

ASSESSMENT OF TREES AND VEGETATION IMPLICATED IN SUBSIDENCE DAMAGE TO No. 2 Ebury Close, Northwood, Middx HA6 2PF



CLIENT:	Mr A Ramaiya
CLIENT REF:	AR/ECNM
AAAL REF:	SAL/KMA/10671
AAAL CONSULTANT:	Shane A Lanigan
REPORT DATE:	26th March 2021

Assessment of Tree and Vegetation Implication in Subsidence Damage to :

No. 2 Ebury Close, Northwood, Middx HA6 2PF

S.A. Lanigan Chartered Arboriculturist, MICFor, Dip.Arb.(RFS), M.ArborA, RCarborA – ISA – BCMA, CUEW,
ASCA Registered Consulting Arborist #588

Date: 26th March 2021 - Our Ref: SAL/KMA/10671

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SUMMARY

The property, No. 2 Ebury Close is a detached dwelling house that has apparently evolved from what I am told, was originally a 1960's built bungalow. Mr & Mrs Ramaiya have owned and occupied the property for around three years experiencing an incidence of subsidence type damage in 2019. Investigations were carried out by way of trial pits and associated boreholes and these found the subsoil close to the building to be desiccated. Some short-term crack monitoring was undertaken, and these two investigative measures caused the structural engineer to conclude that the Leyland cypress tree was the cause of the building subsidence. A decision was taken to remove the tree and an application to fell the tree made to Hillingdon Borough Council who refused the application. The council has asked that more information be provided and that is the purpose of my inspection and report. Having inspected the trees and considered my findings I concluded that the Leyland cypress (T1) is the likely cause of the subsidence.

**S.A. Lanigan – Chartered Arboriculturist
MICFor, Dip.Arb.(RFS), M.Arbor A, RCarborA – ISA, BCMA, CUEW,
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1. INTRODUCTION

1.1 Instruction: I am instructed by Mr Ameet Ramaiya to advise on tree management measures in respect of building subsidence to the right, eastern, end of No. 2 Ebury Close, Northwood, Middx HA6 2PF. Following a visual assessment of the trees and vegetation I will provide a written report advising on tree management measures to mitigate the indirect damage that is apparent on the eastern end of the superstructure of the dwelling house. The following information is to be provided in my report:

- A schedule of trees to include data regarding species, age, size and physiological and structural condition;
- An assessment of the trees' contemporary and future capacity to affect soil moisture levels close to and below the foundations of the dwelling house;
- Recommendations to mitigate the reported damage.

1.2 I made my site inspection on Friday 26th March 2021 beginning at 9.19am and concluding at 10.09am. Throughout my time on site the weather was cool, overcast with sporadic light rain and intermittent periods of wintry sun. Visibility was reasonable.

1.3 The arboricultural issues in relation to this site are highlighted below with accompanying recommendations provided in Section 6.

1.4 Documents provided: I have been provided with copies of relevant documentation including:

- Chelmer Global Ltd – Site Investigation and Drainage Report with JCA Root ID Report
- GHG Subsidence Engineer's Report
- A letter from GHG (Lance La-Band) to Mrs Ramaiya
- Borehole sketch No. 03 by GHG (L/2019/57462/S)
- Trial Pit Sketch No. 01 by GHG (L/2019/57462/S)
- GHG – Details of Crack Monitoring (L/2019/57462/S)
- GHG Photographic Schedule - L/2019/57462/S/LLB/sp/BC Ref: 35618710350

1.5 Should any tree works be deemed necessary statutory controls may be in place and the presence or otherwise of these would need to be ascertained before any works are undertaken. Further statutory controls exist in respect of ecology and biodiversity.

1.6 Ecological Constraints: Impacts on wildlife must be considered prior to and during any tree works deemed necessary. Such matters are governed by various pieces of primary legislation, specifically:

- The Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000 and other more recent regulations, and the European Protected Species legislation. These regulations provide statutory protection for birds, bats and other tree and woodland dwelling creatures. The presence of protected species could impose constraints upon the timing and implementation of the site works. Consultation with an appropriately qualified ecologist must be undertaken should this be deemed necessary.

1.7 Statutory Tree Protection: I have made enquiries of the Local Planning Authority which in this instance is the London Borough of Hillingdon to ascertain the existence or otherwise of any Tree Preservation Orders which may be applied to this site, or whether the site falls within a designated conservation area. The local authority's online mapping system (cmaps) shows that the trees referred to in this report are protected by Tree Preservation Order Area: TPO 114 – Land at 41-47 Kewferry Road & 2-3 Ebury Close dated 25-09-1972 but the site does not appear to lie within a designated conservation area, (see Appendix 3 'A Brief Explanation of Tree Preservation Orders/Conservation Areas' at the back of this report). One of the trees is growing on third-party land and any works deemed necessary would need the consent of the owner. The status of the tree preservation order and conservation area legislation is only confirmed at the time of writing.

1.8 Qualifications and professional experience: This report is based on my on-site inspection and assessment of the existing trees and vegetation. I hold formal qualifications in arboriculture and have the benefit of fifty years working professionally within this discipline. A summary of these matters can be found in Section 9.

1.9 Soils: I accessed the online application of the British Geological Survey to gain insight into the type of soil present here. The app showed that the soil depth was Deep with a texture of Clayey Loam to Silty Loam which has weathered from a soil parent material of Prequaternary Marine/Estuarine, Sand and Silt. The app is generally a good guide to soil type within a general area but is not site-specific. Site soil testing by way of trial pits, boreholes, and technical analysis is the recognised way to obtain truly accurate site-specific results.

2. THE TREES

2.1 **Inspection of trees on site:** I inspected two trees on and adjacent to this site. Tree details are summarised in the tabulation below:

Tree 1	Leyland cypress – <i>Cuprocyparis leylandii</i> (A.B.Jacks.& Dallim) Farjon Family: Cupressaceae
Ownership:	No. 2 Ebury Close
Age Class:	Mature – being within the first one-third of its species life expectancy.
Physiological condition:	Good
Structural condition:	Fair
Height:	18 m (estimated)
DBH (diameter at breast height)	670 mm (measured)
Distance:	7 m (from the nearest part of the building, 9 m from the front southeastern corner which is near to the brickwork cracking and window displacement).
TZI (theoretical zone of root influence)	25 m (at full mature height) - NHBC Standards 2011

Tree 2	Weeping willow – <i>Salix babylonica</i> L Family: Salicaceae
Ownership:	Third-party
Age Class:	Mature – being within the first one-third of its species life expectancy.
Physiological condition:	Good
Structural condition:	Good
Height:	14 m (estimated)
DBH (diameter at breast height)	750 mm (estimated)
Distance:	19 m (from the nearest part of the building 24 m from the front southeast corner which is near to the brickwork cracking and window displacement).
TZI (theoretical zone of root influence)	20 m (at full mature height) - NHBC Standards 2011

3. THE INSPECTION

- 3.1 I inspected both trees from within the garden of No. 2 Ebury Close. The inspection was visual and from ground level only.
- 3.2 The Leyland cypress (T1) is growing within the curtilage of No. 2 close to the eastern boundary (see photograph 1, Appendix 1 at the back of this report). It is a large tree of documented high-water demand which shows high vitality and due to its widely spreading crown, 8 m north-south and 12 m west-east, has a high leaf area index. These three factors combined indicate that the tree will have a very high-water uptake, which due to the tree/building proximity will impact on soil moisture levels close to and under the built footprint. The tree has significant growth potential and will continue to increase its water usage for many years as it grows on.
- 3.3 Tree 2, the weeping willow, is also a tree with a documented high-water demand. This is mitigated by the fact of repeated pollarding/reduction operations which have served to maintain the tree at a reduced size (see photograph 2, Appendix 1 at the back of this report). It is therefore less certain that this tree will have any detrimental effects on soil moisture levels close to the building.

4. DISCUSSION

- 4.1 In this instance I have been instructed to report on the possible implication of T1 (Leyland cypress) and T2 (weeping willow) in subsidence type movement to the right eastern side of the dwelling house. Extensive investigations were carried out by the Graham High Group (GHG) including trial holes with associated boreholes. Trial hole 1 established that the building foundations are extremely shallow by modern standards. Beneath the eastern end of the building, they are reported to be 300 mm deep strip concrete bearing onto stiff dry, brown silty clay 350 mm below grade.
- 4.2 Structural cracking to this area of the building seems to have been noticed after the very dry summer of 2018. The Graham High Group carried out extensive investigations in 2019. These included excavation of two trial holes with boreholes extending through the bottom near the front right (eastern) end of the dwelling house. GHG found the soil beneath the foundations to be stiff and dry and concluded that the Leyland cypress tree (identified as T1 within this report) was a causal factor. Their structural engineer found the cracks to be 5-15 mm in width meaning that the extent of the damage falls within Category 3 (moderate) according to BRE Digest 251-Assessment of Damage to Low Rise Buildings (August 1990). GHG's report shows that the cracking width increases with height from approximately 1 mm to 5-6 mm. It is appreciably more by the right-hand side of the first-floor window (10 mm) (see photographs 3 & 4, Appendix 1 at the back of this report). The cracking pattern shows rotational movement and dropping of the eastern flank wall toward the cypress tree (T1). This type of movement is consistent with subsoil shrinkage caused by moisture extraction and a consequent reduction of subsoil volume.
- 4.3 Vegetation in general, and trees in particular often contribute to soil drying and subsequent desiccation. Smaller shrubs, grass and ruderal weed growth will induce soil drying but usually not to significant depths. Large trees, particularly those of high-water demand are able to grow roots down to significant depth, often 3 m or so, and to extensive distances laterally. Their drying influence is much more significant than smaller, more transient vegetation and trees often cause a permanent moisture deficit which becomes more widespread over time. It is possible to differentiate between seasonal movement caused by smaller, lower vegetation and ongoing rotational downward movement attributable to large trees nearby by the cracking pattern. Cracks due to seasonal movement usually close more or less completely in the winter as soil rewets. Those caused by a persistent deficit do not, because the winter rainfall is insufficient to fully restore the pre-existing soil moisture levels. On this site the cracking evident on the front elevation seems to be ongoing and no recovery seems to be occurring in the winter months (I made my inspection in March when I would expect the soil moisture levels to be at "field capacity").

4.4 Subsidence damage really came to prominence following the 1976 extreme drought year. Since that time research has been ongoing in all aspects of the causal mechanisms. Trees, their size, growth rate and water demand have been thoroughly investigated. Developers and council building control officers now adhere to the technical guidelines provided with the National House Building Council's publication – NHBC Standards 2011. This document categorises trees as either high, moderate or low water demanding species. It then uses an assessed ultimate height and appropriate multiplication factor to calculate a theoretical zone of root influence which is used to dictate the depth of foundations for new buildings. The document provides useful guidance as to the likely effects of various tree species on existing buildings. Within the standards document both Leyland cypress and willow trees are classified as being of high-water demand and therefore subject to a multiplication factor of 1.25. Using this data, it is possible to calculate the following theoretical zones of influence (TZI) for T1 and T2 as follows:

T1 - Leyland cypress - mature height = 20 m, TZI = 20 m x 1.25 – 25 m

T2 - Weeping willow - mature height = 16 m, TZI = 16 m x 1.25 – 20 m

This shows that T1, the Leyland cypress, could likely cause soil desiccation beneath a large area of the eastern sector of the dwelling house. The TZI of T2, the weeping willow, would extend almost to the rear northeastern corner of the building but may fall short of this due to the fact of the tree having been repeatedly reduced in size.

4.5 The site investigations carried out by GHG were extensive and found the clay type subsoil to be dry and stiff beneath the damaged eastern region of the building. Although no cypress roots were positively identified I consider it probable that T1 is the cause of the soil drying beneath the building. It is the fine feeding roots and their mycorrhizal associations that actively take up water from the soil. Roots grow where conditions are suitable and sufficient air and water is present. Such conditions are present between T1 and the eastern flank wall and also to the north and south of the dwelling house. It is highly unlikely that no roots are active in these areas.

5. CONCLUSION

5.1 Having considered the reports prepared by GHG and the results of my own site investigations I concluded the following:

- i) The Leyland cypress (T1) is a primary actor in the subsidence movement, it is a species with a documented high-water demand and has a theoretical zone of root influence that would encompass much of the footprint of the dwelling house.
- ii) It is a tree in good physiological condition showing high vitality and has a long future life expectancy. Due to its high-water demand and also the rain shadow effect of its foliage it will be contributing significantly to soil desiccation around and under the building footprint.
- iii) The subsoil on site is a shrinkable clayey loam which has likely been desiccated by the action of fine feeding roots of the cypress tree. Subsequent soil volume reduction is the probable cause of the building movement.

6. RECOMMENDATIONS

6.1 **T1 - Leyland cypress** – remove tree after appropriate consultation with a structural engineer to establish the the level of heave that will occur.

T2 – Weeping willow – ensure tree is maintained at or around its current size.

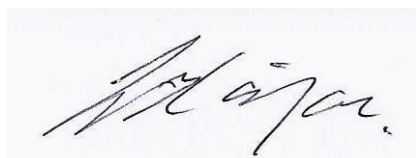
7. ASSUMPTIONS AND LIMITING CONDITIONS

- 7.1 Any legal description provided to the consultant/appraiser is assumed to be correct. Any titles and ownerships to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
- 7.2 Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible, however, the consultant/appraiser can neither guarantee nor be responsible for the accuracy of information provided by others.
- 7.3 The consultant/appraiser shall not be required to give testimony or attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
- 7.4 Loss or alteration of any part of this report invalidates the entire report.
- 7.5 Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to who, it is addressed, without the prior expressed written or verbal consent of the consultant/appraiser.
- 7.6 Neither all nor any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of the consultant/appraiser particularly as to value conclusions, identity of the consultant/appraiser, or any reference to any professional society or institute or to any initialed designation conferred upon the consultant/appraiser as stated in his qualification.
- 7.7 This report and values expressed herein represent the opinion of the consultant/appraiser, and the consultant's/appraiser's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
- 7.8 Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
- 7.9 Unless expressed otherwise, (1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and (2) the inspection was by means of visual examination of accessible items.

8. CERTIFICATE OF PERFORMANCE

I, Shane A. Lanigan, certify that:

- 8.1 I have personally inspected the trees and the property referred to in this report and have stated my findings accurately. The extent of the evaluation or appraisal is stated in the attached report and the Terms of Assignment.
- 8.2 I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
- 8.3 The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and facts.
- 8.4 My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices.
- 8.5 No one provided significant professional assistance to me, except as indicated within the report.
- 8.6 My compensation is not contingent upon the reporting of a predetermined conclusion that favours the cause of the client or any other party nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.
- 8.7 I further certify that I am a Chartered Arboriculturist being a professional member of the Institute of Chartered Foresters and a Registered Consultant of that professional body. I am a Registered Consultant of the Arboricultural Association, and a Registered Consulting Arborist (#588) of the American Society of Consulting Arborists. I am also an ISA Board-Certified Master Arborist and hold the Royal Forestry Society Professional Diploma in Arboriculture. In matters of tree inspection, I hold the International Society of Arboriculture 'Tree Risk Assessment Qualification' (TRAQ) and have completed the LANTRA Professional Tree Inspection Module with integrated assessment and update training. I have worked full time in the field of Arboriculture for a period of fifty years.



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9. PROFESSIONAL DETAILS OF SHANE A LANIGAN

Qualifications: I hold the City and Guilds Certificate in Tree Surgery and am an International Society of Arboriculture Certified Arborist, also holding the International Society of Arboriculture Municipal Arborist Accreditation and being a Board- Certified Master Arborist of that professional body.

In addition, I hold the Royal Forestry Society's Professional Diploma in Arboriculture which is a degree level qualification rated as level 6 on the qualifications and curriculum framework. It is a qualification specific to the arboricultural profession. In matters of tree safety and risk assessment I have undertaken and completed the LANTRA Awards Professional Tree Inspection Course and integrated assessment, I also hold the International Society of Arboriculture Tree Risk Assessment Qualification (TRAQ).

I am a registered consultant of the American Society of Consulting Arborists (ASCA RCA#588) and a Chartered Arboriculturist, being a Professional Member of the Institute of Chartered Foresters and a Registered Consultant of the Arboricultural Association.

With regard to legal issues, I am also a Cardiff University Law School Certified Expert Witness in both civil and criminal proceedings.

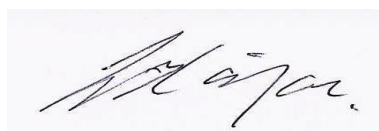
My professional memberships include:

- The American Society of Consulting Arborists
- The Arboricultural Association
- The Consulting Arborist Society
- The International Society of Arboriculture
- The Institute of Chartered Foresters
- The Royal Forestry Society

Career details: I am a second- generation arborist having worked from 1971 to 1979 for a private tree care company before forming my own arboricultural company in 1979.

Continuing professional development: I maintain and improve my professional knowledge by being an active member of the five professional bodies referred to above. In addition, I attend a high number of arboriculture related seminars and the annual conferences of the International Society of Arboriculture, the Arboricultural Association and the Institute of Chartered Foresters (ICF). I was also privileged to serve on the credentialing council of the International Society of Arboriculture educational certification department for seven years. Having served two consecutive terms as an elected member. I 'rolled off' the council in late 2020.

Currently, I am the senior consultant within Abbots Arboricultural Advice Limited. This is my consulting practice which is a forward-looking operation. In order to keep abreast of changes in arboriculture and consulting practice I attend many conferences and seminars which contribute to my CPD/CEU obligations. Currently, all of these events are delivered online.



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APPENDIX 1

Photographs 1 – 5



**PHOTOGRAPH NO. 1 - T1 - Leyland cypress tree located east of
No. 2 Ebury Close**

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PHOTOGRAPH NO. 2 - T2 - Weeping willow located in the third-party property to the northeast of No. 2 Ebury Close



PHOTOGRAPH NO. 3 - Stepped brickwork cracking on the front, southern elevation near to the southeast corner (arrowed)



PHOTOGRAPH NO. 4 - Brickwork cracking and window displacement on the front elevation of No. 2 Ebury Close (arrowed)

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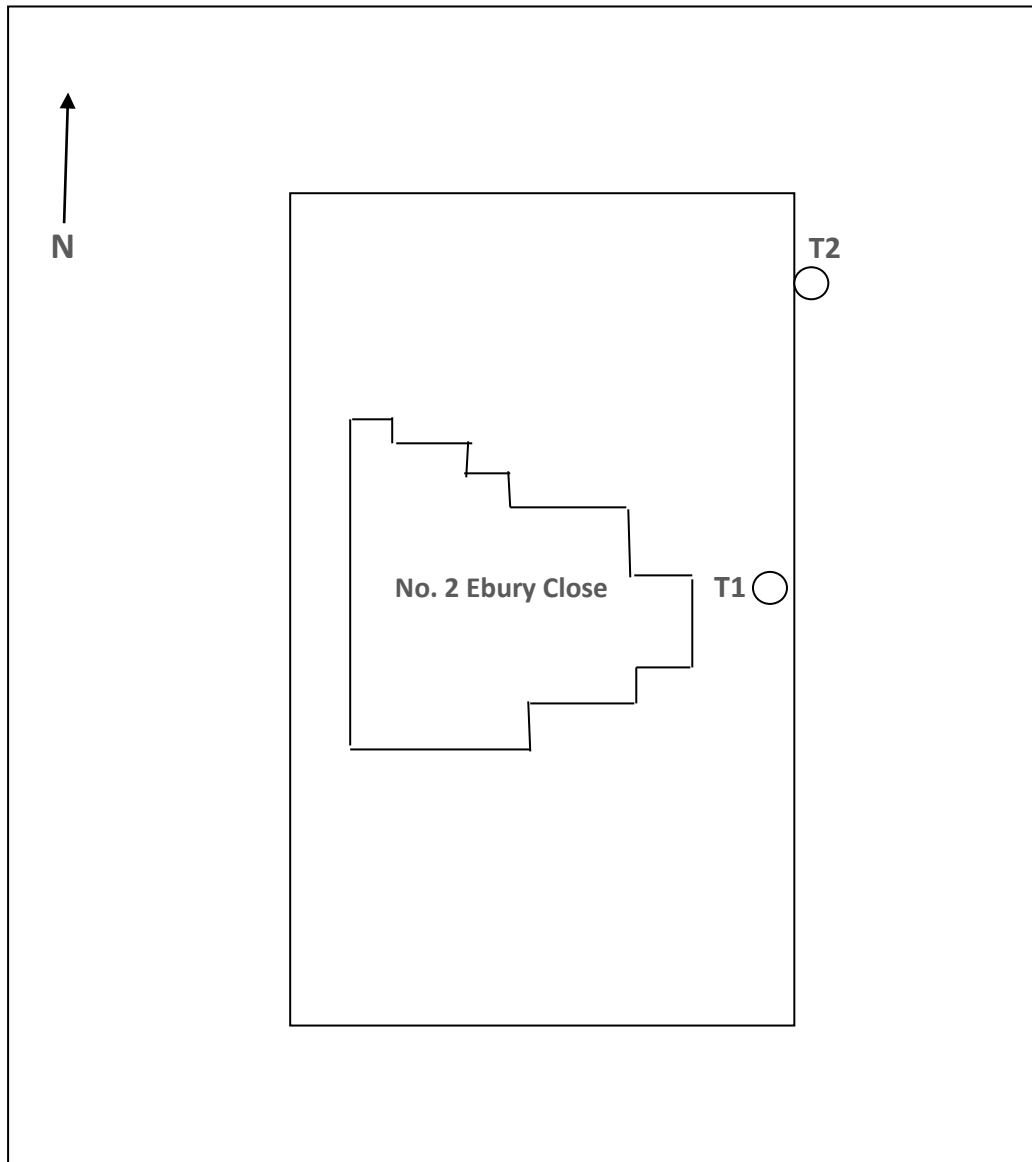
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PHOTOGRAPH NO. 4 - Wooded area to the west of No. 2 Ebury Close

APPENDIX 2

SITE PLAN : NO. 2 EBURY CLOSE, NORTHWOOD, MIDDX HA6 2PF



FRONT

This sketch plan is not to scale and may exclude certain features that are on site.

Assessment of Tree and Vegetation Implication in Subsidence Damage to :

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APPENDIX 3

References:

British Geological Survey Environmental Science Centre, Keyworth, Nottingham, NH12 5GG (Natural Environment Research Council, 2013) – ‘My Soil App’ – accessed March 2021.

Hillier J G (2014). *The Hillier Manual of Trees and Shrubs*. 14th ed. 80 Vincent Square, London SW1P 2PE;(Hillier Nurseries and The Royal Horticultural Society,) p15, p102, P406 & p487.

NHBC Standards (2011). *NHBC Standards Effective 1 January 2011*. NHBC House, Davy Avenue, Knowhill, Milton Keynes MK5 8FP: NHBC.

APPENDIX 4

Statutory Tree Protection

Tree Preservation Orders/Conservation Areas

Tree Preservation Orders are made under Section 198C of the Town & Country Planning Act and applied by the 2012 Tree Regulations. They effectively prohibit unauthorised removal and pruning of trees identified within the order. Conservation areas are designated areas defined by geographic limits within which any tree with a stem diameter of more than 75mm (measured at breast height or 1.5m above ground level) is effectively protected. Certain exceptions exist under both sets of legislation, though these are limited and ideally require interpretation by a suitably qualified arboriculturist.

Felling Licenses

Felling licenses may apply for felling significant volumes of timber on sites without full planning permission. The statutory legislation in this case is the Forestry Act 1967 which is administered by the Forestry Commission.

Faculties

Faculties may be required for significant tree works on sites that fall under the jurisdiction of the church authorities. The local Parochial Church Council can advise on the need and requirements for faculties.

Hedgerow Removal Notices

A hedgerow removal notice will be required for the removal of almost any hedge growing in a rural area. Certain works are permitted without notification including (j) “for the proper management of the hedgerow”. The applicable statutory legislation may be cited as “The Hedgerow Regulations 1997” (Statutory Instrument 1997 No. 1160).