulley Reservoir is located to the southeast of the Site, approximately 150m from the site boundary, at an elevation of approximately 54mAOD. Further nearby waterbodies include a pond and wetland associated with the Canklow Washlands, which form part of an Environment Agency flood storage area, and several smaller waterbodies associated with the Scheduled Monument Blue Man's Bower moated site both in the northwest of the Site.

Figure 2.3 Catchment Overview



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2.3.4 The British Geological Society (BGS) Geology Viewer shows that Site is underlain by two types of sedimentary bedrock, both fluvial in origin. These are Pennine Middle Coal Measures Formation Mudstone and Mexborough Rock Sandstone. Across the majority of the Site there are no superficial deposits present. However, along the riparian corridors of the River Rother and Ulley Brook, there are Alluvium Sand Silt and Gravel deposits present.

2.3.5 Soilscapes mapping indicates that there are three soil types underlying the Site. The northwest part of the Site, where the River Rother, Ulley Brook and Whiston Brook floodplains meet, the Site is underlain by loamy and clayey floodplain soils with naturally high groundwater. In the far south and east of the Site, the soil is classified as freely draining slightly acid loamy soils. The central part of the Site is underlain by slowly permeable seasonally wet acid loamy and clayey soils.

3. Planning Policy Context

3.1 NPPF and Flood Risk

3.1.1 The NPPF was first published in 2012 and most recently republished in 2024 (with amendments made in 2025). Along with its accompanying PPG (flood risk and coastal change), updated in 2025, the NPPF sets out the government's planning policies for England and how these are expected to be applied. The principal aim of the NPPF is to achieve sustainable development. This includes ensuring that flood risk is taken into account at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest. Where development is necessary in areas of flooding, the NPPF aims to ensure that it is safe, without increasing flood risk elsewhere. Suitable mitigation and adaption measures are also advised in the planning process to address the likely future impacts of climate change.

3.1.2 Early adoption of, and adherence to, the principles set out in the NPPF and its PPG, with respect to flood risk, should ensure that detailed designs and plans for developments take due account of flood risk and the need for appropriate mitigation, if required.

3.2 The Sequential and Exception Test

3.2.1 The NPPF identifies four Flood Zone classifications, detailed in Table 3.1 below.

Table 3.1 Flood Zones (PPG, Flood Risk and Coastal Change, Table 1)

Flood Zone	Definition
Zone 1 - Low Probability	Land having a less than 0.1% AP of river or sea flooding.
Zone 2 - Medium Probability	Land having between a 1% and 0.1% AP of river flooding; or land having between a 0.5% and 0.1% AP of sea flooding.
Zone 3a - High Probability	Land having a 1% or greater AP of river flooding; or Land having a 0.5% or greater AP of sea flooding.
Zone 3b - The Functional Floodplain	Land where water has to flow or be stored in times of flood, identified by local authorities in Strategic Flood Risk Assessments. Identification of functional floodplain should take account of local circumstances and not be solely defined on rigid probability parameters. Functional floodplain normally comprises: Land having >3.3% AP of flooding (with any existing flood risk management infrastructure operating effectively); or Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% AP of flooding).

3.2.2 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The PPG provides further guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 3.2.

Table 3.2 Flood Risk Vulnerability Classifications (PPG, Flood Risk and Coastal Change, Table 2)

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1 Low Probability	✓	✓	✓	✓	✓
2 Medium Probability	✓	Exception Test required	✓	✓	✓
3a High Probability	Exception Test required	×	Exception Test required	✓	✓
3b The Functional Floodplain	Exception Test required	×	×	×	✓

Key: ✓ *Development is appropriate* × *Development should not be permitted*

3.2.3 When a development site falls partly within multiple Flood Zones, the highest risk Flood Zone should be used when assessing development vulnerability.

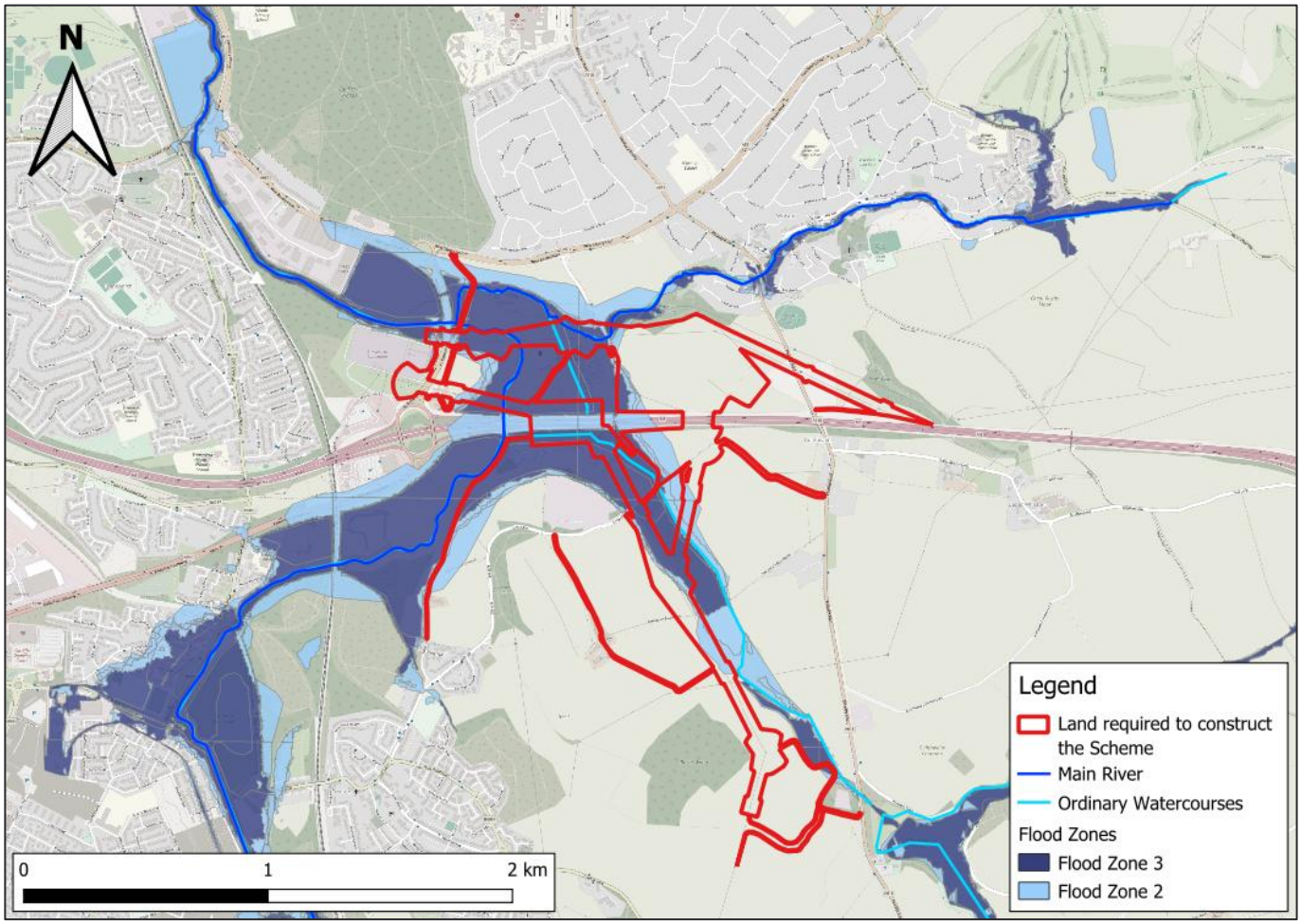
3.2.4 If it is not possible for development to be located in zones with a lower risk of flooding, the Exception Test may have to be applied. For the Exception Test to be passed, it should be demonstrated that:

- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

3.3 Flood Zone Classification

3.3.1 The Environment Agency Flood Map for Planning (Flood Zones) (Figure 3.1) shows the central, north and western parts of the Site to be located within Flood Zone 2 and 3, associated with the River Rother, Ulley Brook and Whiston Brook. The eastern and southern parts of the Site are in Flood Zone 1.

Figure 3.1 Environment Agency Flood Map for Planning – Flood Zones 2 and 3



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3.4 Application of the Sequential Test and Exception Test

3.4.1 The Scheme is classified as 'essential infrastructure' in accordance with the NPPF, falling within the category of 'infrastructure for electricity supply'. As defined in Table 3.2, essential infrastructure is deemed appropriate within Flood Zones 1, 2 and 3, subject to satisfaction of the NPPF Exception Test in Flood Zones 3a and 3b.

3.4.2 With regard to the Sequential Test, the Scheme is necessarily associated with the existing Long Lane Substation and proposed 400kV substation, and therefore there are no reasonably available alternative sites at lower risk of flooding in which to locate the Scheme.

3.4.3 For the Exception Test to be passed the following criteria are to be satisfied:

a) It must be demonstrated that the development provides wider sustainability benefits to the community that will outweigh flood risk; and,

b) A site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall.

3.4.4 Part (a) is justified on the basis that the Scheme forms part of the Great Grid Upgrade, which will enable the electricity grid to carry more clean energy from renewable sources to communities, homes and businesses in every part of England and Wales, helping the UK to reach net zero.

3.4.5 Section 5 of this FRA demonstrate that the proposed development satisfies Part (b) of the criteria.

4. Potential Sources of Flooding

4.1 Overview

4.1.1 In line with best practice, this section considers the flood risk from range of possible sources listed in Table 4.1 and identifies where further appraisal and/or mitigation measures are required.

Table 4.1 Sources of flooding

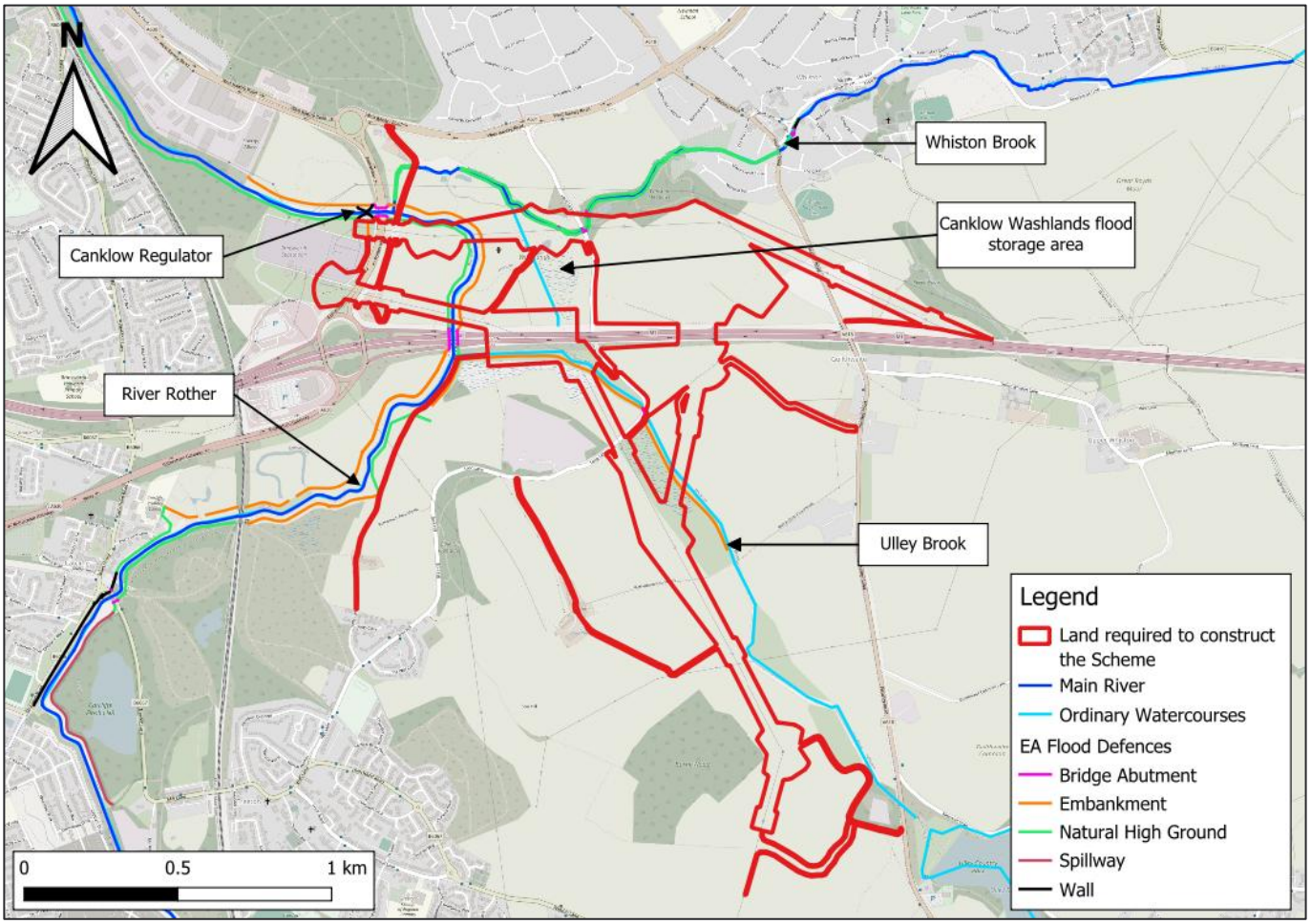
Source of Flooding	Description
Flooding from rivers (fluvial)	Floodwater originating from a nearby watercourse when the amount of water exceeds the channel capacity of that watercourse
Flooding from the sea (tidal)	Flooding originating from the sea or a connected waterbody when seawater overflows onto land through extreme tidal conditions, storm surge or breach
Flooding from surface water (pluvial)	Flooding caused by intense rainfall exceeding the available infiltration and/or drainage capacity of the ground
Flooding from groundwater	Flooding caused when groundwater levels rise above ground level following prolonged rainfall
Flooding from sewers	Flooding originating from surface water, foul or combined drainage systems, typically caused by limited capacity or blockages
Flooding from reservoirs, canals, and other artificial sources	Failure of infrastructure that retains or transmits water or controls its flow

4.2 Flood Defences

4.2.1 The Environment Agency Spatial Flood Defences dataset shows there are defences along all three watercourses near the Site, as shown in Figure 4.1. The River Rother benefits from defences in the form of embankments and natural high ground, both with a design Standard of Protection (SoP) of 25 years. There are further embankments along the left bank of Ulley Brook with a design SoP of 25 years. Whiston Brook is also defended by natural high ground with a design SoP of 25 years. Where the River Rother flows underneath the M1 and Rotherway and where Whiston Brook flows underneath Long Lane, there are bridge abutments in place.

4.2.2 Canklow washlands are a flood storage area managed by the Environment Agency via a regulator located to the west of the site. The lowering of Canklow regulator limits the flow of the River Rother, allowing the flood peak to be delayed until the after the River Don flood peak has passed through Rotherham. Closing the regulator allows for the filling of seven washland storage areas. The site is located across several of these washland storage areas.

Figure 4.1 Environment Agency Flood Defences



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4.3 Historic Flooding

4.3.1 The 2008 Rotherham Metropolitan Borough Council Strategic Flood Risk Assessment (SFRA) outlines that the borough has been subject to significant flooding events in 1947, 1958, 2000 and 2007. Sources of flooding are outlined as fluvial from the River Rother and River Don, as well as more localised flooding from surcharging sewers, blocked culverts and gullies, and surface water runoff.

4.3.2 The Environment Agency Historic Flood Map and Recorded Flood Outlines datasets show areas of land that have previously been subject to flooding, as shown on Figure 4.2. These datasets include flooding events at the Site for the following dates:

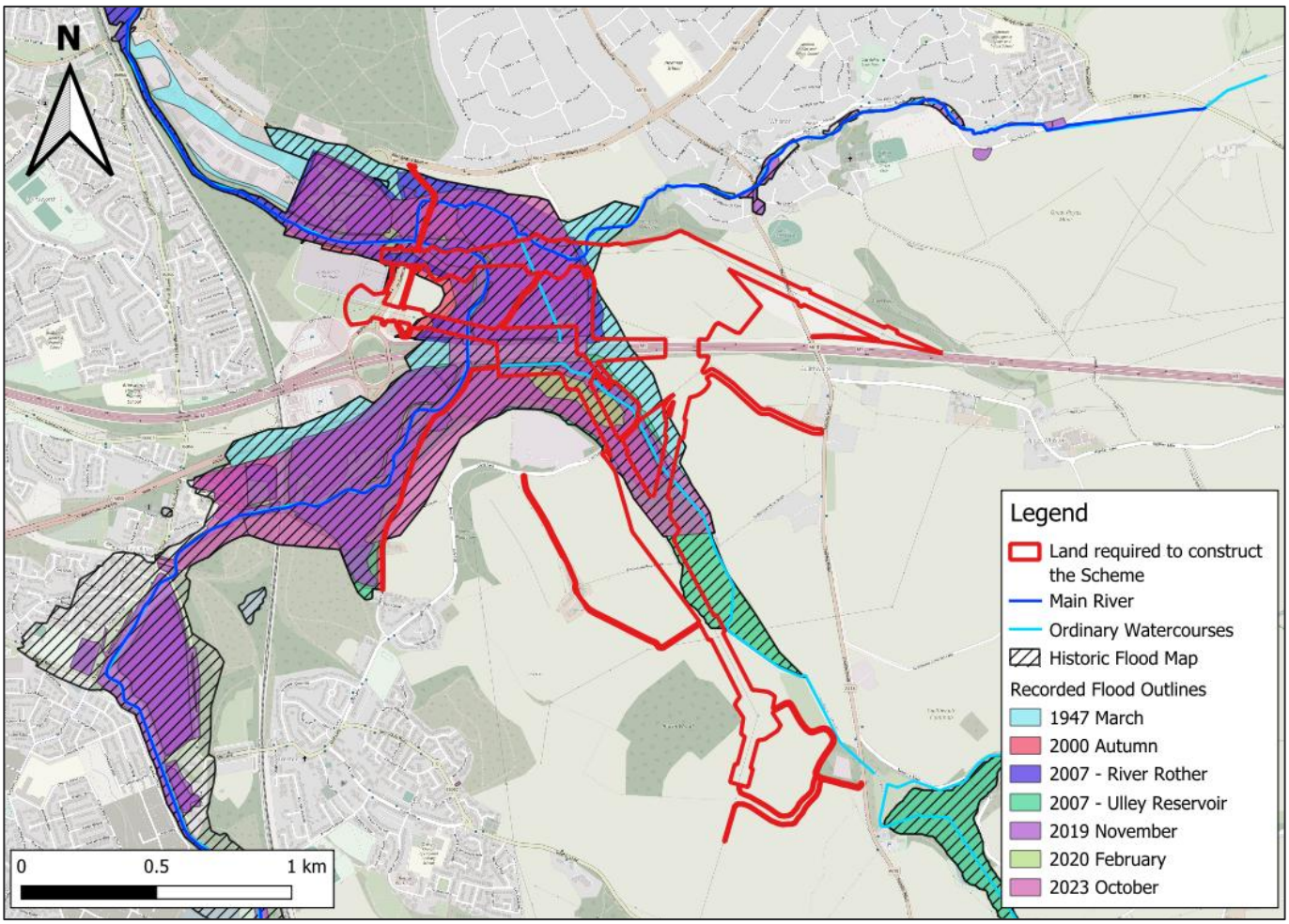
- March 1947: west and north of the Site, from the River Rother, Ulley Brook and Whiston Brook;
- November 2019: centre, north and west of the Site from the River Rother;
- Autumn 2000: west and north of the Site from the River Rother;
- 2007: northwest of the Site (north of M1 only) from the River Rother;
- 2007: centre and south of the Site, along Ulley Brook river valley;

- February 2020: areas across the centre, north and west of the Site, attributed to Storm Dennis; and
- October 2023: centre, north and west of the Site, attributed to Storm Babet.

4.3.3 It is noted that the central and norther parts of the site for part of the strategic flood storage area at Canklow Washlands, therefore, these areas of the site are designed to flood and it is anticipated that in several of the historic events, that the flooded area across the site were intentionally flooded by lowering the Canklow reservoir.

4.3.4 A request for historical flooding records was sent to the Environment Agency. No response has been received to date.

Figure 4.2 Historical Flooding



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4.4 Flooding from Rivers and the Sea

4.4.1 Two available sources of online mapping exist that consider the risk of flooding from these sources. The Environment Agency Risk of Flooding from Rivers and Sea Map (RoFRS) is based on the National Flood Risk Assessment (NaFRA2), which takes account of modelled in-channel flood levels for watercourses and asset inspection information relating to raised flood defences, where they exist. NaFRA2 maps consider the risk of overtopping or failure of raised defences or natural ground to provide a probabilistic assessment of the risk of flooding. This contrasts with the

previously described Flood Map for Planning (Flood Zones), which is deterministic, and shows whether sites are 'in' or 'out' of given 'Flood Zones'. It ignores the presence of flood defences but highlights where defences exist. Given the presence of defences along the River Rother, Ulley Brook and Whiston Brook, the RoFRS mapping has been used in the assessment of fluvial flood risk to the Scheme.

Present Day Flood Risk

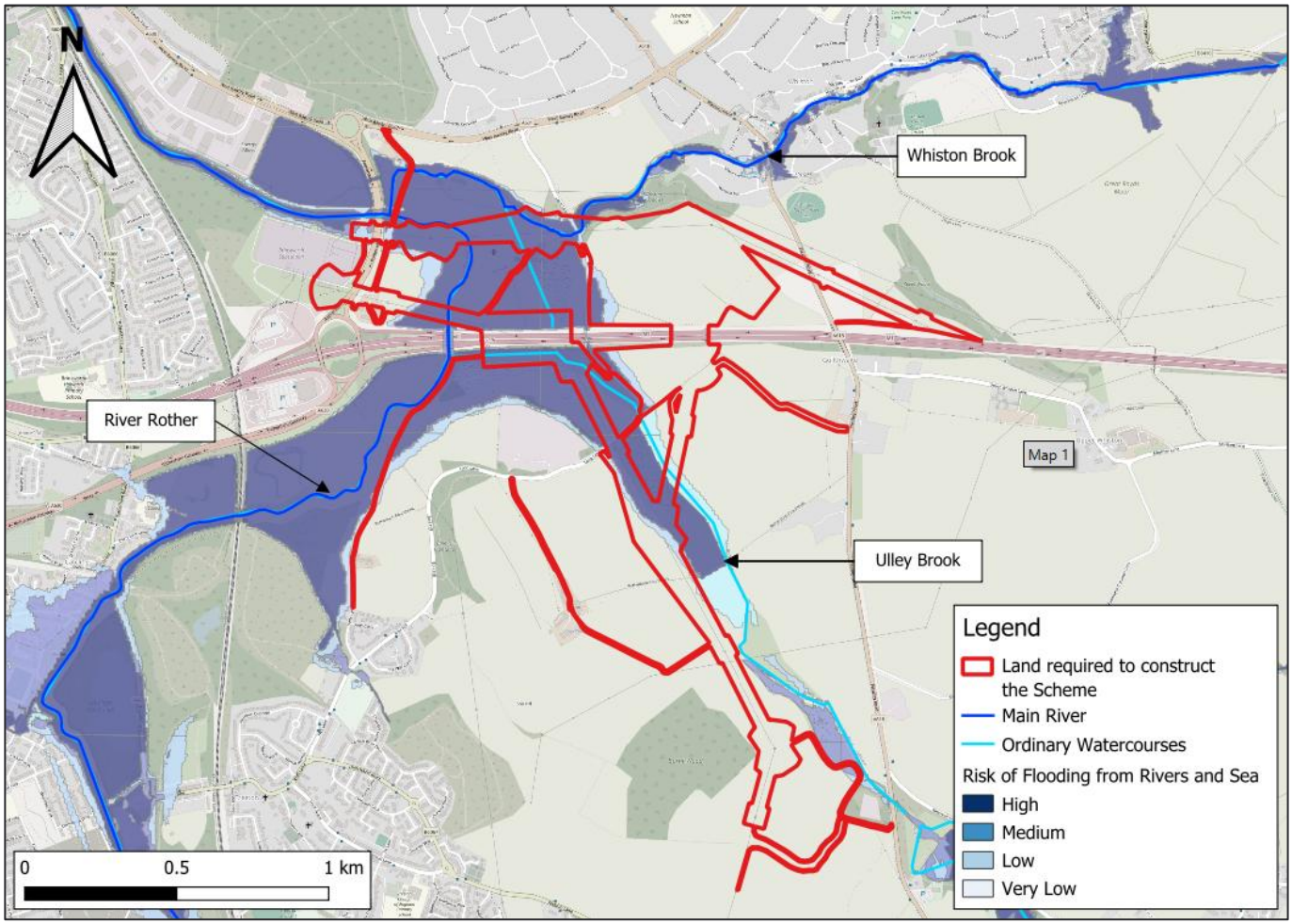
4.4.2 The Environment Agency RoFRS defines the following scenarios for flood risk:

- High - greater than or equal to 3.3% chance in any given year (1 in 30)
- Medium - less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low - less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low - less than 0.1% chance in any given year (1 in 1,000)

4.4.2 The RoFRS mapping (Figure 4.3) indicates large parts of the Site are at high risk of flooding, particularly the centre, north and west areas of the Site where the Site interacts with the River Rother, Whiston Brook and Ulley Brook. The southern and eastern parts of the Site are shown to be not at risk of flooding from rivers and the sea. It is noted that large parts of the area shown to be at high risk of flooding forms part of the strategic flood storage area at Canklow Washlands and is therefore designed to be flooded to alleviate flooding downstream.

4.4.3 The Scheme is located approximately 105km from the coast so is not considered to be at risk of coastal flooding. There are no tidally influenced waterbodies nearby.

Figure 4.3 Risk of Flooding from Rivers and Sea



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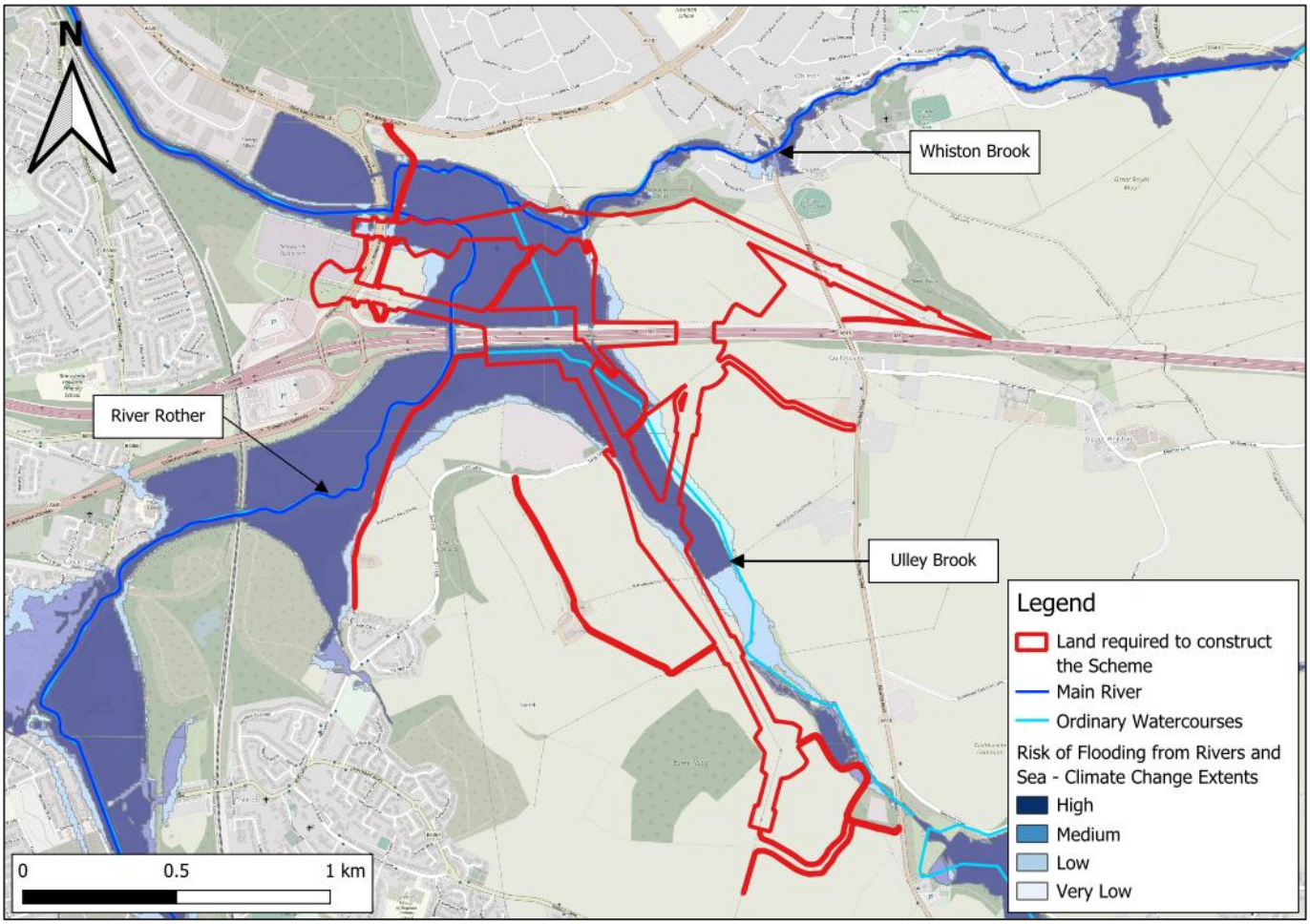
Future Flood Risk

4.4.4 The NaFRA2 data set includes climate change scenarios to indicate the predicted future flood risk. The climate change allowances are based on the latest UK Climate Projections (UKCP18) from the Met Office, using the Representative Concentration Pathway (RCP) 8.5. Near-term epochs and central/higher central allowances are being used initially, to support short and medium-term decisions informed by the highest flood likelihood projections:

- Fluvial: central allowance - 2040-2069 ("2050s" epoch)
- Coastal: higher central allowance - 2036-2065

4.4.5 This mapping has been reviewed and is presented in Figure 4-4. This shows there is no predicted change to the extents of fluvial flooding at the Site in the future as a result of climate change.

Figure 4.4 Risk of Flooding from Rivers and Sea – Climate change extents



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4.5 Flooding from Surface Water

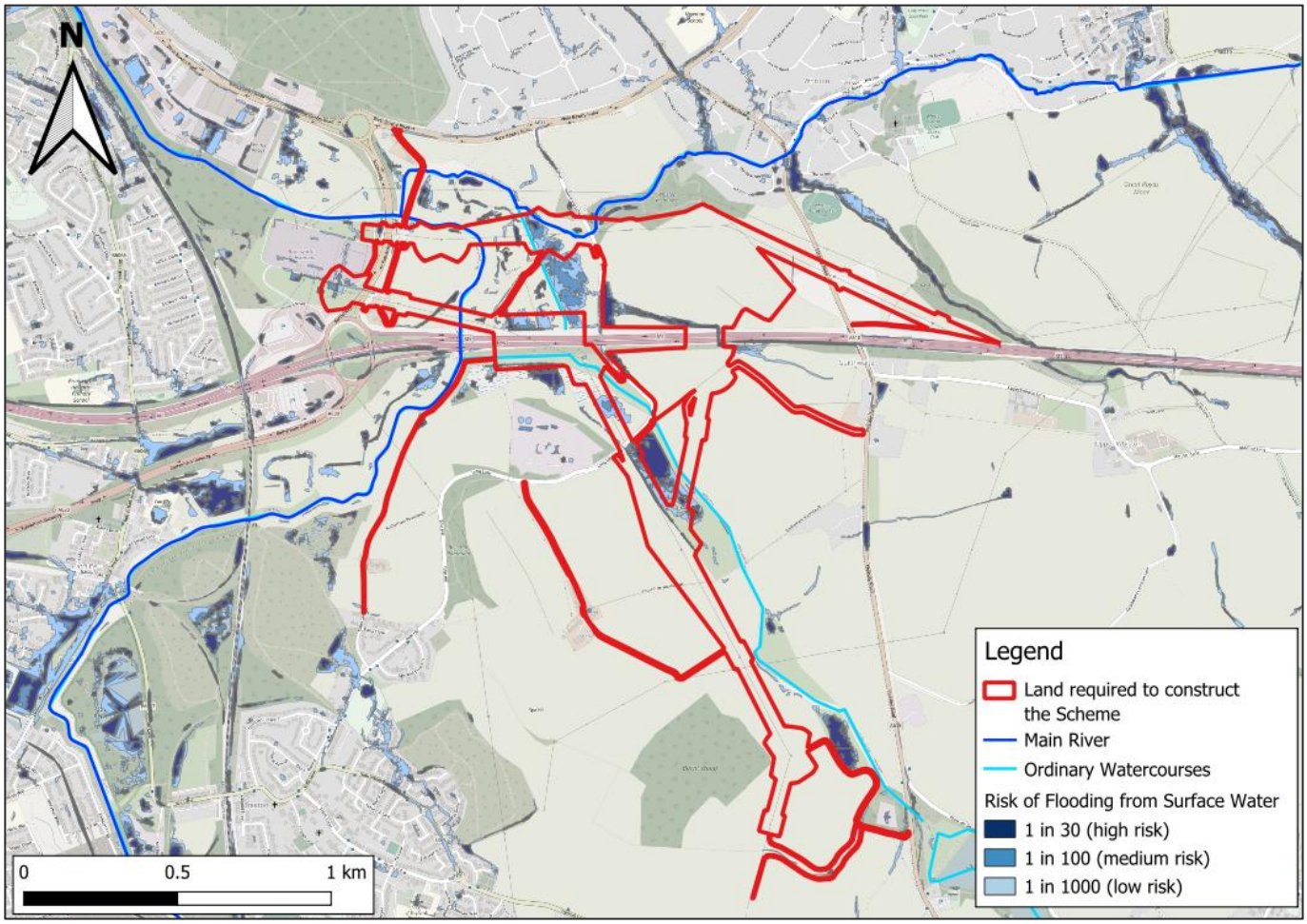
4.5.1 The Environment Agency Flood Map for Planning Surface Water Spatial Planning Extents Present Day dataset has been used to inform this assessment of surface water flood risk to the Site. The mapping defines the following scenarios:

- High risk - 3.3 per cent (1 in 30) annual exceedance probability
- Medium risk - 1 per cent (1 in 100) annual exceedance probability
- Low risk - 0.1 per cent (1 in 1000) annual exceedance probability

4.5.2 As shown in Figure 4.5, most of the Site is at a very low risk of surface water flooding. There are areas of the Site which are at 'medium' and 'high' risk of flooding, particularly in the central and northern parts of the Site. These areas are associated with localised topographical depressions, notably in the Canklow Washlands and along the Ulley Brook river valley.

4.5.3 Predicted surface water flood depths across the Site are typically less than 0.15m in the 'high' risk event. There are isolated locations across the Site, particularly within the Canklow Washlands, where surface water depths in the 'high' risk event reach between 0.15m and 0.3m. Predicted surface water flood depths in the 'medium' risk event are similar, with depths typically less than 0.15m, but reaching between 0.15m and 0.3m in isolated locations across the Site.

Figure 4.5 Risk of Flooding from Surface Water



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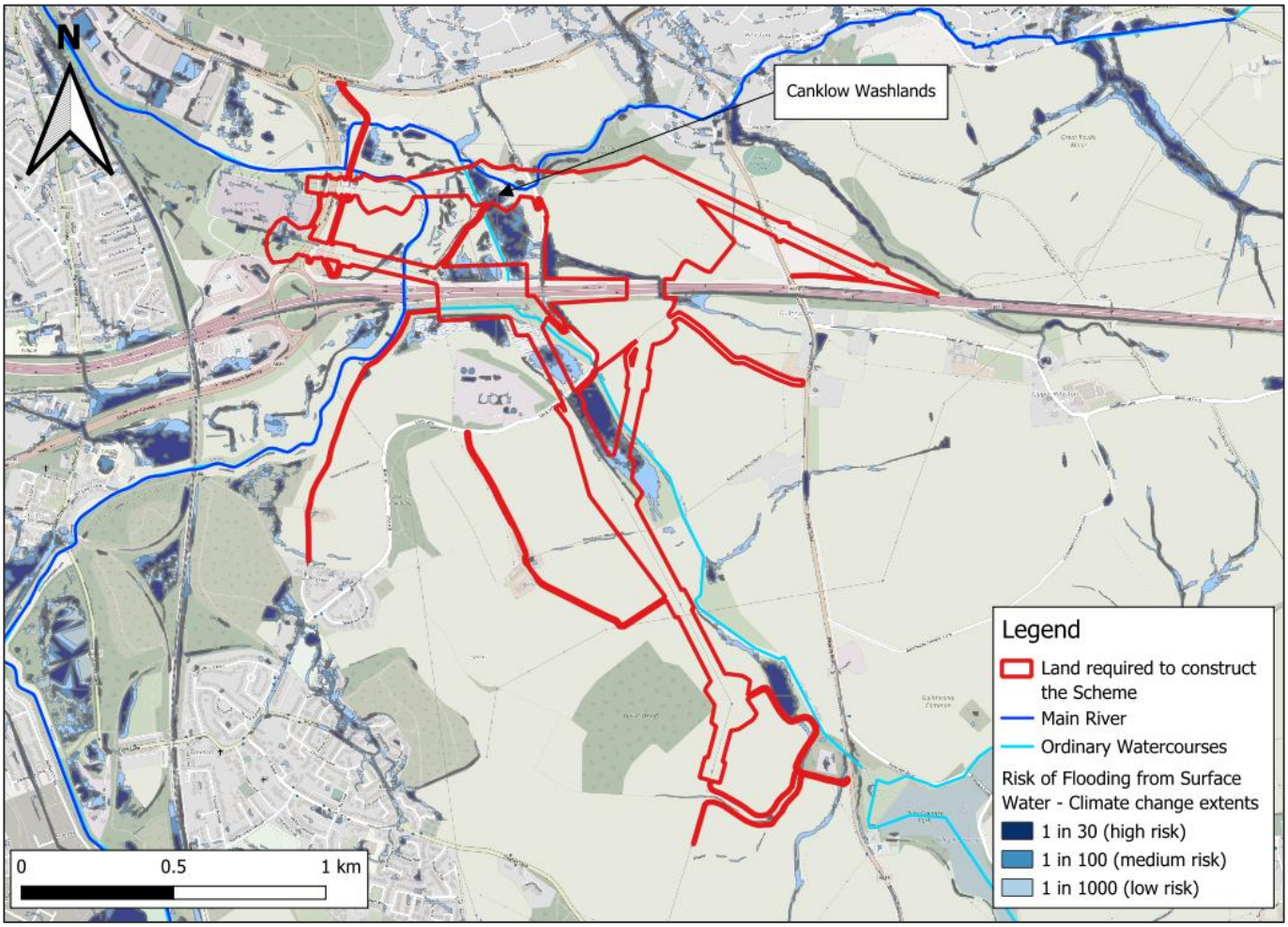
4.5.4 The Environment Agency Flood Map for Planning surface water spatial planning extents climate change show how the risk of surface water flooding is expected to increase in the future due climate change, based on the upper end scenario for the 2070s epoch. This mapping is shown in Figure 4-6. The mapping indicates a slight increase in surface water flood risk due to climate change across the Site, in particular within the Canklow Washlands.

Figure 4.6 Flood Map for Planning Surface Water Extents including climate change



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4.6 Flooding from Groundwater

4.6.1 Groundwater flooding occurs when groundwater rises to the ground surface. This may happen during winter and/or after prolonged or heavy rainstorms. There are generally two forms of groundwater flooding (i) 'clearwater flooding' associated with the water table rising to the surface in areas of permeable bedrock geology such as chalk; and (ii) 'river-groundwater interaction' where river levels interact with permeable superficial deposits within river valleys, flooding areas far from the river without necessarily overtopping raised riverbanks.

4.6.2 As discussed in Section 2.3, the Site is underlain by sedimentary bedrock of the Pennine Middle Coal Measures Formation Mudstone and Mexborough Rock Sandstone. Magic Map classifies these as a Principal aquifer, defined as supporting significant quantities of drinking water and water for business needs, as well as supporting rivers, lakes and wetlands. Where superficial deposits overlie the bedrock, they are also classified as supporting a principal aquifer. Given the presence of principal aquifers in the bedrock and superficial deposits underlying the Site, there is a risk of clearwater flooding.

4.6.3 Parts of the Scheme are located on flat, low-lying land immediately adjacent to the River Rother, Ulley Brook and Whiston Brook. The Site is underlain by loamy and clayey floodplain soils with high groundwater, on top of permeable superficial

deposits. Therefore, there is risk of groundwater flooding of the low lying parts of Site from ‘river-groundwater’ interaction.

4.6.4 The Rotherham Metropolitan Borough Council SFRA (2008) indicates groundwater flood risk is variable across the borough however there have been no reported incidents of groundwater flooding within the borough.

4.7 Flooding from Sewers

4.7.1 Flooding from sewers can result from lack of sewer capacity, blockages within the sewer network or failure of infrastructure such as pumps. Any area that benefits from sewerage infrastructure has a potential risk of flooding, but the likelihood and consequences are increased by topographic constraints such as low spots or flow paths that could influence the behaviour of floodwater originating from sewers.

4.7.2 The Rotherham Metropolitan Borough Council SFRA (2008) does not provide records of sewer flooding history across the borough.

4.7.3 In the absence of detailed sewer flooding records, the Environment Agency Risk of Flooding from Surface Water Map can be used to make a reasonable assumption of the risk of flooding from sewers. The Scheme is located in a predominantly rural area. Were sewer flooding to occur in the nearby villages of Ulley and Aughton, any sewer flooding would likely follow the Ulley Brook river valley, bypassing the majority of the Site.

4.8 Flooding from Reservoirs, Canals and other Artificial Sources

4.8.1 The Environment Agency Risk of Flooding from Reservoirs Map indicates the potential flood extent if large, raised reservoirs were to fail and release the water they hold.

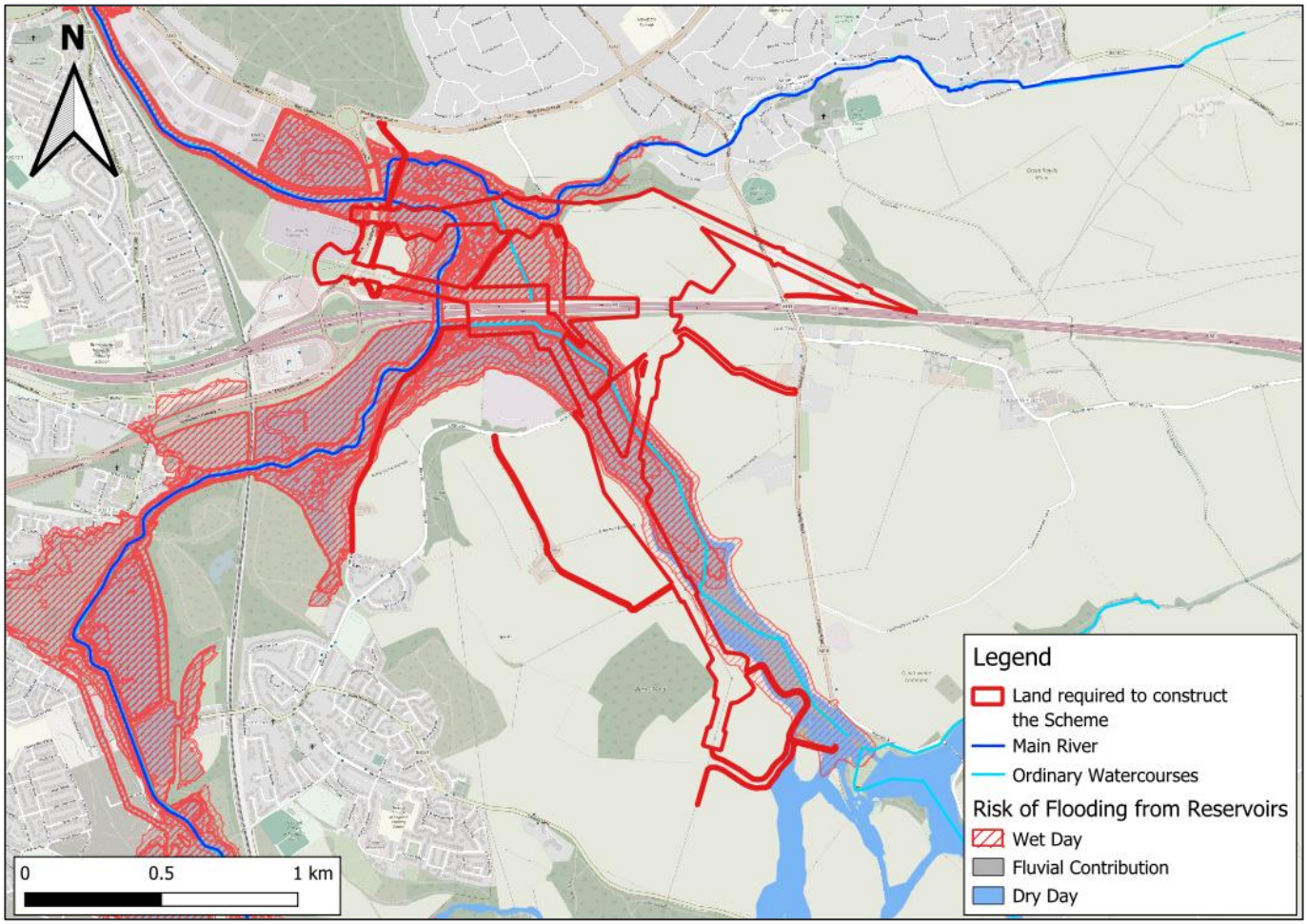
4.8.2 Figure 4.7 below shows the ‘Dry Day’ event, where rivers are at normal levels, the ‘Wet Day’, which indicates the extents if a river was already experiencing an extreme out of bank flooding event, and the ‘Fluvial Contribution’, which shows the extent of river flooding added to the reservoir model to determine the impacts of failure on a ‘Wet Day’. Figure 4.7 shows that the majority of the Site is at risk of reservoir flooding.

4.8.3 The Environment Agency Flood Risk from Reservoirs map represents an extreme worst-case scenario of dam breach flooding, and in reality, the chances of a reservoir failing in the UK are extremely remote. This is due to the stringent inspection and maintenance requirements imposed by the Reservoirs Act 1975, as amended by the Flood and Water Management Act 2010. This form of flooding is therefore not considered to pose an onerous risk to the Scheme.

4.8.4 As discussed in Section 2.3, there are artificial waterbodies near the Site, including the Scheduled Monument Blue Man’s Bower moated Site. This is located in the northwest of the Site and therefore, should overtopping occur water would flow northwest away from the Site, following the River Rother.

4.8.5 There are no canals at or near the site.

Figure 4.7 Risk of Flooding from Reservoirs



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4.8.6 The Scheme is considered to be at a low risk of flooding from reservoirs. The Scheme is not considered to be at risk of flooding from artificial sources.

5. Proposed Scheme Flood Risk and Mitigation

5.1.1 The Scheme is generally at very low to low risk from flooding from sewers, reservoirs, canals and other artificial sources. The Scheme, during construction and operation, presents a negligible risk of exacerbating flooding from these sources to third parties and therefore no mitigation measures are considered necessary.

5.1.2 Fluvial, surface water, and groundwater flood risks are medium to high across parts of the Scheme. These flood sources have been investigated further in this section to understand the flood risk implications as a result of the proposed development.

5.2 Fluvial Flood Risk

Construction Phase

5.2.1 Parts of the proposed construction works will be undertaken within Flood Zones 2 and 3, associated with a risk of flooding from the nearby River Rother, Ulley Brook and Whiston Brook. The temporary work sites would be managed in accordance with a Construction Environmental Management Plan, that will include protocols and procedures for a flood emergency, linked to receipt of Environment Agency flood warnings.

5.2.2 Certain activities within the Canklow Washlands flood storage area would also be governed by the conditions of an Environment Agency Flood Risk Activity Permit.

5.2.3 Given the nature of the proposed construction works and their very limited above ground level footprint, potential for impacts on flood risk to third party land during construction of the Scheme is negligible.

Operational Phase

5.2.4 The permanent works involve the removal replacement and restringing of existing pylons, as well as construction of new pylons and associated overhead lines. There are seven new pylons proposed. Of these, four are located in Flood Zone 1. One pylon is replacing an existing pylon in Flood Zone 3 therefore there is no change to the existing baseline here. The remaining two pylons are located within Flood Zone 2. One of these new pylons is located entirely in Flood Zone 2, where the pylon it replaces is located only partially in Flood Zone 2. The final new pylon does not replace an existing pylon and is located partially in Flood Zone 2.

5.2.5 The existing baseline for permanent infrastructure will remain largely unchanged. The additional above ground footprints of the new pylons within Flood Zones 2 and 3 are very small, with consequent very minor losses of floodplain storage and negligible impact on flood level within the floodplain cell. The permanent works are therefore not expected to materially affect fluvial or tidal flood risk or increase flood risk elsewhere.

5.2.6 Land not required for permanent infrastructure will be reinstated to its pre-construction condition following completion of the works. As there would be no permanent change to flood risk, no mitigation measures are considered necessary.

5.3 Surface Water Flood Risk

Construction Phase

5.3.1 Surface water drainage during the construction phase will be managed by the Lot 2 Partner through the implementation of temporary drainage and water management measures in accordance with industry best practice. These measures will be designed to minimise runoff generation, manage flows and prevent pollution incidents. As such it is considered that there would be no increase in surface water flood risk elsewhere as a result of the Scheme.

Operational Phase

5.3.2 The Scheme involves works of nature such that there would be no appreciable change to impermeable land cover area. As such, the permanent works are not expected to materially affect surface water flood risk or increase flood risk elsewhere. Land not required for permanent infrastructure will be reinstated to its pre-construction condition following completion of the works. As there would be no permanent change to surface water flood risk, no mitigation measures are considered necessary.

5.4 Groundwater Flood Risk

Construction Phase

5.4.1 During construction, localised excavations for pylon foundations and temporary works may encounter shallow groundwater, particularly in lower-lying areas of the Site. However, any groundwater-related risk would be temporary and localised and would be managed through appropriate construction-phase controls, including groundwater management measures where required. These measures would be set out in the Construction Environmental Management Plan. On this basis, construction activities are not expected to materially alter groundwater levels, groundwater flow pathways or groundwater storage, and would not increase groundwater flood risk elsewhere.

Operational Phase

5.4.2 The Scheme infrastructure comprises reinforcement of existing energy transmission infrastructure. The proposed new and replacement/refurbished pylons and their concrete foundations will maintain a comparable ground footprint to the existing baseline and are not expected to alter groundwater levels, groundwater flow pathways. On this basis, groundwater flooding is not considered to present a material operational constraint to the Scheme, and the permanent works are not expected to increase groundwater flood risk elsewhere, no mitigation measures are considered necessary.

5.5 Satisfaction of the Exception Test

5.5.1 This FRA demonstrates that the proposed Scheme is considered to remain safe for its lifetime without increasing flood risk elsewhere, thereby satisfying Part (b) of the Exception Test in relation to flood risk.

6. Conclusions

This FRA has been prepared to support the application for Section 37 consent for the Scheme.

6.1 Flood Risk Summary

6.1.1 Flood risk to the Site can be summarised as follows:

- Much of the Scheme is located in Flood Zone 2 and 3 (indicative of a high and medium risk of flooding from rivers and sea), associated with the River Rother, Ulley Brook and Whiston Brook. Areas of the east and south of the Site are located in Flood Zone 1 (indicative of a low risk of flooding);
- There are areas of the Scheme which are at 'medium' and 'high' risk of surface water flooding. Predicted flood depths are typically less than 0.15m but are greater in some locations across the Site, corresponding to localised topographical depressions;
- The Site is considered to be at medium risk of groundwater flooding. However, the Scheme is not considered to be vulnerable to groundwater flooding and therefore this is not considered a constraint; and
- The Scheme is at low risk of flooding from all other sources considered in this FRA.

6.2 Proposed Mitigation

6.2.1 Measures will be implemented to manage surface water runoff during construction of the Scheme, and the construction work sites within Flood Zone 3 would be managed in accordance with flood emergency protocols and procedures (informed by Environment Agency flood warnings), in the unlikely event of flooding from the River Rother, Ulley Brook or Whiston Brook.

6.3 Conclusions

6.3.1 The Scheme will deliver wider sustainability benefits to the community by means of secure and sustainable energy transmission as part of the Great Grid Upgrade. The Scheme is necessarily associated with the existing Brinsworth Substation and the proposed 400kV Long Lane Substation and therefore there are no reasonable alternative sites at lower risk of flooding. The Scheme is considered essential infrastructure and on the grounds that the works are reinforcing existing energy infrastructure, there would be no increase to flood risk at the Site or elsewhere. This is because any new and replacement pylons would be naturally resilient to all forms of flooding given their concrete bases and lattice designs, which allow water to move through them and result in negligible impediment to the flow or storage of water in a floodplain.

6.3.2 This FRA has demonstrated that the Scheme would be safe from flooding over its lifetime and not increase flood risk elsewhere, therefore satisfying the Exception Test.

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Appendix L
Outline Soil Management Plan

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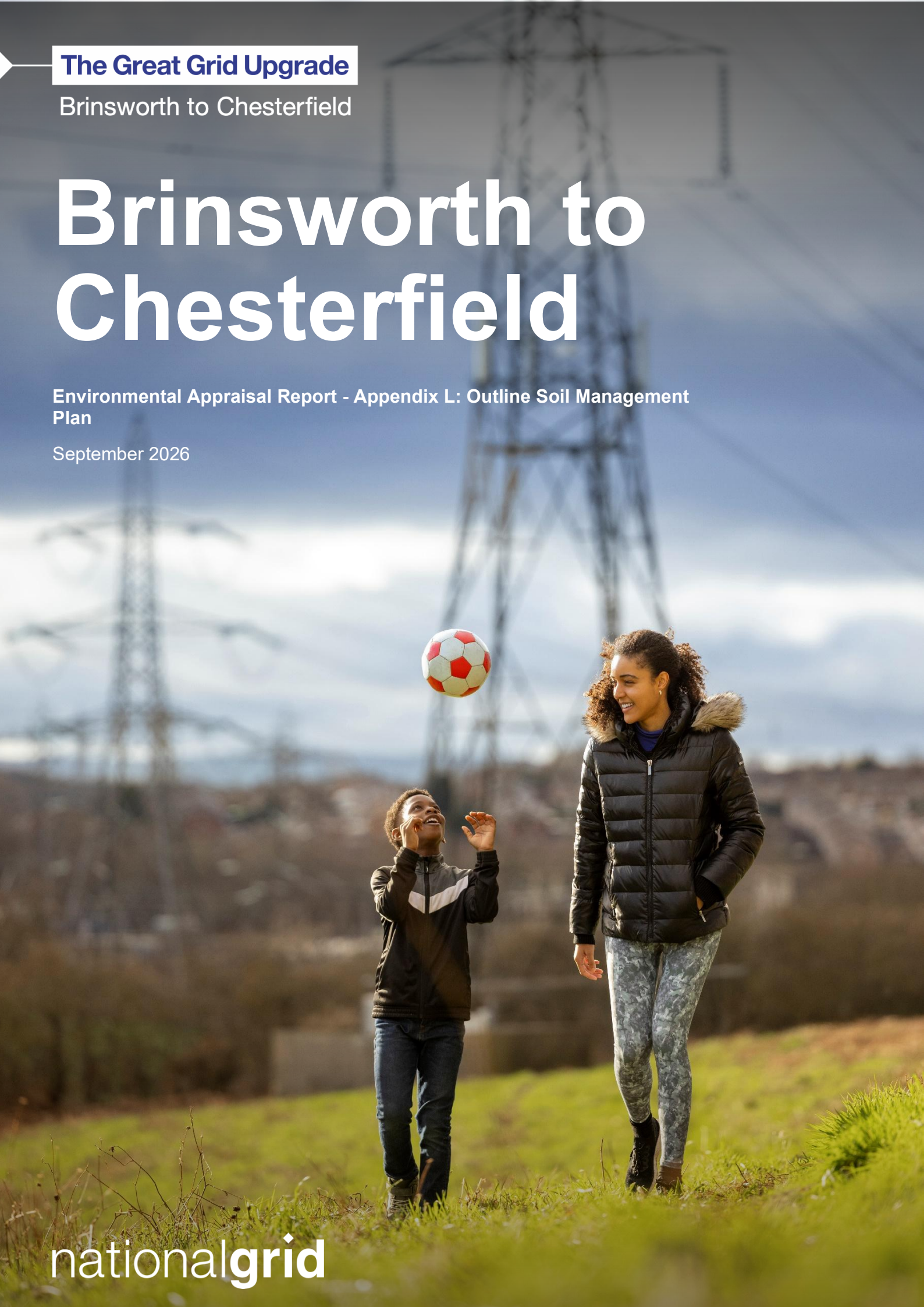
The Great Grid Upgrade

Brinsworth to Chesterfield

Brinsworth to Chesterfield

Environmental Appraisal Report - Appendix L: Outline Soil Management Plan

September 2026



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Contents

1.	**Outline Soil Management Plan**	**1**
1.1	Introduction	1
1.2	Scheme Description	1
1.3	Guidance and Methodology	1
1.4	Soil Protection Strategy	2
1.5	Roles and Responsibilities	2
	Environmental Manager(s)	3
	Soil Scientist	4
	Roles and Responsibilities Checklist	4
1.6	Soil Baseline	7
1.7	Soil Protection Measures	7
1.8	Wet Weather Working and Cessation of Works	8
1.9	Use of Toolbox Talks	9
1.10	Soil Management Measures	9
	General Soil Protection Measures	9
	Clearance of Existing Vegetation	10
	Subsoil stabilisation	10
	Soil Stripping	10
	Soil Stockpiling	11
	Soil Reinstatement	13
	Aftercare	14
1.11	Monitoring	15
1.12	Reporting of Findings	16
1.13	Failures of Acceptability Criteria and Corrective Actions	16
2.	**Bibliography**	**17**

Table 1.1	Roles and responsibilities matrix	5
Table 1.2	Monitoring requirements	15
Table 1.3	Items for monitoring records	16

Annex A	British Society of Soil Science Competency Standards
Annex B	Field Assessment of Soil Plasticity
Annex C	Soil Stripping Method
Annex D	Soil Stockpiling Methodology
Annex E	Soil Reconditioning Methodology
Annex F	Soil Placement Methodology

1. Outline Soil Management Plan

1.1 Introduction

1.1.1 This Outline Soil Management Plan (OSMP) provides strategy, guidance and methods to protect soil resources during construction. The OSMP outlines the soil mitigation measures needed to ensure, where required, the land can be restored to its previous condition following the completion of the construction phase and any required aftercare period, and any surplus soil resources can effectively be re-used.

1.1.2 This OSMP will be developed into a detailed Soil Management Plan (SMP) by the Main Works Contractor(s) prior to construction commencing. The detailed SMP will take account of, for example, detailed construction approaches and project programme, with more site-specific soil measures added as required. The SMP will be informed by the detailed Agricultural Land Classification (ALC) surveys.

1.1.3 The OSMP will not be used in its current form for soil management during construction. However, it will define the principles of soil handling and inform the development of the detailed SMP, which will be implemented during construction.

1.2 Scheme Description

1.2.1 The Scheme comprises overhead line ("Tie-In") works, which include the installation of new sections of overhead line (OHL), modification of existing infrastructure, removal of selected existing OHL, and associated temporary construction activities, including working areas and access.

1.2.2 The Scheme forms part of the wider Brinsworth to Chesterfield reinforcement project, which will uprate the existing 275kV transmission system between Brinsworth and Chesterfield to operate at 400kV. The reinforcement project includes the development of a new 400kV substation at Long Lane; however, this ALC assessment relates solely to the Tie-In works required to facilitate the connection of that infrastructure to the National Grid network.

1.3 Guidance and Methodology

1.3.1 This section sets out the guidance and methodology used to inform the development of this OSMP.

1.3.2 The guidance which has been followed in developing the requirements set out in this document is as follows:

- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009a);
- Safeguarding our Soils: A Strategy for England (Defra, 2009b);
- Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021);
- BS 3882 Specification for topsoil (British Standards Institution, 2015); and

- BS 8601 Specification for subsoil and requirements for use (British Standards Institution, 2013).

1.3.3 The development of the OSMP is supported by the findings of the ALC surveys, providing baseline information on the soil resources present and the grade of the agricultural land.

1.4 Soil Protection Strategy

1.4.1 Since soil is a vulnerable and non-renewable resource, care must be taken throughout all handling, transporting, and stockpiling activities to protect and conserve the soil resources for future use. Many construction activities have the potential to damage soils. The following sections of this OSMP describe how the management of soils would be controlled and how soils would be protected, and their quality conserved throughout all stages of the work.

1.4.2 Failure to protect soils during soil handling can lead to their degradation with consequential environmental impacts, both on-site and off-site, such as:

- soil erosion, reducing soil volume, rooting depth and nutrient availability and increasing sediment loading to adjacent watercourses;
- loss of soil organic matter, leading to a loss of nutrients, a reduction in soil moisture holding capacity and a decline in soil fertility, potentially resulting in poor establishment and long-term survival of vegetation;
- soil compaction leading to loss of soil structure, reduced permeability to water (leading to waterlogging) and restricted aeration and rooting potential; and
- loss of soil biological activity.

1.4.3 These impacts on soils can have wider environmental consequences, including:

- alteration to hydrology;
- increased sediment loading to adjacent watercourses;
- poor establishment and long-term growth of vegetation; and
- visual impact of slope failure or soil erosion leading to bare soil surfaces.

1.4.4 Measures provided in this OSMP on how soils on-site will be stripped, handled, and stored appropriately for reuse (where relevant) will be further developed in the detailed SMP.

1.5 Roles and Responsibilities

1.5.1 The effective implementation of the soil management measures will be the responsibility of the Environmental Manager(s) of the Main Works Contractor(s). This individual(s) will have sufficient training and expertise in assessing soils, soil conditions and soil handling operations to ensure the measures outlined within this OSMP can be implemented, supervised, and monitored effectively.

1.5.2 The Soil Scientist appointed by the Main Works Contractor(s) will provide any training required and will undertake monitoring visits and audits. The qualified Soil Scientist will have the necessary training, qualifications, and experience, having achieved the Soil Professional Competence Standards No. 1 (Foundation skills in field soil

investigation, description, and interpretation) as set out by the British Society of Soil Science (BSSS, 2018a) and No. 4 (Soil science in soil handling and restoration) (BSSS, 2018b) (see Annex A of this OSMP).

1.5.3 Further details of the responsibilities of these roles are set out below.

Environmental Manager(s)

1.5.4 The Environmental Manager(s), in collaboration with the technical teams, will be responsible for planning, over-seeing and carrying out routine inspections of soil management activities to ensure these are undertaken in line with the requirements of the detailed SMP.

1.5.5 The Environment Manager(s) will be responsible for ensuring:

- adherence to defined access/haul route alignments with no off-route access throughout the works;
- vegetation and foreign matter clearance prior to soil stripping commencing;
- soil plasticity testing is undertaken ahead of soil stripping commencing, with additional checks undertaken if rainfall results in works having to be stopped/recommenced due to rainfall/wet ground conditions;
- effective separation of soil types and layers during stripping and in stockpiles;
- effective stockpile construction and monthly inspections of stockpile condition; and
- effective backfilling of each layer in the correct sequence (where backfilling is required).

1.5.6 The Environmental Manager(s) will be responsible for reporting on all soil stripping and stockpiling activities by recording the following:

- confirmation of effective vegetation clearance and the removal of arisings;
- confirmation that topsoil and subsoil resources have been correctly identified;
- records of soil plasticity test results;
- data relating to the volume and type of topsoil and subsoil excavated transported and stockpiled;
- stockpile location and condition with reference to finalised site and landscaping plans; and
- thickness of each layer replaced where soil reinstatement is required with reference to finalised site and landscaping plans.

1.5.7 The Environmental Manager(s) may delegate these activities to individuals with sufficient training and expertise, where required. The Environmental Manager(s) and anyone with delegated responsibility will undertake training provided by the appointed Soil Scientist.

Soil Scientist

1.5.8 The appointed Soil Scientist will be responsible for the provision of expert and technical advice on soils throughout the earthworks and the subsequent site restoration activities. The role includes the following:

- liaison with the Site Manager and any other personnel/ organisations as relevant to works affecting soils, including undertaking monitoring and audit visits;
- train key site staff in the identification of topsoil and subsoil resources which are suitable for re-use so that accurate segregation of topsoil and subsoil resources can be achieved; and
- Provide training on the assessment of soil plasticity status based on the field technique provided in Annex B of this OSMP.

Roles and Responsibilities Checklist

1.5.9 Table 1.1 summarises the split of responsibilities across the above two roles.

Table 1.1 Roles and responsibilities matrix

Role	Sub-activities	Frequency	Responsible	Qualifications
Training	Presentation of key aspects of soil management	Once, at start of site preparation works	Soil Scientist	An individual with the necessary "Foundation Skills", having achieved the soil professional competence standards set out by the British Society of Soil Science (BSSS, 2018a).
	Identification of topsoil and subsoil resources	Once, at start of site preparation works		
	Soil plasticity assessment	Once, at start of site preparation works		
	Toolbox talks	To be agreed with Environmental Manager(s)		
Inspections and monitoring	Adherence to defined access/haul route alignments and no off-route access.	Continuous until soil stripping complete	Environmental Manager(s) (can be delegated to individuals with sufficient training and expertise where required)	In-house training provided by qualified Soils Scientist (with monitoring by the Soil Scientist to check works).
	Vegetation and foreign matter clearance	Ahead of soil stripping		
	Soil plasticity	Ahead of soil stripping for each stripping unit. Additional checks required if rainfall results in works having to be stopped prior to soil stripping recommencing within that stripping unit		
	Appropriate separation of soil layers as required (topsoil, upper subsoil, lower subsoil) and accurate documentation of depths stripped, and volumes transported from each stripping unit	Continuous until soil stripping complete		
	Appropriate segregation of soil materials in stockpiles by stripping unit, layer and plasticity, and accurate documentation of	Continuous until soil stockpiling complete		

Role	Sub-activities	Frequency	Responsible	Qualifications
	material source and stockpile location			
	Stockpile construction	Continuous until soil stockpiling complete, and stockpiles prepared for storage period		
	Inspection of soil storage stockpiles	Monthly		
	Assessment of soil condition (including plasticity) within stockpiles prior to re-use	Prior to re-use from each stockpile	Soil Scientist	An individual with the necessary "Foundation Skills", having achieved the soil professional competence standards set out by the British Society of Soil Science.
	Inspection of soil reconditioning windrows (where required)	Continuous until soil reconditioning complete		
	Inspections of restored soil profiles	Continuous until soil placement complete. Checks should be undertaken as each layer is placed		
Reporting	Condition reports detailing works undertaken and replaced soil conditions (in relation to target)	On completion of soil replacement activities for each asset	Soil Scientist	
Monitoring	All the above activities will be monitored and recorded	Weekly checks of soil handling operations (either combined with site visit or through review of reporting documentation)	Soil Scientist	
Auditing	All above activities will be audited	Monthly audits will be undertaken of activities which have taken place in the preceding month Annual audits of all activities will be undertaken	Soil Scientist	

1.6 Soil Baseline

1.6.1 The ALC survey has established the soil baseline across the Site, detailing the soil's physical properties. This information was used to guide decisions regarding outline approaches to manage soil handling, the sustainable reuse of soil (i.e. supporting landscape design and planting) and soil export, if required.

1.6.2 The ALC surveys identified that the principal soil types across the survey area included shallow loam over sandstone (generally acidic sandy clay loams or medium sandy loams) and deep loam (either acidic medium clay loam over heavy clay loam or medium clay loam over sandy loam and loamy sand).

1.6.3 The remainder of the land required to construct the Scheme was either non-agricultural or not surveyed due to access constraints at the time of survey. Soil resource surveys will be undertaken post consent/preconstruction in areas which were not covered by the detailed ALC surveys.

1.6.4 The soil baseline will be incorporated into the SMP, including the soil data from the ALC survey. The soil baseline will include (but not be limited to) the following:

- soil types (including soil textures and the main soil types present onsite);
- soil type map of the different topsoil and subsoil resources;
- soil depths of topsoil and subsoil;
- soil depth map;
- potential site-won soil volume; and
- soil balance.

1.7 Soil Protection Measures

1.7.1 This OSMP describes procedures for soil stripping, handling, transporting, storing, and restoring soils, to maintain, as far as practicable, their soil quality and viability as required for the proposed end uses. There will be a number of control measures at each stage of the works.

1.7.2 A summary of these measures is outlined below and described in more detail in the following sections.

1.7.3 Early soil protection measures:

- measures for in situ soil protection during early site clearance activities;
- soil recovery and storage (soil stripping and stockpiling);
- in-situ soil protection ahead of stripping;
- pre-treatment of existing vegetation;
- measures for handling and stockpiling;
- measures to ensure correct segregation of different topsoil and subsoil resources;
- measures for separate storage of different soil types; and
- method and locations of stockpiling.

1.7.4 Soil reconditioning (for use where required):

- measures to recondition wet and plastic soil resources before reuse;
- measures to ensure correct segregation of different topsoil and subsoil resources; and
- measures for handling and to optimise soil drying and re-aeration.

1.7.5 Soil restoration methods:

- soil prescriptions for each different land use;
- soil handling/replacement methods;
- in situ soil treatments for each different land use; and
- clear re-use strategy for all soil resources taken off-site.

1.7.6 Monitoring:

- monitoring programme; soil assessment procedures for (a) soil stripping and storage (b) soil reconditioning and (c) restoration activities;
- acceptability criteria for soil storage, reconditioning and soil replacement activities; and
- failures of acceptability criteria and corrective actions.

1.7.7 Quality control and auditing measures:

- quality control, auditing procedures and plans; criteria for cessation of works;
- non-compliances and corrective actions; and
- use of toolbox talks for staff training.

1.8 Wet Weather Working and Cessation of Works

1.8.1 Soils shall be tracked over and handled when they are in a reasonably dry and friable state, or where they have passed the test for soil plasticity (as described in Annex B of this OSMP). This is when soil structural units are least susceptible to damage by compaction and smearing.

1.8.2 The soil plasticity tests shall apply to all soil materials that are to be tracked over and handled (to include stripping, stockpiling and reinstatement). All soil plasticity tests shall be carried out by a competent Soil Scientist or practitioner, or an individual who has been trained by the appointed Soil Scientist. The results of the soil plasticity tests are to be recorded.

1.8.3 Soil stripping operations must be suspended under the following conditions and not restarted until the ground has had at least a full dry day, or the soil moisture criteria set out in Annex B of this OSMP have been met to allow the restarting of soil handling operations:

- sustained heavy rainfall (>10mm in 24 hours) which leads to waterlogged soils or pools or water on the ground surface; and
- the ground surface is frozen or covered by snow.

1.8.4 The Environmental Manager(s) and Soil Scientist will ensure there is continuous awareness of ground conditions as weather patterns change and take pro-active decisions regarding whether soil handling operations should be suspended/restarted. Where soil handling operations continue when soils have become plastic the soil materials will be clearly tracked as plastic so that effective reconditioning measures can be implemented at the appropriate time.

1.8.5 In some exceptional cases, it may be necessary to handle soils when they are in a plastic or frozen state, for example due to engineering constraints, where delays may give rise to other environmental impacts or due to the specific nature of the soil. In these cases, location-specific methods will be agreed with the Environmental Manager(s) and Soil Scientist with approval for the recommendation being required from the Project Manager/Senior Project Manager prior to works commencing and with the decision form completed to record the recommendation, actions and approval.

1.9 Use of Toolbox Talks

1.9.1 Toolbox talks will be used so that all site personnel are aware of the SMP and applicable soil handling and soil protection procedures. The toolbox talks will be site- and task-specific, discussing soil conditions and approaches to soil handling at the Site.

1.9.2 Toolbox talks must include at least the following topics:

- key aspects of the SMP;
- identification of topsoil and subsoil resources (to ensure accurate soil stripping and prevention of topsoil/subsoil mixing);
- stockpile creation;
- assessment of soil plasticity using the techniques set out in Annex B of the OSMP; and
- soil reinstatement approach (where required).

1.9.3 The suite of toolbox talks will be developed by the Soil Scientist in collaboration with the Environmental Manager(s).

1.10 Soil Management Measures

General Soil Protection Measures

1.10.1 Plant and other site vehicles will be managed so that they do not directly traffic across in situ topsoil. Where required, trackway will be used if vehicle access is required over unstripped soils and the access could result in compaction/rutting (based on the soil plasticity test set out in Annex B of this OSMP). If site access arrangements change as works progress, all personnel should be made aware of the new arrangements through a toolbox talk.

1.10.2 There will be no lay-down of materials outside of designated storage areas, except for those materials required for specific on-going construction activities.

1.10.3 Subject to ground conditions and confirmation from the Environmental Manager(s) and/or Soil Scientist, materials can be temporarily stored on topsoil if it is considered this will not be detrimental to soil quality.

Clearance of Existing Vegetation

1.10.4 Prior to soil stripping commencing, any vegetation would be cleared, and arisings removed. This is to ensure large quantities of green vegetative material do not get mixed with the stockpiled soils.

1.10.5 The method used will depend on the nature of the vegetation present. The clearance operation should ensure the vegetation is removed to ground level and all arisings (including chipped wood material) are removed. Vegetation clearance would be undertaken by best practicable methods. Blading off vegetation using a bulldozer will not be permitted.

1.10.6 All vegetation clearance works would ensure, where practicable, that the soils are not damaged through the creation of ruts or mixing or compaction of topsoil and subsoil resources. This is particularly important where the soils are of a heavier texture and more prone to compaction and smearing (i.e. the compression and smoothing of clay-rich materials, removing structural units and drainage routes through the soil).

1.10.7 The potential risks from vegetation clearance will be identified by the Soil Scientist (or suitably briefed delegate) in a toolbox talk prior to the works commencing. Soil plasticity tests will be undertaken as detailed in Annex B of this OSMP to minimise the risk of soil damage (as vegetation clearance would require tracking over unstripped topsoil).

Subsoil stabilisation

1.10.8 Subsoil stabilisation techniques may be used in appropriate locations (as determined by the Soil Scientist) where arrangements can be agreed with landowners. These techniques have the potential to reduce the depth of stone required for the haul roads by approximately a third in ideal conditions, with the benefit of reducing vehicle movements. After the stripping of topsoil (to be stored in a separate bund to the side of the haul roads), and potentially the excavation of some subsoil material, one of a number of different treatments would be applied/mixed with the subsoil. The treatments use various means to bind the subsoil material together to form the base for the road and are then topped by imported stone (which may also be treated) to provide a running surface. Once any treated roads are no longer required, and after removal and recycling of the upper layers of stone surfacing, further treatments (chemical and/or mechanical) would be used to unbind the subsoil.

1.10.9 Any excavated material would be reused and replaced where practicable (ensuring topsoil is replaced above subsoil), with the site returned to its prior use and handed back to the landowner. Subsoil stabilisation would only be adopted where it would result in no materially different effects to those assessed in the Environmental Statement (ES). The Soil Scientist would develop an appropriate testing schedule to confirm the suitability of any soil stabilisation approach.

Soil Stripping

1.10.10 Before any soil stripping activities take place, the proposed works and phasing will be detailed by the Main Work Contractor(s) in the appropriate documentation (to include

method statements, drawings and specifications) and issued to National Grid Electricity Transmission plc (National Grid) for acceptance. The Main Works Contractor Pre-start Information Pack will provide timescales and sequencing of soil stripping the proposed haul routes.

1.10.11 The earthworks will be phased to ensure that the topsoil is stripped in each part of the site ahead of subsoil materials, and that all soils are stripped from a designated area prior to bulk excavation and earthwork activities within that area.

1.10.12 To ensure that the correct soil depths are stripped to avoid the mixing of topsoil and subsoil resources, all personnel involved in the works will attend a toolbox talk to gain general awareness on the identification of topsoil and subsoil resources. Specific instructions regarding soil depths to be stripped will be provided during Daily Activity Briefings (DABs).

1.10.13 All stripped materials will be logged, tracked and labelled, in line with the movement and tracking systems detailed in the Site Waste Management Plan (SWMP).

1.10.14 All stripped soils will be free from significant quantities of foreign matter or other materials which would make the soils unsuitable for their intended re-use.

1.10.15 Immediately prior to stripping, the soil shall be tested for plasticity using the methodology presented in Annex B of this OSMP.

1.10.16 Soil will be stripped using a hydraulic excavator or tracked dozer following the methodology set out in Annex C of this OSMP to minimise the risk of compaction of either topsoil or subsoil materials.

1.10.17 Prior to soil stripping commencing, a toolbox talk will be provided by a Soil Scientist (or suitably briefed delegate) in conjunction with the construction lead, to set out how topsoil and subsoil resources will be stripped and stockpiled separately. This will ensure that any differences between the topsoil/subsoil boundary is understood.

1.10.18 Dump trucks will be used to transport the soils to the landscape bund or stockpile locations.

Soil Stockpiling

1.10.19 Key issues for soil handling, storage and eventual re-use are soil moisture content and soil consistency (plasticity). During the works, soil plasticity status will be determined in situ prior to stripping (see Annex C of this OSMP) and the test results recorded.

Stockpile Formation

1.10.20 Locations of stockpiles will be determined by the Environmental Manager(s) and/or Soil Scientist when pre-construction information is available and will be decided in line with the detailed SMP.

1.10.21 Appropriate stockpile heights should be used for topsoil that can be stripped and stockpiled in a dry state, but heights may need to be greater where storage space is limited. Good practice recommends that topsoil stockpiles should be no higher than 3m and subsoil no higher than 5m (Defra, 2009a). The precise size and height of the stockpile should be determined by the Environmental Manager(s) and/or Soil Scientist taking into account the amount of space available, the nature and

composition of the soil, the prevailing weather conditions at the time of stripping and planning conditions associated with the works, in line with the detailed SMP.

1.10.22 The following principles will be followed for all stockpiled materials, following the methodology presented in Annex D of this OSMP:

- Topsoil and subsoil materials will not be mixed; separate stockpiles will be created for topsoil, upper subsoil and lower subsoil (if subsoil stripping is required).
- Stockpiles within each soil horizon layer (i.e. topsoil, upper subsoil, lower subsoil) should be separated based on soil texture. There will be no mixing of soil textural groups (i.e. light textured sandy topsoil would not be stockpiled with heavy textured clay topsoil).
- Documentation and physical control measures (such as signing of stockpiles) will be put in place to prevent accidental mixing, to ensure soils are segregated according to source location, and to protect soils from being trafficked by plant or vehicles.
- Where there are spatial constraints, soils may need to be stockpiled against each other. Physical separation may be achieved by means of a marker layer (such as straw or clear recording of ground level information) so that no mixing occurs, and the different materials can be effectively separated.
- Soil materials will also be stored on like for like i.e. topsoil can be stockpiled on topsoil but subsoil should only be stockpiled on subsoil. A suitable marker layer (such as straw or clear recording of ground level information) will be used where topsoil is stockpiled in topsoil to ensure the in situ soils are not disturbed on stockpile removal.
- Stockpiles will not be positioned adjacent to ditches and not within 10m of a watercourse.
- Soil resources will be loose tipped.
- The sides of stockpiles will be smoothed using the back of an excavator bucket to ensure they shed water and to reduce the risk of waterlogging within the core of the stockpile.
- Measures to manage and treat site runoff and prevent erosion and dust generation during soil stripping and stockpiling works will be set in place through a series of specific control measures, as set out in the detailed SMP.

Stockpile Maintenance

1.10.23 Soil stockpiles will be managed and monitored throughout their lifetime so that they can be maintained in relation to stability and integrity. Measures to manage stockpiles are as follows:

- Soil stockpiles will be seeded with a grassland seed mix to maintain slope stability and to prevent erosion or dust generation if they will be used in place for longer than 6 months.
- Stockpiles without vegetation cover should be sprayed with water where necessary to firm the surface of the stockpile and create a crust to prevent the generation of dust.

- Soil stockpiles will be managed and monitored throughout their lifetime so that they can be maintained in relation to stability and integrity, and any weed growth can be managed in a timely manner.

Stockpile Reconditioning

1.10.24 Prior to restoration activities taking place, soil resources may have been stored in stockpiles for extended periods and in some exceptional cases, soils may have been handled and stockpiled in a plastic state. To confirm the suitability of stockpiled soils for restoration, they should be visually inspected, and assessments carried out before their reinstatement (see Section 1.11 - Monitoring). If any soil is found to be plastic or display excessive anaerobic conditions, the materials should be reconditioned as detailed below. It will be the responsibility of the Soil Scientist to assess soil in each stockpile and to recommend and record appropriate pre-treatment prior to soil placement, should it be required.

1.10.25 Soils which are plastic in consistency shall be reconditioned using the methodology presented in Annex E of this OSMP.

Soil Reinstatement

1.10.26 The works required to effectively reinstate a soil profile suitable for the proposed end use and to ensure the required soil structure is present and that there is no compaction, will depend on what soil layers have been stripped and the extent of the trafficking over the exposed surface that has occurred.

1.10.27 The sequence required to reinstate the soil profile will be detailed by the Environmental Manager(s) and/or Soil Scientist and will be briefed to all personnel involved in the works during the DABs.

1.10.28 Subsoil and topsoil re-use will aim to achieve the following:

- creation of the required combination of topsoil and/or subsoil to create a soil profile with the characteristics required for the proposed use, or re-create the soil profile in line with pre-existing soils where restoration to previous land use and land quality is required; and
- ensure, through careful handling and placement of soils, no compaction within the restored soil profiles that may limit vegetation establishment and growth or restrict water infiltration.

1.10.29 The approach for the checks required and the methodology to be used to reinstate the land at the end of the construction phase will depend on the thickness of soils stripped and the results of compaction testing. The approaches set out will be in line with published guidance and will ensure the following:

- deep ripping of the overburden where required prior to the placement of subsoil; and
- the soil profile created will be checked by suitably qualified personnel to ensure it is suitable for the proposed end use (Table 1.1).

1.10.30 Where soils stripped during the construction phase will not be reinstated and cannot be re-used on site, they will be removed off-site. Prior to any removal off-site, the quantity and characteristics of available soil materials will be assessed.

1.10.31 The soil profiles being reinstated will be designed to maximise re-use (ensuring placing more soil does not have any detrimental effects). For example, it will be assessed whether a thicker topsoil layer can be placed. The final soil profile requirements will be detailed within the final landscape plans and a soil re-use summary report produced by the Environmental Manager(s) and/or Soil Scientist to demonstrate how off-site disposal has been minimised.

1.10.32 During the placement of soil resources in their final location the methods outlined above will be followed. This will include, but not be limited to, the implementation of an access and egress plan for vehicles and plant to prevent unnecessary trafficking of restored areas, use of appropriate scale plant, avoidance of double handling and avoidance of mixing topsoil and subsoil where these materials are required for the restoration of agricultural land. Soil replacement will be undertaken in accordance with the methodology set out in Annex F of this OSMP.

Aftercare

1.10.33 There will be a requirement for an aftercare period where soils are being reinstated to ensure they are returned to their previous condition, or the condition required for their end use.

1.10.34 An Aftercare Management Plan will be produced by the Main Works Contractor(s), which would define:

- Purpose and scope of the Aftercare Management Plan, including the aftercare parcels and their intended end uses. End uses may include (but are not limited to) agriculture, landscaping, habitat, biodiversity net gain (BNG) and this information would be used to inform appropriate soil aftercare;
- Links to other management plans (e.g. Landscape and Ecology Management Plan, BNG) as required;
- Aftercare stages and duration: duration should be up to 5 years, with scope for early completion if success criteria are met. The Aftercare Plan should set out in tabular format activities for each year/season;
- Success criteria (including anticipated timeframe) for each area/land use;
- Roles and responsibilities: who delivers aftercare measures (e.g. contractor/ operator/ landowner) and who oversees it (e.g. soils specialist);
- Management commitments: controls on trafficking, timing of operations, vegetation establishment/management, and access controls (e.g. fencing);
- Monitoring programme: soil parameters (e.g. structure, depths/mixing, compaction, drainage/wetness, debris/contamination, vegetation performance, fertility) and frequency/timing of monitoring (to include post-reinstatement and periodic checks);
- Methods: e.g. Visual evaluation of soil structure (VESS)/soil pits, augering and sampling, penetrometer testing, visual drainage/erosion checks;
- Triggers and remedial actions: define how issues would be identified and required corrective measures (e.g. cultivation/subsoiling, drainage repairs, amendments, targeted imports as last resort); and
- Reporting and sign-off criteria, including requirements for aftercare monitoring reports, records of interventions, and completion criteria. Completion criteria would include post-reinstatement soil profile checks, and ALC verification. The

timing of these is likely to be after 1-3 seasons as a minimum where land returns to agriculture.

- Success criteria would be based on the soil baseline information, along with pre-entry condition surveys, photograph logs and landowner/occupier engagement.

1.11 Monitoring

1.11.1 To ensure that the quality of the soil materials is not detrimentally affected during the soil stripping, stockpiling and re-use/restoration works, monitoring by the Soil Scientist will be undertaken as detailed in Table 1.2.

1.11.2 Responsibility for some repeated tasks, as indicated in the table below, can be delegated to a suitable experienced and trained person following the initial monitoring. Training will be provided by the Soil Scientist.

Table 1.2 Monitoring requirements

	Monitoring Requirement	Responsible
1	Effective clearance of vegetation and arisings from the soil surface – once prior to soil stripping commencing	Soil Scientist (can be delegated)
2	Soil plasticity state – prior to soil stripping commencing with additional tests following rainfall events	Soil Scientist (can be delegated)
3	Topsoil stripping – correct identification of base of topsoil and minimisation of subsoil incorporation throughout the soil stripping operations	Soil Scientist (can be delegated)
4	Subsoil stripping (if required) - correct identification of base of subsoil and minimisation of overburden incorporation throughout the soil stripping operations	Soil Scientist (can be delegated)
5	Stockpile construction to ensure no mixing of topsoil and subsoil – throughout the stockpile construction period	Soil Scientist (can be delegated)
6	Stockpile condition – checks to record signs of vehicle tracking, erosion, and weed growth and set out remedial measures should issues be identified	Soil Scientist (can be delegated)
7	General monitoring of soil handling operations	Soil Scientist
8	Reinstated soil profiles – check to confirm profile and soil condition is suitable for the proposed end use	Soil Scientist

Table 1.3 Items for monitoring records

No.	Information to be Recorded
1	Confirm successful treatment of vegetation
2	Confirmation of soil type (topsoil or subsoil)
3	Soil depth stripped
4	Soil plasticity (determined as ‘plastic’ or ‘non-plastic’)
5	Date(s) stripped, weather conditions during stripping, equipment/plant used for stripping.
6	Stockpile location. Designate each stockpile or stockpile portion as ‘plastic’ or ‘non-plastic’
7	Record any stockpile non-compliance from stockpile inspections. Detail, date, and stockpile location code (refer to Stockpile Inspection Checklist and Stockpile Plan)
8	Reinstated soil profiles characteristics and condition
9	Sign off for each stage

1.12 Reporting of Findings

1.12.1 The findings of all examinations and assessments will be recorded and held by the Main Works Contractor(s) for record keeping and to enable actioning of any necessary corrective actions.

1.13 Failures of Acceptability Criteria and Corrective Actions

1.13.1 Where the soils are found to be non-compliant in any respect, an appropriate means of remediation will be proposed by the Main Works Contractor(s) for acceptance by National Grid. Guidance will be provided by the Soil Scientist. Once the affected area has been treated, it will be reassessed before sign-off.

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Annex A
British Society of Soil Science Competency Standards

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DOCUMENT 1

Foundation skills in field soil investigation, description and interpretation

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Background

The investigation of soils in the field, their consistent description according to a recognised scheme, and the interpretation of soil profiles, properties and conditions are generic foundation skills for professional scientists and engineers employed on tasks that relate to the use and/or management of land. This document identifies the minimum qualifications, skills and knowledge which the British Society of Soil Science (BSSS) considers to be required of scientists and engineers conducting field soil investigations.

Qualifications

Professional soil scientists with competence in these foundation skills are likely to have graduated in a relevant science subject. They will also have a number of years of relevant, regular field soil-based experience and will have, or be adequately qualified for, membership of a relevant professional body such as the BSSS.

Minimum competencies

Skills:

1. The ability to dig and/or auger a soil, or to instruct others to do this, so as to **expose a soil profile** to a relevant depth and to then accurately **identify the sequence of horizons** that comprise the soil profile (natural or manmade) using standard reference documents such as The Soil Survey Field Handbook[1]
2. The **design and development of a soil investigation strategy** that is appropriate to the site or landscape to be investigated, and will generate representative soil information at an appropriate scale. This should be based upon the objectives and context of the study, and an understanding of the likely patterns of soil variability
3. The ability to **read and interpret maps/spatial data** of topography, geology, soil and aerial photography in relation to the interpretation of soil conditions; where and when appropriate, conversance with the use of GIS, GPS and mobile technology

DOCUMENT 1

Foundation skills in field soil investigation, description and interpretation

WORKING WITH SOIL
setting standards in soil science

4. The application of a relevant scheme of **field soil description** (such as Soil Survey Field Handbook) and the production and recording of accurate, consistent descriptions of soil profiles or materials. This should normally include the ability to describe soil colour (e.g. using a Munsell soil colour chart[2]) including mottling, soil texture, the properties of the soil surface, soil structure, consistence and porosity
5. The consistent **hand texturing** of particle size distribution in the fine earth, and the description of stones by their frequency, size, shape and rock type
6. The ability to **interpret soil horizons, features and materials** and whole profile descriptions to develop an understanding of the soil environment and its variability within a landscape
7. The ability and understanding required to **sample a soil or the soils of a site** for one or more relevant determinands representative of the soil or site and relevant to the objectives of the study. This may involve the collection of aggregated topsoil samples or horizon bag or tin samples
8. The ability and knowledge required to interpret the results of any soil chemical, physical or microbial analysis
9. The ability to **interpret the relationships between soil and landscape, land use and climate**
10. The ability to **produce accurate and understandable verbal and written reports** of the soil conditions (text and map information as appropriate) at or across the investigation site, with an interpretation of these in a way that is relevant to the context of the investigation (this is amplified by other BSSS PCSS documents in this series)

1 Hodgson, J M (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe

2 Munsell Soil Colour Book, Munsell Colour (2009)

Knowledge:

1. An understanding of **soil development processes** and of the influence of relief, geology, climate, vegetation and soil organisms on soil development
2. A basic knowledge of world and European soils and their taxonomy, and a more detailed knowledge of soil development and taxonomy within the United Kingdom
3. An understanding of the potential for **soil heterogeneity** in space and time, and of the factors that cause and influence variability
4. Knowledge of **soil horizon notation** and, where appropriate, of a relevant scheme for soil classification including the identification of diagnostic horizons, features and materials
5. Knowledge of **local soils and land use history affecting the soils** and of the range of soils developed across the UK and Europe, and of information sources for more detailed information
6. Knowledge of **natural soil properties and conditions** that is sufficient to set soil conditions at an investigation site within the context of natural variability
7. Knowledge and application of relevant **Health and Safety, Environmental and Biosecurity regulations,** including any animal or plant health restrictions in force and all relevant safe working practices
8. Knowledge of the **potential impacts of human activity and of land management** on soil properties and processes
9. Particular specialist knowledge of soil and crop nutrition, soil hydrology, and of the influence of soil on plant and animal ecology may be required in particular circumstances and these are detailed in related PCSS competency documents

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BRITISH SOCIETY OF SOIL SCIENCE

DOCUMENT 4

Soil science in soil handling and restoration

WORKING WITH SOIL
setting standards in soil science

Background

Large amounts of soil are disturbed during the development of land for urban, industrial/retail and transport uses, for installation of energy networks and for the quarrying of aggregates and minerals. In addition, previously excavated soils are re-instated after mineral working and in the restoration of previously despoiled land to green after-use and to create parks, gardens and landscaped areas within the built environment. Professional soil science has an important role to play in ensuring a successful outcome. Professional competence in managing the restoration of land after soil disturbance builds upon foundation skills in field soil investigation, description and interpretation (BSSS PCSS Document 1). The competencies outlined in BSSS PCSS Documents 6 (Soil science in the establishment, management and/or conservation of natural habitats and ecosystems) and 8 (Soil science in landscape design and construction) will also be relevant depending on the intended after-use of a site.

Qualifications

Professional soil scientists and engineers with competence in soil handling and land restoration will have graduated in a relevant science subject. They will also have a second degree and/or a number of years relevant field experience and will have or be adequately qualified for full membership of a relevant professional body such as the British Society of Soil Science (BSSS).

Minimum competencies

Skills and knowledge:

These are described under a number of sub-headings that relate to different tasks. A professionally-competent scientist or engineer should have the skills and knowledge identified under the **General heading** and **all other headings that are relevant** to the tasks required. Professional soil scientists and engineers working in this sector should be familiar with the Defra Construction Code of Practice for the Sustainable use of Soils on Construction Sites (Defra 2009).

General

1. The ability to investigate, sample, describe and interpret soils in the field in a consistent manner and to professional standards (BSSS PCSS Document 1)
2. The ability and knowledge required to interpret the results of any soil chemical, physical or microbiological analyses

DOCUMENT 4

Soil science in soil handling and restoration

WORKING WITH SOIL
setting standards in soil science

3. Knowledge of relevant European and national regulations and policies, including national and local land use planning policy and guidance, and soil protection policy
4. A working knowledge of the industry being advised, whether quarrying, development, infrastructure installation or landscaping
5. The ability to effectively communicate soil information in a simple and relevant form to developers, planners, landscape architects and earthmoving contractors with clear statements as to the reliability and certainty of the results
6. The ability to write accurate reports and/or method statements, written in clear terms, that communicate the relevant information to site planners, site managers, site personnel and eventual users of restored land
7. An awareness of the importance of systems of quality assurance and control in all aspects of professional work

The characterisation of soil resources

1. The know-how to select appropriate survey and sampling densities to characterise *in situ* and stockpiled soil resources to required levels of certainty
2. Understanding of Health and Safety requirements on site and the ability to compile a risk assessment when requested
3. Familiarity with the use and limitations of GPS for determining sampling locations on site
4. Proficiency in fieldwork practices and procedures such as soil texturing, soil description and the delineation of soil resource units (see BSSS PCSS Document 1)

The provision of advice on soil handling

1. A knowledge of the machines used for handling soils, their capabilities and limitations
2. An awareness of methods of soil handling that minimise physical damage to soils and guidance[1] that describes such methods, including management of stockpiled soil
3. An understanding of soil hydrology and physical and engineering properties such as plastic limit, and their relevance to soil handling
4. The ability to calculate volumes of *in situ* soil layers to be moved as well as soil stored in stockpiles
5. A knowledge and understanding of waste management and/or contaminated land regulations that might restrict the export of soil materials off-site or their management within site
6. Familiarity with British Standards relevant to characterising soil materials already on site or being imported to site[2]
7. The ability to prepare a Soil Management Strategy/Soil Resource Plan[3] and simple method statements for site personnel

The restoration of land

1. The ability to characterise existing substrates on site and make best use of them, including chemical or physical amelioration where necessary
2. Knowledge and experience of the uses of manufactured soils and the use of organic materials for soil creation where natural soils are in short supply
3. Understanding of the specific soil chemical and physical conditions (including the principles of soil engineering) necessary for various restored after uses and landforms, such as woodland, Best and Most Versatile agricultural land, wet meadow, species-rich grassland, commercial landscaping, etc.

The aftercare and assessment of restored land

1. The ability to prepare and/or interpret aftercare plans (for those restored land uses where one is required)[1]
2. The ability to assess soil physical quality and make any recommendations for amelioration to create a 'fit-for-purpose' soil profile[2]
3. The ability to take representative soil samples for chemical analysis and to interpret the results to make recommendations for the use of fertilisers[4], lime or other chemical ameliorants[3]

1 for example the MAFF (2000) Good Practice Guide for Handling Soils
2 e.g. BS3882:2007 Specification for Topsoil and Requirements for Use
3 Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites
4 Might necessitate a FACTS qualification where the use is agricultural; see BSSS PCSS Document 10 Soil science in crop and livestock production

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Annex B
Field Assessment of Soil Plasticity

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Annex B
Field Assessment of Soil Plasticity

B.1.1 This annex presents the method for assessing the plasticity (consistency) of soils in the field. This method is to be used to assess soil plasticity at all pertinent stages of the earthworks programme including:

- in situ before/during soil stripping;
- storage stockpiles (non-plastic soils only);
- reconditioning windrows; and
- during soil re-spreading and decompaction/cultivation operations.

B.1.2 The procedure is outlined as:

- walkover/visual examination;
- soil sampling; and
- sample assessment.

Walkover/Visual Examination

B.1.3 The assessor shall first walk over or along the area/field or stockpile/windrow to be assessed to identify any apparent significant variability (e.g., evidence of poaching incidents, surface water ponding, saturated soils, or distribution of moisture loving plant species such as Juncus) and to identify suitable locations for sampling.

B.1.4 Any locations likely to display varying plasticity to the majority (such as low-lying spots and the base of stockpiles/windrows) shall also be accounted for when sampling.

B.1.5 Site observations relating to soil moisture content, soil plasticity and the distribution of any significant variability shall be recorded.

Soil Sampling

B.1.6 For undisturbed areas, the topsoil and upper subsoil shall be sampled at several locations using an Edelman soil auger. Separate samples from each soil layer shall be taken from their full depth.

B.1.7 For stockpiles and windrows, the soil shall be sampled at representative locations using an Edelman soil auger at a range of depths depending on the stockpile size. Where deemed necessary by the Soil Scientist, samples from greater depths shall be obtained using a suitably sized mechanical excavator.

B.1.8 For each layer, approximately a double handful of soil shall be collected and mixed up in a suitable container.

B.1.9 A minimum of five locations shall be sampled and assessed per field or stockpile/windrow.

Sample Assessment

B.1.10 The test sample (small handful) shall be taken from the collected sample and prepared for assessment by removing stones and vegetation including all roots greater than 1mm. Any significant quantity of very fine roots (<1mm) shall be removed.

B.1.11 The test sample shall be kneaded to break down its structure and ensure the mass has a uniform moisture content. It will be assessed in accordance with Table B.1 below.

Table B.1 Sample assessment for dry and friable soils

Examination	Assessment
If the soil sample is wet, films of water are visible on the surfaces of grains and aggregates and/or when a soil sample is squeezed in the hand, and it readily deforms into a cohesive 'ball'.	Handling not recommended – if handled, stockpiled material to be recorded as plastic
Peds (structures) break up/crumble readily when squeezed in the hand rather than forming into a ball.	Handling ok
If the sample is moist, there is a slight dampness when squeezed between the fingers, but it does not significantly change colour (darken) on further wetting.	No handling by dozers but may be handled by tracked excavators if consistency test is passed
If the sample is dry and brittle it will look dry and change colour (darken) if water is added.	Handling ok if consistency test is passed

Consistency Test

B.1.12 Attempt to mould a soil sample into a ball by hand:

Table B.2 First consistency test for dry and friable soils

Examination	Assessment
Impossible because the soil is too hard (dry)	Handling ok
Impossible because the soil is too loose (dry)	Handling ok
Impossible because the soil is too loose (wet)	Handling not recommended – if handled, stockpiled material to be recorded as plastic
Possible	Go to table below

B.1.13 Attempt to roll the ball into a thread of 3mm diameter on a flat non-adhesive surface using light pressure from the flat of the hand:

Table B.3 Second consistency test for dry and friable soils

Examination	Assessment
Impossible; the soil crumbles or disintegrates	Handling ok
Possible	Handling not recommended – if handled, stockpiled material to be recorded as plastic

Annex C
Soil Stripping Method

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Annex C Soil Stripping Method

C.1.1 This annex sets out the approach to be followed for soil stripping.

Existing Vegetation

C.1.2 Woodlands/hedges shall be pre-treated before soil stripping, in two stages:

- each tree shall be felled and removed from site, including all branches/brash; and
- tree stumps and associated large roots (>20mm diameter) shall be lifted using a suitable excavator.

C.1.3 All woody materials (tree trunks, stumps, branches and brash) including wood chippings shall be removed from the area being stripped and will be managed in accordance with the SWMP. Excessive amounts of woody material will not be incorporated with the stripped soils. The only exception would be where deadwood forms a component of the surface features; in such circumstances a proportion of existing dead wood would be salvaged and used to recreate this habitat.

C.1.4 Any temporary stockpiles of woody materials shall be constructed with a small 'core' to minimise the risk of spontaneous combustion and monitored as appropriate.

C.1.5 Other vegetation will be cleared using an appropriate method. All arisings will be removed prior to the start of soil stripping. This will ensure that significant quantities of green materials are not incorporated with the stripped topsoil, which can lead to the development of anaerobic conditions within the stockpiled soil.

Access Routes

C.1.6 Access to each area/compartment to be stripped shall be created by stripping the topsoil, followed by subsoil, to expose the 'basal layer'. The intention is that the receiving dump truck for the rest of the area/compartment shall run on the basal layer to prevent damage to the topsoil or subsoil.

C.1.7 Access shall be created wide enough for the dump trucks to transport the stripped soils to the storage area.

Topsoil Stripping

C.1.8 In advance of stripping, the topsoil shall be cleared of all foreign matter or waste materials such as building rubble and fill materials.

C.1.9 All topsoil shall be stripped using hydraulic excavators and tracked dozers and transported using dump trucks, unless being stockpiled to one side of the construction area in accordance with the Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021), as shown in the figures below.

C.1.10 The tracked dozer shall run on the surface of the subsoil and push up the topsoil in a single pass into a temporary row at the end of its run. Using a hydraulic excavator, the stripped topsoil shall be loaded onto a dump truck for transportation to the designated stockpile location.

Figure C1 Soil stripping with bulldozers and dump trucks: the bed and segment system

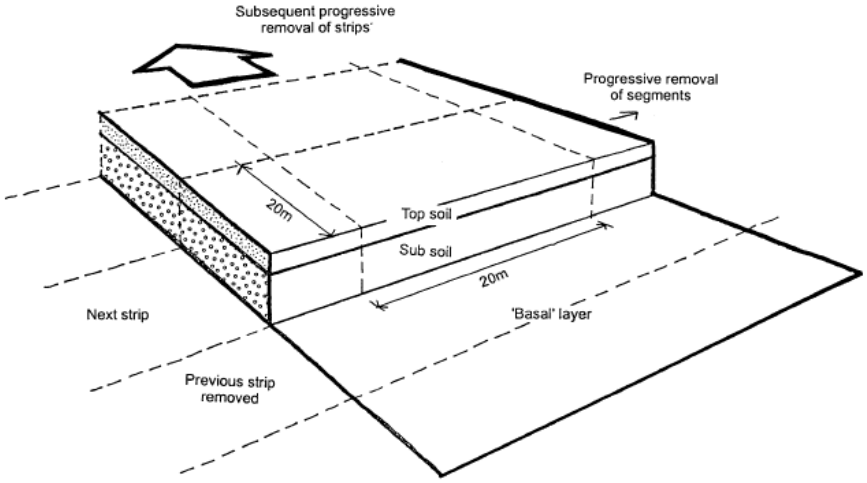
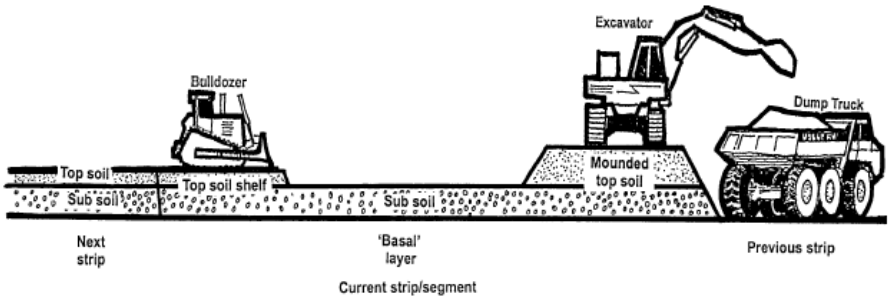


Figure C2 Soil stripping with bulldozers and dump trucks: Topsoil



C.1.11 The depth of strip shall be as set out in the Soil Stripping Plan. The aim of the topsoil strip is to enable the majority of the topsoil to be recovered without the inclusion of significant quantities of underlying subsoil. Since topsoil depths will vary, the machine operator will use their best judgement (based on soil colour and/or firmness) during the topsoil strip to maximise topsoil recovery without compromising the quality of the soil resource.

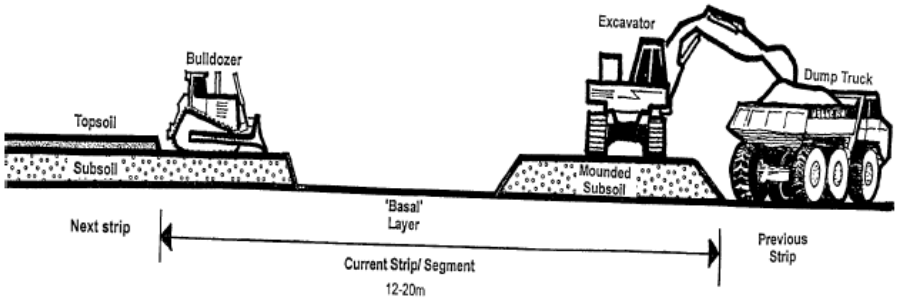
C.1.12 Once loaded, the dump truck shall transport the topsoil along the pre-designated access route to the desired stockpile location.

C.1.13 These operations shall be closely monitored to ensure that the correct soil type is recovered without the inclusion of other soils or wastes. Cross contamination with subsoil could significantly degrade the quality of the topsoil.

Subsoil Stripping

C.1.14 Subsoil shall be stripped (where required) using hydraulic excavators and tracked dozers and transported using dump trucks.

Figure C3 Soil stripping with bulldozers and dump trucks: Subsoil



C.1.15 The tracked dozer shall run on the surface of the basal layer and push up the subsoil in a single pass into a temporary row at the end of its run. Using a hydraulic excavator fitted with a toothed bucket, the stripped subsoil shall be loaded onto a dump truck for transportation.

C.1.16 Once loaded, the dump truck shall transport the subsoil along the pre-designated access route to the desired stockpile location.

C.1.17 These operations shall be closely monitored to ensure that the correct soil type is recovered without the inclusion of other soils or wastes. Cross contamination with deeper subsoil/parent material could significantly degrade the quality of the subsoil.

Annex D
Soil Stockpiling Methodology

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Annex D Soil Stockpiling Methodology

Introduction

D.1.1 This annex sets out the approach for the storage (stockpiling) of soils.

D.1.2 Stockpiling will ensure that topsoil and subsoil resources are stored separately. Where required, soil resources with differing characteristics shall also be stockpiled separately.

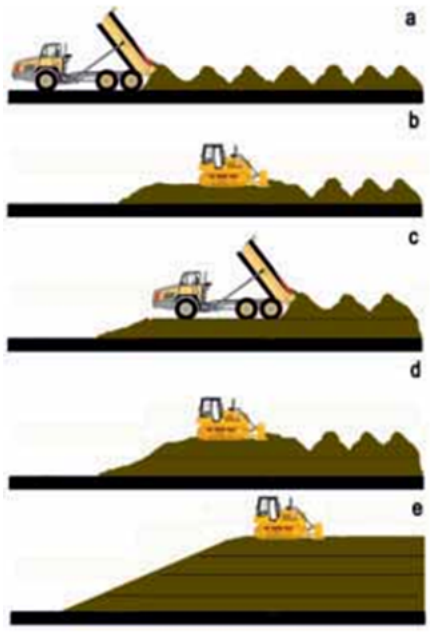
D.1.3 Stockpile locations will be identified in advance and clearly shown on relevant plans to ensure they do not interfere with other site operations, minimising the risk of stockpiled soil resources becoming contaminated or tracked over.

D.1.4 The area(s) designated for soil storage shall be cleared of vegetation and stripped, where required ahead of stockpile construction. Topsoil will be stored on top of in situ topsoil, with a marker layer of straw placed first to ensure, at the time of soil recovery, it is clear where the base of the stockpiled material lies. Subsoil will only be stored on subsoil (i.e. in an area where topsoil has been stripped).

Stockpiling Method

D.1.5 The approach illustrated in the graphic below will be used to stockpile non-plastic soils. Ideally, plastic soils will be reconditioned as shown in Annex E of the OSMP prior to final stockpile creation.

Figure D1 Stockpiling Method



The process requires the soil to be transported to the storage area in a dump truck, and 'loose tipped' in a line of heaps to form a windrow (a).
Once the heaps cover the storage area, a tracked dozer (e.g. D6 Caterpillar) shall level the heaps to form a level, stable platform for dump trucks to travel across to tip a second layer of topsoil. (b and c) This sequence shall be repeated until the maximum stockpile height is achieved (d).
Assuming that the topsoil is reasonably dry and friable during the stripping and storage operation, it shall be heaped to its maximum permitted height for this site.
To protect from wet weather once the final height is achieved, the excavator or blade shall regrade the sides and top of the stockpile to firm the surface by tracking across it to form a smooth gradient. The aim is to seal in the dry topsoil and reduce rainfall/infiltration and stabilise the surface (e).
Once the stockpile has been completed, the area shall be cordoned off to prevent any disturbance or contamination by other construction activities.
Any emergent vegetation shall be managed to a maximum height of 300mm and not allowed to 'set seed'.

Annex E
Soil Reconditioning Methodology

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Annex E Soil Reconditioning Methodology

Introduction

E.1.1 This annex presents the approach to be used for reconditioning plastic soils. This OSMP requires all soils to be handled when non-plastic but should this not happen or plastic soils be identified in stockpiles prior to re-use, reconditioning will be required.

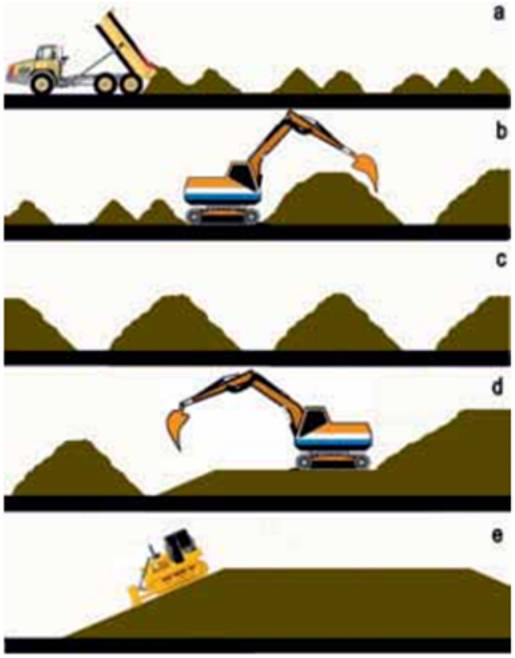
E.1.2 Reconditioning will be undertaken in area(s) of the site where it will not interfere with other site operations to minimise the risk of soils that are being reconditioned becoming contaminated or tracked over.

E.1.3 The area(s) designated for soil reconditioning shall be cleared of vegetation. Soil materials will only be windrowed on compatible soil types/layers. Where possible reconditioning at the re-use location will reduce the amount of handling required.

Soil Reconditioning Method

E.1.4 The approach illustrated in the graphic below shall be applied, through placing the plastic soils into windrows and allowing the soil to dry over a period of several weeks (assuming suitable weather conditions). The reconditioned soil can then be used to reinstate areas or be re-stockpiled in a non-plastic state, as shown in the graphic below.

Figure E1 Conditioning prior to stockpiling



Excavate soil from existing stockpile using a hydraulic excavator fitted with a toothed bucket. Load into dump truck and move to reconditioning area.
The soil is tipped in a line of heaps to form a 'windrow', starting at the furthest point in the storage area and working back toward the access point (a).
Any additional windrows are spaced sufficiently apart to allow tracked plant to gain access between them so that the soil can be heaped up (b). To avoid compaction no machinery including tracked plant, traverses the windrow.
Once the soil has dried out and is non-plastic in consistency (this usually requires several weeks of dry and windy or warm weather and for the windrows to be turned at least once), (c) the windrows are combined to form large stockpiles to the maximum height for this Site using a tracked excavator (d).
The surface of the stockpile is then regraded and compacted (e) by a tracked machine (dozer or excavator) to reduce rainwater infiltration.

Annex F
Soil Placement Methodology

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Annex F Soil Placement Methodology

F.1.1 This annex presents the methods for the placement of the soils. It comprises the following:

- soil handling considerations;
- placement and treatment of overburden;
- subsoil and topsoil placement and spreading; and
- cultivations and monitoring.

Soil Handling Considerations

F.1.2 To avoid further physical degradation during all phases of soil placement and handling (e.g. re-spreading/placement, overburden ripping/subsoiling and topsoil cultivation), these operations will be carried out when soil is non-plastic in consistency. As such, soil handling will be stopped during and after heavy rainfall, and not continue until the soil is again non-plastic in consistency.

F.1.3 Monitoring of the soil placement will be undertaken to ensure the placed soil is not structurally damaged and so any required remedial measures can be implemented as the works progress.

Placement and Treatment of Overburden

F.1.4 The finished surface, prior to the placement of subsoil and topsoil materials, will be loosened through the use of appropriate plant, such as a heavy duty subsoiler/ripper fixed to a tracked dozer. If access is limited, a single rigid tine fitted to a hydraulic excavator will be used to undertake this operation.

F.1.5 The depth of ripping of the overburden will be to 0.4m, with tine spacing at a maximum of 1m centres. Any oversized rocks (greater than 0.2m diameter) that are uplifted to the soil surface during ripping will be picked and removed for use as infill elsewhere.

F.1.6 To ensure effective drainage, ripping shall include a straight run across the width of the area being reinstated at an angle of approximately 45° to any slope followed by a subsequent oblique pass. If assessed as necessary by the Soil Scientist, a third pass shall be run at an angle of 90° to the first pass to ensure that there are no remaining blocks of unbroken compacted soil.

F.1.7 As the areas being reinstated are generally narrow linear corridors, ripping will be undertaken to ensure tie in with adjacent, non-worked land parcels such that the ripping does not result in subsequent drainage issues on those land parcels.

Subsoil and Topsoil Placement

F.1.8 A sequential approach to subsoil and topsoil placement will be undertaken as outlined below:

Subsoil Placement

- using a hydraulic excavator fitted with toothed bucket (to avoid smearing), remove subsoil from stockpiles;

- transport with dump truck to the appropriate re-use location;
- tip subsoil in a line of heaps at the edge of the ripped/subsoiled area to avoid re-compaction of the overburden;
- spread the subsoil using either a tracked dozer or tracked excavator; and
- Soil Scientist to check and ensure correct subsoil depth is achieved across the reinstatement area.

Topsoil Spreading

F.1.9 Once satisfactory subsoil placement has been achieved, topsoil shall be removed from stockpiles and spread following the same procedures for the subsoil above, ensuring that placed and loosened subsoil and overburden is not tracked over.

F.1.10 Topsoil depths shall be checked by the Soil Scientist to ensure correct topsoil depth is achieved.

Cultivations and Monitoring

F.1.11 Once the soil profile has been formed, final cultivation will be undertaken. Cultivation will only be undertaken when the soils are dry and friable to the full depth of working to avoid the risk of smearing the soil.

F.1.12 An appropriate tracked machine or tractor fitted with a wing-tine subsoiler will be used for loosening the subsoil (subsoiling). For inaccessible areas, a suitable tracked excavator, fitted with a single rigid tine (ripper tooth) will be used. Loosening will be undertaken to a minimum depth of 0.6m below surface level at maximum 0.6m centres.

F.1.13 To ensure good drainage, subsoiling will include a straight run across the width of the reinstatement area at an angle of approximately 45° to any slope followed by a subsequent oblique pass. If assessed as necessary by the Soil Scientist, a third pass shall be run at an angle of 90° to the first pass to ensure that there are no remaining blocks of unbroken compacted soil.

F.1.14 After subsoiling, the Soil Scientist shall assess the subsoil layer to check the effectiveness of the operation. If compaction is still recorded, the above process will be repeated until this is removed.

F.1.15 Once subsoiling has been undertaken successfully, the topsoil will then be cultivated (with repeat cultivations as required) to its full depth using appropriate tillage equipment (e.g. chisel plough, power harrow or set of discs) to produce a suitable tilth. This operation will also help to re-aerate the topsoil after storage (if applicable).

F.1.16 Where access is limited, the topsoil may be cultivated using a landscape rake attachment fitted to a suitable hydraulic excavator.

F.1.17 Any undesirable material brought to the surface during this exercise shall be removed by picking or raking. For example, stones, fill materials and coarse vegetation larger than 50mm in any dimension.

F.1.18 After topsoil cultivation, the Soil Scientist shall assess the topsoil horizon to check the effectiveness of the operation and to confirm that the condition of the topsoil is suitable for the intended end use.

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