# A1 in Northumberland: Morpeth to Ellingham

## Scheme Number: TR010059

# 6.51 Arboricultural Technical Note – Calculation of Total Tree Removal for Parts A and B

Rule 8(1)(c)

Infrastructure Planning (Examination Procedure) Rules 2010

Planning Act 2008

May 2021

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning (Examination Procedure) Rules 2010**

# The A1 in Northumberland: Morpeth to Ellingham

Development Consent Order 20[xx]

## Arboricultural Technical Note – Calculation of Total Tree Removal for Parts A and B

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# 1 ARBORICULTURAL TECHNICAL NOTE – CALCULATION OF TOTAL TREE REMOVAL FOR PARTS A AND B

## 1.1 INTRODUCTION

1.1.1. A request was made within the Issue Specific Hearing 3 (ISH3) – Environmental Matters (reference 5.11) for the Applicant to provide the total number of trees lost as a result of the Scheme.

1.1.2. A high-level approximation of the total number of individual trees lost to the scheme has been summarised as follows:

- **Part A:** Approximately 6,7341 trees (Note G8 which contains 1247 plants, is formed primarily of shrubs).
- **Part B:** Approximately 2,658 trees.

1.1.3. Tables 1-6 below, provide a breakdown of these numbers according to their context i.e. individual trees, linear groups, groups and woodland. Where appropriate the table provides more information relating to the size of the groups and woodlands ($m^2$), the total area of impact ($m^2$) and average crown spreads (m) in order to provide an indicative number of trees to be removed from each of these features.

## 1.2 INDIVIDUAL TREES

**Table 1-1 - Likely significant effects – Individual Trees Retained and Removed – Scheme Whole**

| | Trees Removed | Trees Retained |
|---|---|---|
| Part A | 362 | 331 |
| Part B | 85 | 339 |
| **Scheme Totals** | **447** | **670** |

## 1.3 LINEAR GROUPS

1.3.1. To provide a high-level approximation of the number of individual trees forming linear group features (LG) impacted by the Scheme (**Table 2**), reference was made to Appendix A – Survey Schedule of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] and Appendix A – Survey Schedule of ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286]. Where the number of trees forming each of the groups has not been identified within the Survey Schedules, an assumption (see section 1.6 below) has been made in order to demonstrate how the number of trees has been derived, this also supports in helping the

ExA understand the likely impacts and the significance of effects on trees and woodland cover.

1.3.2. In order to provide an indicative number of trees, the length of the Linear Group (metres) was divided by the average crown spread (Lin. m x crown spread = number of trees); with the Linear Group assumed to be a single row of trees. For Part A, the number of trees was calculated on the basis of the length of the Linear Group to be removed multiplied by the canopy spread, as identified in Appendix 7.5 Arboricultural Report [APP-220]. For Part B, the number of trees forming Linear Groups was counted and recorded in Appendix A – Survey Schedule of ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286].

**Table 1-2 - Approximate number of trees forming Linear Groups (LG) Removed – Scheme Whole**

| | Trees within Linear Groups Removed |
|---|---|
| Part A | 199 |
| Part B | 80 |
| **Scheme Totals** | **279** |

## 1.4 GROUPS OF TREES

1.4.1. To provide a high-level approximation of impacts to group features at an individual tree level, we have adopted a sampling method. The sampling method determines an approximation of the number of trees; with a minimum of 75 mm stem diameter when measured at 1.5 m above ground level in accordance with BS5837:2012. The crown spread/coverage of each tree within group and woodlands is assumed to be a true circle.

1.4.2. The approximation of total number of individual trees removed from each group has been calculated as follows:

Area of Impact divided by Average Crown Area = indicative number of individual trees impacted.

1.4.3. These calculations are shown in **Table 1-3** and **Table 1-4**.

1.4.4. The crown spreads (m) referenced in the Tables below have been taken from Appendix A – Survey Schedule of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] and Appendix A – Survey Schedule of ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286].This sum has been applied to each of the groups and woodlands to be impacted.

**Table 1-3 - Approximate Number of Individual Trees Removed from each Group (G) and Total Area of Impact ($m^2$) for Part A**

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G4 | 46 | 3 | 28.28 | 2 | |
| G5 | 506 | 8 | 201.09 | 3 | |
| G6 | 13 | 3 | 28.28 | 1 | |
| G8 | 3916 | 1 | 3.14 | 1247 | Variety of shrub species, cotoneaster, rhododendron, berberis, lilac, dogwood variety. Small proportions, young/immature age. |
| G17 | 168 | 4 | 50.27 | 4 | |
| G18 | 1597 | 4 | 50.27 | 32 | |
| G19 | 5149 | 6 | 113.11 | 46 | |
| G20 | 458 | 3.5 | 38.49 | 12 | * Insufficient GIS data. High-level approximation made. |
| G21 | 168 | 2 | 12.57 | 14 | * Insufficient GIS data. High-level approximation made. |
| G27 | 250 | 1 | 3.14 | 80 | |
| G28 | 375 | 1 | 3.14 | 120 | |
| G34 | 376 | 1.5 | 7.07 | 54 | |
| G35 | 76 | 1.5 | 7.07 | 11 | |
| G37 | 224 | 5 | 78.55 | 3 | |
| G38 | 945 | 1.5 | 7.07 | 134 | |
| G39 | 1998 | 6 | 113.11 | 18 | |
| G50 | 997 | 5 | 78.55 | 13 | |
| G75 | 537 | 6 | 113.11 | 5 | |
| G82 | 587 | 3 | 28.28 | 21 | |
| G84 | 224 | 4 | 50.27 | 5 | * Insufficient GIS data. High-level approximation made. |
| G86 | 945 | 5 | 78.55 | 12 | * Insufficient GIS data. High-level approximation made. |
| G91 | 62 | (Plantation - based on 2m spacings) | 4 | 16 | Approximate number of trees based on assumption of 2 metre tree spacings. Therefore crown spread is assumed to be 4m2. |
| G92 | 340 | 3 | 28.28 | 12 | |

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G93 | 98 | 5 | 78.55 | 2 | |
| G94 | 579 | 3 | 28.28 | 21 | |
| G95 | 266 | 2 | 12.57 | 22 | |
| G96 | 901 | 2 | 12.57 | 72 | |
| G97 | 1770 | 10 | 314.20 | 6 | |
| G98 | 185 | 2 | 12.57 | 15 | |
| G103 | 370 | 4 | 50.27 | 8 | |
| G104 | 80 | 5 | 78.55 | 1 | |
| G105 | 267 | 5 | 78.55 | 4 | |
| G111 | 1350 | 2 | 12.57 | 108 | |
| G112 | 191 | 3 | 28.28 | 7 | |
| G113 | 55 | 4 | 50.27 | 2 | |
| G115 | 1208 | 5 | 78.55 | 16 | |
| G123 | 80 | 2 | 12.57 | 7 | * Insufficient GIS data. High-level approximation made. |
| G124 | 534 | 3 | 28.28 | 19 | * Insufficient GIS data. High-level approximation made. |
| G129 | 1350 | 4 | 50.27 | 27 | * Insufficient GIS data. High-level approximation made. |
| G137 | 1920 | 3 | 28.28 | 68 | * Insufficient GIS data. High-level approximation made. |
| **TOTALS ($m^2$)** | **31,161** | **-** | **-** | **2,259** | |

**Table 1-4 - Approximate Number of Individual Trees Removed from each Group (G) and Total Area of Impact ($m^2$) for Part B**

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G8 | 878 | 5 | 78.6 | 12 | |
| G9 | 582 | 4 | 50.3 | 12 | |
| G13 | 344 | 4 | 50.3 | 7 | |
| G15 | 5361 | 5 | 78.6 | 69 | |

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G16 | 457 | 5 | 78.6 | 6 | |
| G17 | 168 | 3 | 28.3 | 6 | |
| G18 | 1569 | 5 | 78.6 | 20 | |
| G19 | 5149 | 4 | 50.3 | 103 | |
| G23 | 404 | 2 | 12.6 | 33 | |
| G24 | 696 | 3 | 28.3 | 25 | |
| G27 | 181 | 3 | 28.3 | 7 | |
| G31 | 2906 | 4 | 50.3 | 58 | |
| G32 | 1116 | 4 | 50.3 | 23 | |
| G33 | 3042 | (Plantation - based on 2m spacings) | 4 | 761 | Young trees - Group is a new planting, trees still located in correx tubes, consists of ash, oak, hawthorn. Crown spreads assumed to be $4m^2$, stems 80 millimetres and 3m heights. Approximate number of trees based on assumption of 2 metre tree spacings. |
| G34 | 376 | 3 | 28.3 | 14 | |
| G35 | 75 | 3 | 28.3 | 3 | |
| G37 | 233 | 6 | 113.1 | 3 | |
| G38 | 945 | 4 | 50.3 | 19 | |
| G39 | 1998 | 5 | 78.6 | 26 | |
| G41 | 1149 | 5 | 78.6 | 15 | |
| G42 | 269 | 3 | 28.3 | 10 | |
| G46 | 640 | 3 | 28.3 | 23 | |
| G48 | 475 | 4 | 50.3 | 10 | |

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G49 | 6759 | 5 | 78.6 | 87 | |
| G50 | 997 | 8 | 201.1 | 5 | |
| G51 | 9126 | 5 | 78.6 | 117 | |
| G55 | 3017 | 4 | 50.3 | 60 | |
| G59 | 1613 | 3 | 28.3 | 57 | |
| G60 | 25 | 5 | 78.6 | 1 | |
| G61 | 804 | 4 | 50.3 | 16 | |
| G63 | 460 | 3 | 28.3 | 17 | |
| G67 | 350 | 3 | 28.3 | 13 | |
| G68 | 2603 | 4 | 50.3 | 52 | |
| G69 | 3032 | 3 | 28.3 | 108 | |
| G71 | 2673 | 4 | 50.3 | 54 | |
| G72 | 301 | 5 | 78.6 | 4 | |
| G75 | 537 | 3 | 28.3 | 19 | |
| G77 | 152 | 4 | 50.3 | 3 | |
| G79 | 1960 | 3 | 28.3 | 70 | |
| G81 | 1104 | 3 | 28.3 | 39 | |
| G82 | 587 | 4 | 50.3 | 12 | |
| G83 | 629 | 4 | 50.3 | 13 | |
| G85 | 2410 | 6 | 113.1 | 22 | |

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| G91 | 62 | 1 | 3.1 | 20 | |
| G92 | 340 | 6 | 113.1 | 3 | |
| G93 | 97 | 6 | 113.1 | 1 | |
| G94 | 579 | 3 | 28.3 | 21 | |
| G95 | 266 | 6 | 113.1 | 3 | |
| G96 | 901 | 6 | 113.1 | 8 | |
| G97 | 1770 | 6 | 113.1 | 16 | |
| G98 | 92 | 6 | 113.1 | 1 | |
| G99 | 1512 | 5 | 78.6 | 20 | |
| G100 | 300 | 8 | 201.1 | 2 | |
| G101 | 97 | 6 | 113.1 | 1 | |
| G102 | 298 | 4 | 50.3 | 6 | |
| G103 | 370 | 4 | 50.3 | 8 | |
| G104 | 80 | 4 | 50.3 | 2 | |
| G105 | 267 | 2 | 12.6 | 22 | |
| G106 | 16471 | 8 | 201.1 | 82 | |
| G107 | 293 | 4 | 50.3 | 6 | |
| G108 | 740 | 6 | 113.1 | 7 | |
| G109 | 2861 | 6 | 113.1 | 26 | |
| G110 | 79 | 4 | 50.3 | 2 | |

| Group Reference | Total Area of Impact ($m^2$) | Average Crown Spread (m) | Average Crown Area ($m^2$) | Indicative number of Individual trees removed | Notes |
|---|---|---|---|---|---|
| **TOTALS ($m^2$)** | **95,627** | **-** | | **2,300** | |

## 1.5 WOODLANDS

1.5.1. To provide a high-level approximation of impacts to woodland features at an individual tree level, we have adopted the same sampling method which was used to provide a response to LV.2.13 of Applicant's Response to ExA's Further Written Questions [REP5-023] . This sampling method determines an approximation of the number of trees; with a minimum of 75 mm stem diameter when measured at 1.5 m above ground level in accordance with BS5837:2012.

1.5.2. The known total area of woodland canopy cover removed ($m^2$) is provided in **Table 1-5** and **Table 1-6** below.

1.5.3. The crown spreads (m) referenced in the Tables below have been taken from Appendix A – Survey Schedule of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] and Appendix A – Survey Schedule of ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286].

1.5.4. The approximation of total number of individual trees removed from each woodland has been calculated as follows:

Total Area of Woodland to be Removed divided by average Crown Area = indicative number of individual trees impacted.

1.5.5. The woodlands have been sub-divided into four broad woodland types.

1.5.6. The broad woodland types devised for the purpose of addressing the approximate number of individual tees affected are defined as follows:

- Ancient Woodland - Ancient woodland is defined as any area that has been continuously wooded since 1600 AD and accounts for approximately 2% of the United Kingdom's land area. As presented in ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] a review of Defra's MAGIC website (which provides geographic information about the natural environment from across UK government) on 14 March 2019 identified three ancient woodland , referenced as W120, W121 and W122;
- Young/Immature Woodland: 1/3rd to 2/3rd estimated life expectancy and containing trees defined as "young" and "semi-mature" in Appendix A of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220];
- Mature Woodland: > 2/3rd estimated life expectancy and containing trees defined as "mature" in Appendix A of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220]; and,
- Plantation/s: Woodlands referred to as 'plantations' within Appendix A of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] regardless of age class.

**Table 1-5 - Approximate Number of Individual Trees Removed from each Woodland based on Woodland Type and Total Area of Canopy ($m^2$) Removed by Part A**

| Woodland Reference | Woodland type | Total Area of Wooldland ($m^2$) | Total area of Woodland to be removed ($m^2$) | Average Crown Spread (m) | Indicative number of Individual trees removed | Environmental Status | Legal Status |
|---|---|---|---|---|---|---|---|
| W120 | Ancient Woodland | 7808 | 4392 | 4 | 87 | Ancient semi-natural woodland | |
| W121 | Ancient Woodland | 8477 | 1234 | 4 | 26 | Ancient semi-natural woodland | |
| W122 | Ancient Woodland | 5017 | 4180 | 2 | 334 | Ancient semi-natural woodland | |
| W125 | Plantation | 1298 | 411 | 3 | 15 | - | - |
| W127 | Plantation | 1020 | 1020 | 1 | 328 | - | - |
| W128 | Mature woodland | 5934 | 3520 | 4 | 70 | - | - |
| W13 | Mature woodland | 2357 | 2357 | 5 | 31 | - | - |
| W134 | Young/Immature Woodland | 2700 | 72 | 3 | 3 | - | - |
| W135 | Mature woodland | 1164 | 11 | 3 | 1 | - | - |
| W14 | Plantation | 3984 | 1386 | 2 | 110 | - | - |
| W15 | Plantation | 5583 | 3779 | 2 | 300 | - | - |
| W16 | Mature woodland | 21533 | 501 | 5 | 6 | - | - |
| W22 | Mature woodland | 23378 | 4689 | 1.5 | 663 | - | - |
| W23 | Mature woodland | 11670 | 11003 | 2 | 876 | - | TPO |
| W25 | Mature woodland | 7301 | 2420 | 5 | 31 | - | - |
| W29 | Young/Immature woodland | 18734 | 3634 | 1.5 | 514 | - | - |
| W33 | Mature woodland | 6911 | 1091 | 7 | 7 | - | - |
| W4 | Plantation | 5761 | 678 | 2 | 54 | - | - |
| W5 | Young/Immature woodland | 1681 | 867 | 3 | 31 | - | - |
| W53 | Mature woodland | 2024 | 170 | 5 | 2 | - | - |
| W6 | Plantation | 5934 | 2170 | 2 | 173 | - | - |
| W69 | Mature woodland | 11292 | 2663 | 7 | 17 | - | - |
| W70 | Plantation | 7064 | 3822 | 2.5 | 195 | - | - |
| W74 | Plantation | 3445 | 115 | 5 | 2 | - | - |

| Woodland Reference | Woodland type | Total Area of Wooldland ($m^2$) | Total area of Woodland to be removed ($m^2$) | Average Crown Spread (m) | Indicative number of Individual trees removed | Environmental Status | Legal Status |
|---|---|---|---|---|---|---|---|
| W77 | Young/Immature woodland | 33965 | 4019 | 6 | 36 | - | - |
| W81 | Young/Immature woodland | 4622 | 123 | 5 | 2 | - | - |
| | | **TOTAL ($m^2$)** | 60330 | | | | |
| | | **TOTAL (ha)** | 6.03 | **TOTAL** | 3,914 | | |

**Table 1-6 - Approximate Number of Individual Trees Removed from each Woodland based on Woodland Type and Total Area of Canopy ($m^2$) Removed by Part B**

| Woodland Reference | Woodland type | Total Area of Woodland ($m^2$) | Total area of Woodland to be removed ($m^2$) | Average Crown Spread (m) | Indicative number of Individual trees removed | Environmental Status | Legal Status |
|---|---|---|---|---|---|---|---|
| W36 | Plantation | 1310 | 1310 | 4 | 27 | - | - |
| W52 | Mature Woodland | 4556 | 867 | 6 | 8 | - | - |
| W64 | Plantation | 608 | 151 | 4 | 3 | - | - |
| W65 | Plantation | 1326 | 833 | 6 | 8 | - | - |
| W66 | Mature Woodland | 42356 | 3461 | 4 | 69 | - | - |
| W76 | Mature Woodland | 5448 | 1615 | 6 | 15 | - | - |
| W80 | Mature Woodland | 10212 | 1814 | 8 | 10 | - | - |
| W84 | Mature Woodland | 21688 | 603 | 8 | 3 | - | - |
| W86 | Mature Woodland | 79639 | 9955 | 8 | 50 | - | - |
| | | **TOTAL ($m^2$)** | 20,609 | **TOTAL TREES** | 193 | | |
| | | **TOTAL (ha)** | 2.06 | | | | |

## 1.6 ASSUMPTIONS AND LIMITATIONS

1.6.1. For the purposes of the calculations, each woodland type is as defined with reference to both ‘Age Class’ and ‘Notes’ columns of the Survey Schedule provided in Appendix A of ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] and Appendix A – Survey Schedule of ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286]**.**.

1.6.2. We have classified the data into four broad woodland types, as identified above. These woodland compositions and age range of the trees therein are the basis for the approximation of individual tree numbers to be removed.

1.6.3. We have assumed for the purpose of providing an approximation of the ‘Total Area of Canopy’ as calculated in Technical Note 2 – Response to LV.2.13 of Applicant’s Response to ExA’s Further Written Questions [REP5-023] is on the basis of a complete canopy coverage for each of the groups of trees and woodlands with no breaks or gaps in the canopy coverage.

1.6.4. Further, we have assumed that the canopy coverage for each group of trees and woodland type is closed i.e. persists without gaps or breaks which tends towards overestimating the number of trees impacted. This is further evident where no exception has been made for natural or managed glades, rides or natural decline/death of trees which inherently creates gaps in live crown growth.

1.6.5. We consider that the assumption above balances the inability to record any trees which may occur in the understorey or shrub layer of a woodland; trees which could not be visually captured beneath those upper canopy layer trees.

1.6.6. To determine the impact to each of the arboricultural features, reference has been made to the following Figures/Plans:

- ES Appendix 7.5 (Arboricultural Report) (Part A) [APP-220] - Figure B4a Tree Protection Plan
- ES Appendix 7.1 (Arboricultural Report) (Part B) [APP-286] - Figure 2 Tree Protection Plan – Part B
- TR010059-001437-Change Request 23 - 2.9 Vegetation Clearance Plans – Rev 2 [REP4-040]

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