Subsidence Risk Assessment Report

Site:

12 Clorane Gardens
London
NW3 7PR

Prepared for:

[redacted]

Date of Visit:

Tuesday 13th August 2024

Prepared by:

Mr G Davies
Senior Arboricultural Consultant
ISA Tree Risk Assessment Qualified
Professional Tree Inspector Qualified

Bartlett Project Reference:

GD/240532/Ra

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Bristol,
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[redacted]

BARTLETT CONSULTING
A DIVISION OF THE F.A. BARTLETT TREE EXPERT COMPANY

Submitted on 23rd August 2024

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1.0 SCOPE OF REPORT

1.1.1 To survey the principal trees growing within 10.0 metres of the buildings associated with 12 Clorane Gardens, London NW3 7PR and identify which, if any may have potential to damage the buildings either directly or in-directly.

1.1.2 To assess the overall health and structural condition of the surveyed trees, assessing the current risk posed to persons and property and were deemed necessary provide suitable management recommendations.

1.1.3 To provide a report which identifies those trees which have the potential to influence the soil around the buildings of 12 Clorane Gardens, London NW3 7PR, which are not currently reported to be damaged.

1.1.4 This assessment will be based on a combination of factors including the tree species, their current and ultimate size, the sub-soils and proximity of the subject trees to the building, period of design and suitability of the foundations.

1.1.5 The report will include appropriate guidance and recommendations aimed at reducing any such risk.

1.2 Background

1.2.1 On the instruction of their building insurance provider, Bartlett Consulting have been approached by Mr & Mrs Marsh, the current owners of 12 Clorane Gardens in order to obtain an arboricultural report suitable to satisfy their insures request.

1.3 External Property Damage as Visible from Non-Expert Inspection

1.3.1 I have not been provided with any information to suggest the property is currently affected by tree related damage, nor have the surrounding trees ever been implicated with damage to the property.

1.3.2 Further to this, no evidence was visible on the day of the survey to suspect structural damage to either building has occurred. Therefore, this report is based on the premise that the buildings are not currently subject to damage.

1.3.3 If the property is subsequently found to be subjected to damage or a detailed investigation is commenced after the date of this document, our report will be void, and a new assessment will be required based on information collated by a structural engineer or surveyor.

1.4 Report References

1.4.1 Our Arboricultural Subsidence Appraisal has evolved from industry material including the following:

- BRE Digest 298 (1999) *Low Rise Building Foundations: The Influence of Trees in Clay Soils*
- Dunstar, J.A, Smiley. T, Matheny. N, Lilly. S. (2017) *Tree Risk Assessment Manual, Second Edition*. International Society of Arboriculture. Champaign, IL.
- Health & Safety Executive (2001) *Reducing Risk, Protecting People: HSE's Decision-Making Process*
- LTOA (2007)(3rd Edition) *A Risk Limitation Strategy for Tree Root Claims*
- Mattheck, C, et. al. (2015) *The Body Language of Trees – Encyclopaedia of Visual Tree Assessment*. Karlsruhe Institute of Technology Campus North.
- NHBC Standards 4.2(2010) *Building near Trees*
- P.G. Biddle (1998) *Tree Root Damage to Buildings Volume 1 & 2,* Willowmead Publishing Ltd, Wantage, Oxfordshire, OX12 9JA

1.0 SCOPE OF REPORT (Continued…)

1.5 Report Limitations & Methodologies

1.5.1 This report is restricted to the four single trees, all located within the rear garden of 12 Clorane Gardens.

1.5.2 Whilst making every effort to identify the tree whose potential impact on the building are most significant, it must be noted that other trees may have an effect on the building in the future. Bartlett Consulting cannot accept any liability for trees subsequently found to be causing damage that have not been identified by this survey or made-know to Bartlett Consulting previously.

1.5.3 It is important to consider the potential effects of heave on the building if the tree is removed. Heave potential can be calculated from soil samples, which may be organised by a Structural Engineer.

1.5.4 The tree details and location where accurately measured using a diameter tape ,clinometer and laser measure, of Age range and vigour were also recorded. The tree was subject to a "Level 1 Limited Assessment" as per the methodology established by the International Society of Arboriculture, looking at the site and ground conditions.

1.5.5 It is important to understand that as trees are living and dynamic organisms, it is not possible to maintain them free of risk. Some level of risk must be accepted in order to experience the full range of benefits that trees provide. As such, we reference the previously published document by the National Tree Safety Group (NTSG), Common Sense Risk Management of Trees (Forestry Commission 2011). This document provides guidance on trees and public safety in the UK for owners', managers and advisors.

1.5.6 The statements, findings and recommendations made within the report do not take into account any effects of extreme climate and weather incidences, vandalism, changes in the natural and built environment around the tree after the date of this report or any damage whether physical, chemical or otherwise.

1.5.7 Assessments within this report relates only to the main buildings, of 12 Clorane Gardens, London NW3 7PR that consists of the main house and separate office building.

1.5.8 Bartlett Consulting cannot accept any liability in connection with the above factors, nor where recommended tree management is not carried out in accordance with modern tree health care techniques, within the timeline proposed.

1.5.9 This report is valid for one year from date of issuance.

2.0 TREE PROTECTION STATUS

2.0.1 Both the Town & Country Planning Act (Tree Preservation) (England) Regulations 2012 and the Town & Country Planning Act 1990 (as amended) provides legislative protection for trees within England.

2.0.2 An online enquiry of the site and the trees was conducted by Bartlett Consulting on 15th August 2024, via accessing the London Borough of Camden's online interactive online mapping service found at the following website address:

2.0.3 https://ssa.camden.gov.uk/connect/analyst/mobile/#/main?mapcfg=%2FMapProjects%2FCamdenConservation

2.1 Tree Preservation Order (TPO) Status

2.1.1 None

2.2 Conservation Area (CA) Status

2.2.1 Redington Frognal Conservation Area

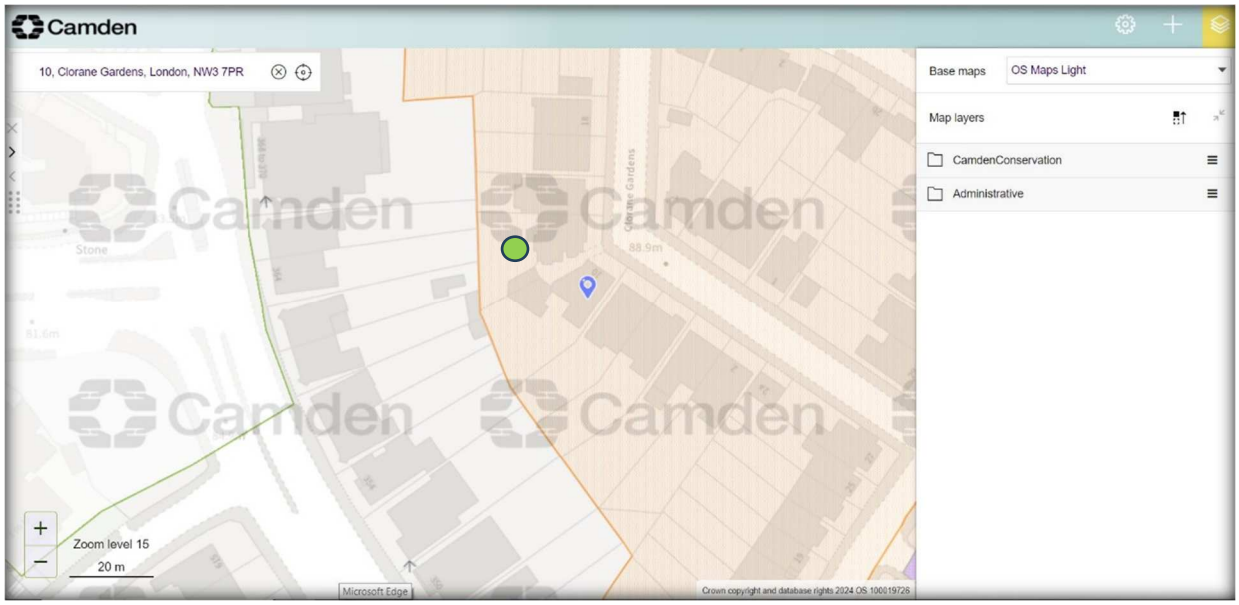


Figure 1: Screenshot of the London Borough of Camden's interactive mapping service, identifying the approximate location of the site within the Redington Frognal Conservation Area with the green dot.

2.3 Tree Works Implications

2.3.1 The trees on this site are not subject to a Tree Preservation Order (TPO), however, it has been established via an online search that the site is located within a conservation area.

2.3.2 This status affects trees of a stem diameter greater than 75mm, when measured at 1.5m above ground level. Therefore, the surveyed trees will be protected by virtue of their size and location within this designated CA.

2.3.3 Under the Town and Country Planning Act 1990 (as amended), a Section 211 Notice must be served upon the LPA, providing them with 6 weeks' notice of any intention to implement works to protected trees.

2.3.4 The purpose of this notice is to provide the LPA an opportunity to consider whether a TPO should be made in respect of the trees.

3.0 SITE & BUILDING DETAILS

3.1 Site Location

3.1.1 The site, 12 Clorane Gardens, London NW3 7PR is located close to Hampstead Village and Golders Green within Greater London.

3.1.2 There is a good level of tree cover surrounding the site comprising both street trees as well as those growing within the rear garden of neighbouring private residential properties.

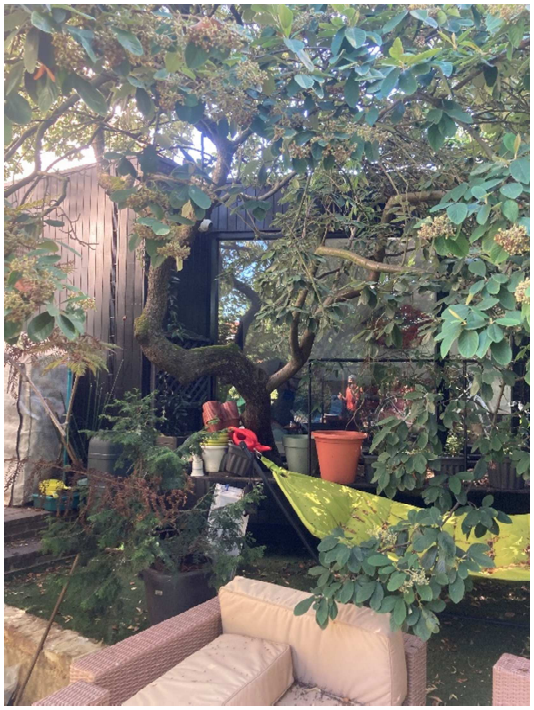


Figure 2: Image of surveyed tree T1 growing adjacent to the separate office space.

3.2 Building Type

3.2.1 The property of 12 Clorane Gardens is believed to be of an Edwardian style constructed around the early part of 1900. Its construction is typical of the period consisting of a solid brick walls and clay tiled roof.

3.2.2 The premises has had undergone a number of works throughout its life including most recently a large renovation in 2007 prior to the current owners moving in.

3.2.3 There is also a detached office room to the southern boundary which I have been informed was completed in 2020 and constructed upon a deep pile foundation and designed to accommodate the retention of the adjacent mature Cotoneaster tree (T1) shown in figure 2 above.

3.3 Tree Locations

3.3.1 All the trees included within this survey are growing within the rear garden on 12 Clorane Gardens

3.4 Visible Service Runs

3.4.1 This survey did not identify any underground services, nor have I been provided any information with regards to any specific drainage inspections.

3.0 SITE & BUILDING DETAILS (Continued…)

3.5 Underlying Soils

3.5.1 (Ref: British Geological Survey materials © NERC [2024] – Website data as of 15th August 2024)

3.5.2 In the absence of a scientific laboratory soil analysis, using the British Geological Survey 'BGS Geology Viewer' (www.bgs.ac.uk) as viewed on 15th August 2024, it has been determined that the sub-soils are:

- Bedrock Geology – Claygate Member - Clay, silt and sand
- Superficial Deposits – Non recorded

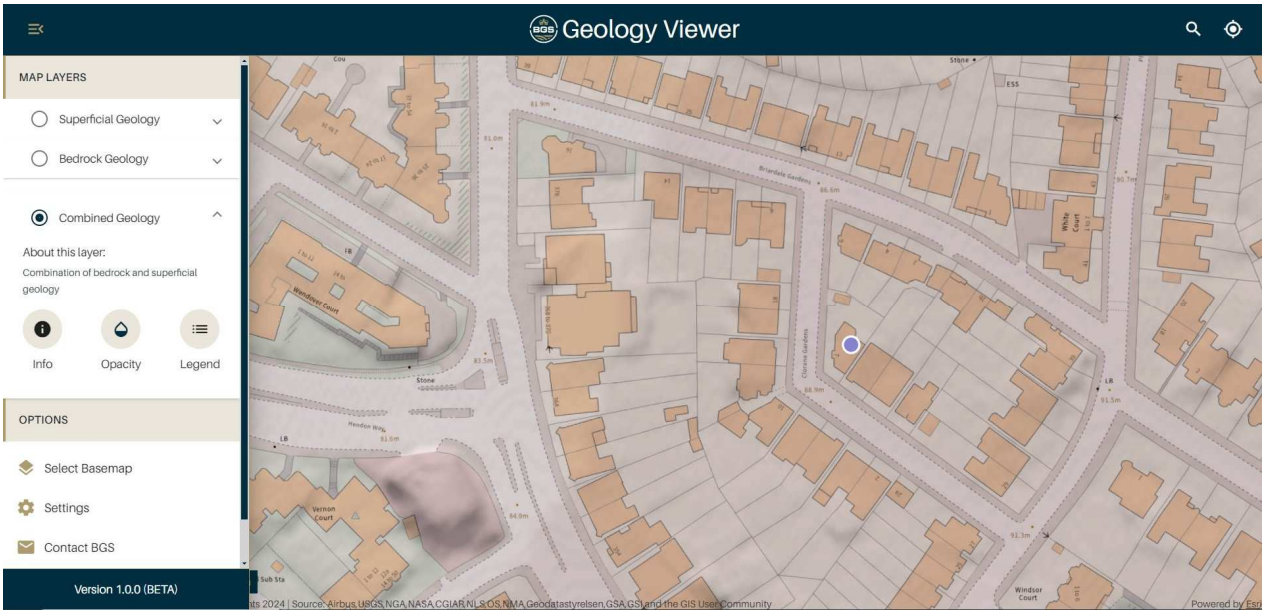


Figure 3: Screenshot of British Geological Survey Geology Viewer showing the soils within the local area

3.6 Plasticity Index

3.6.1 Plasticity index (PI) is the measure of a soils ability to shrink and expand in volume when wetted or dried. A high percentage (greater than 40%) is indicative of a soil with a wide range of potential movement.

3.6.2 As no soil samples are available at time of writing, the specific PI is unknown however with reference to the BGS findings the local soils are suspected to be Claygate Member of which occurs in the axial zone of the London Basin and is associated with the Parent unit London Clay Formation (LC). With reference to Appendix B of The Soil Property Data from the Geological Society (2006) the PI of Claygate Member ranges between 34 & 47.

3.6.3 Soils testing would be required to provide further as to the exact PI of the local soils.

4.0 DEFINITIONS

4.1 Indirect damage

4.1.1 Indirect damage, typically referred to as tree subsidence and heave, is usually associated with volumetric change in the subsoil through seasonal variation. Trees and other vegetation extract moisture from the soil to fuel a number of natural processes including photosynthesis and transportation of nutrients.

4.1.2 When a sufficient level of clay is present within the soils, this process can result in the desiccation of the soil leading to volumetric changes which can affect a structure or its support/foundation leading to damage.

4.2 Direct Damage

4.2.1 Direct damage is a term applied when tree roots come in direct contact with a structure leading to damage caused by the increased growth of the roots, and/or where the tree utilises the structure as an anchor point transferring above ground stresses into the root system, i.e. wind induced tree movement.

4.2.2 The severity of any direct damage is related to the ability of the structure to resist the force being exerted by or through the root.

4.2.3 Direct damage can also occur above ground and is generally associated with incremental growth of the main stem in direct contact with a structure; the movement of branches in the wind causing damage through direct contact or striking; or failure of branches and main limbs from the tree and falling on people or property below.

4.3 Heave and Recovery

4.3.1 Heave is when a building is taken above the original build level due to rehydration of the soil. Heave is usually, though not always, restricted to situations where there is a persistent moisture deficit. This is when the drying is such that rewetting in the autumn and winter months is not enough to rehydrate the soil before the next drying season. A common cause of heave is the removal or significant reduction of trees or other vegetation, causing a clay soil to fully re-hydrate.

4.3.2 Recovery is when a subsided building is returned to its original build level following rehydration of the soils. Recovery will often occur in “standard situations” where there is seasonal movement of the soils with desiccation in the summer and rehydration in the winter.

5.0 VISUAL TREE ASSESSMENT

Table 1: Tree Survey

Tree No.	Species	DBH (mm)	Height (m)	Crown Spread (m)	Age	Vitality	Condition
T1	Himalayan Tree-Cotoneaster *Cotoneaster frigidus*	250	5.5	N-5 E-4 S-2 W-4	Early-mature	Good	• Single stem specimen • Decking built around main stem inhibiting full inspection in direct contact with main stem • Sweep on main stem • Eastern and southern crown overhanging outbuilding currently in direct contact Asymmetrical crown bias to north and west
T2	Common Ash *Fraxinus excelsior*	340	12	N-6 E-6 S-4 W-3	Semi-mature	Good	• Single stem specimen • Growing to boundary • Slight lean on main stem to east • Regrowth forming on upper stem • Asymmetrical crown bias to east due to competition from neighbouring trees overhanging outbuilding approx .5m current clearance • Previous crown reduction resulting in approx. 3.0m current regrowth, forming on suspected weakened points of attachment • Damage to outer leaves associated with pigeons • Do sign of ash-dieback visible within crown
T3	Common Lime *Tilia europaea*	710	12	N-5 E-4 S-5 W-4	Early-mature	Good	• Single stem specimen • Growing to boundary • Epicormic regrowth forming at base 2x young tree stems establishing at base • Epicormic regrowth on main stem • Historically topped at 7.0m resulting in the formation of multiple leaders • More recent high pollard at 10m resulting in approx. 2.0m multiple regrowth
T4	Honey Locust *Gleditsia Triancanthos*	200	6	N-3 E-4 S-3 W-2	Semi-mature	Good	• Single stem • Rope tied tight around lower stem causing girdling • Multiple leaders forming from 1.0m • Epicormic regrowth establishing within lower crown • Asymmetrical crown bias to east

6.0 TREE SURVEY SCHEDULE & SUBSIDENCE RISK DETAILS

Table 2 below provides relevant information about the relationship of the surveyed trees and their proximity to the properties.

Table 2: Tree Details and Proximity to Buildings

Tree Ref	Species	Water Demand / Risk	Existing Height (m)	Mature Height (m)	Amenity Value British Standard 5837:2012	Stem to Building (m)	Zone of Influence (m) NHBC Chapter 4.2 Existing / Mature Height	
							Existing	Mature
T1	Himalayan Tree-Cotoneaster *Cotoneaster frigidus*	High	5.5	6.0	B1	0.3	6.9	7.5
T2	Common Ash *Fraxinus excelsior*	Moderate	12	23	B1	1.5	9.0	17.25
T3	Common Lime *Tilia europaea*	Moderate	12	22	B1	6.5	9.0	16.5
T4	Honey Locust *Gleditsia Triancanthos*	Low	6	14	B1	7.4	3.0	7.0

Key: Tree Ref – tree/ hedge reference on plan and/ or tree tags where used. **Species** – tree species giving English common name. **Water Demand** - based on matrix of NHBC Classification and BRE Digest. **Height –** tree/ hedge height recorded in metres. **Spread** - average of overall crown spread from each of the four cardinal compass points. **Vigour** - physiological assessment of tree as normal for species. **DBH –** the individual or cumulative (if multi-stem) trunk diameter when measured at 1.5m above ground. **Amenity Value –** a tree quality assessment using **U** to remove trees for Arboricultural reasons; **A** is high quality specimen; **B** is moderate quality; **C** is low quality. **Stem to Building -** distance of tree trunk/ nearest part of hedge to nearest building(s) in metres. **Zone of Influence** – distance from tree stem/ hedge within which the tree has the ability to desiccate the soils. This is the zone of influence when (a) the tree reaches maturity and (b) at its existing height.

7.0 DISCUSSIONS

7.1 General Overview

7.1.1 The trees subject to this survey are considered to have either a moderate or low level of public visibility as they can only be very slightly viewed from the main public highway of Clorane Gardens.

7.1.2 The Common Ash tree (T2) and European Lime (T3) have both previously undergone tree works to manage their crown volumes however have both subsequently put on significant regrowth since.

7.1.3 The Honey Locust (T4) does not appear to have undergone any significant pruning works.

7.2 Risk of Indirect Damage (Subsidence Damage)

7.2.1 With reference to the NHBC Standards 2022, chapter 4.2 table 3 (water demand classification) the Common Ash (T2) and European Lime (T3) both have moderate water demand / uptake whilst the Honey Locust (T4) has a low water demand/ uptake.

7.2.2 The water demand / uptake of the Cotoneaster (T1) is not stated within the table and subsequently a high-water demand must be assumed.

7.2.3 The Zone of influence is an area from the tree in which it can influence the local soils, this is based on a calculation derived from water demand and current tree height. Based on its ZOI, only the Cotoneaster (T1) falls within the footprint of the main house.

7.2.4 Based on the same calculation, the Common Ash (T2) and European Lime (T3) both fall within the footprint of the detached office room.

7.2.5 The Honey Locust (T4) currently has a ZOI that falls short of the footprint of either the main house or detached office room. Furthermore, even if this tree reached its anticipated ultimate hight of 14.0m its ZOI would still fall short of the main house and outbuilding.

7.2.6 This information is as detailed within table 2 of this report and represented within the Zone of Influence map attached to the end of this report.

7.2.7 At the time of writing, no detailed laboratory analysis of the surrounding soil has been carried out however, based on the information available within the online geological maps, it would be reasonable to assume that the local soils contain a clay component and as such may be susceptible to volumetric change.

7.2.8 Soils testing would be required to provide further clarity on this matter.

7.2.9 With regards to the main house, the exact foundation depth is unknown, however, during the survey it was noted that the house has a lower ground floor level and as such is assumed to have sufficiently deep foundations and is unlikely to be affected by volumetric change induced by desiccation of the soils by surrounding vegetation.

7.2.10 I have also been informed that the detached office building was built using a deep pile foundation and as such is also unlikely to be affected by volumetric change of the local soils.

7.2.11 Based upon the details provided to me, evidence gathered from the site visit and assumptions made from my assessment, it would be reasonable to conclude that the trees have a low risk of causing indirect damage to either the main house or detached office building.

7.0 DISCUSSIONS (Continued…)

7.3 Risk of Direct Damage

7.3.1 The survey identified that the decking associated with the detached office building has been built around the main stem of the Cotoneaster (T1) and due to incremental growth of the tree is now in direct contact with the decking area. In the near future, the tree is likely to cause damage to the decking.

7.3.2 As such I would recommend that the existing clearance should be extended allowing for future unimpeded growth of the main stem.

7.3.3 During the survey it was noted that the crown of the Cotoneaster (T1) was in direct contact with the eaves and roof of the detached office building. The lower crown of the Common Ash (T2) was also overhanging and in in proximity to the roof of the detached office building.

7.3.4 In both instances, to prevent damage occurring, I would recommend that pruning works are carried out to ensure clearance between the trees and the building.

7.3.5 The survey also noted that the Common Ash (T2) and European Lime (T3) have previously undergone crown reductions which have resulted in multiple regrowth. This regrowth typically forms on weakened points of attachment and is prone to failure if left un-managed.

7.3.6 As such, in order to prevent future branch failure, I would recommend that the regrowth of both trees are managed through crown reduction works.

8.0 CONCLUSIONS

8.0.1 In conclusion, I consider the trees surveyed within this report pose a low risk of in-direct damage to either the main building or detached office building.

8.0.2 This is predominantly due to the assumption that the foundations of both the main building and detached office building are of a suitable depth to resist the effects of ground movement caused by the desiccation of the local clay soils.

8.0.3 With regards to direct damage, this report has highlighted the need to carry out pro-active works to ensure suitable clearance between the decking of the detached office building and the cotoneaster (T1).

8.0.4 I have recommended selective pruning of T1 and crown lift of T2 in order to maintain a suitable clearance preventing direct contact and the potential for damage to occur.

8.0.5 Lastly, to reduce the potential risk of branches breaking out causing damage to any targets below, I have recommended pruning works to the crown of T2 and T3.

8.0.6 Please refer to Table 3: Tree Management Recommendations below for further details.

9.0 RECOMENDATIONS

Table 3: Tree Management Recommendations

Tree Ref	Species	To be carried out within 6 months	To be carried out within 18 months
T1	Himalayan Tree-Cotoneaster *Cotoneaster frigidus*	• Increase the current clearance between the main stem and decking of the detached office building • Carry out selective pruning of the eastern and southern crown to provide suitable clearance form the detached office building	Carry out selective pruning on a cyclical basis to maintain suitable clearance
T2	Common Ash *Fraxinus excelsior*	• Crown lift to maintain suitable over the detached office building roof (recommended clearance 1.0m) • Carry out maximum 2.5m crown reduction pruning beyond previous points	Carry out crown lift on a cyclical basis to maintain suitable clearance
T3	Common Lime *Tilia europaea*	• Re-pollard back to precious pruning points removing regrowth	N/A
T4	Honey Locust *Gleditsia Triancanthos*	• No works currently required	N/A

Bartlett Consulting must be informed should any suspected tree related damage occur to either the main building or detached office building of 12 Clorane Gardens, London NW3 7PR

We trust that the contents and recommendations contained within this report were informative, easy to understand and helpful to you, with regards to managing the subject tree. Should you have any further questions or concerns, please do not hesitate to contact us again.

REPORT CLASSIFICATION: Subsidence Risk Assessment

REPORT STATUS: Final

REPORT COMPLETED BY: Mr G Davies *FdSc Arb MArborA*
Senior Arboricultural Consultant

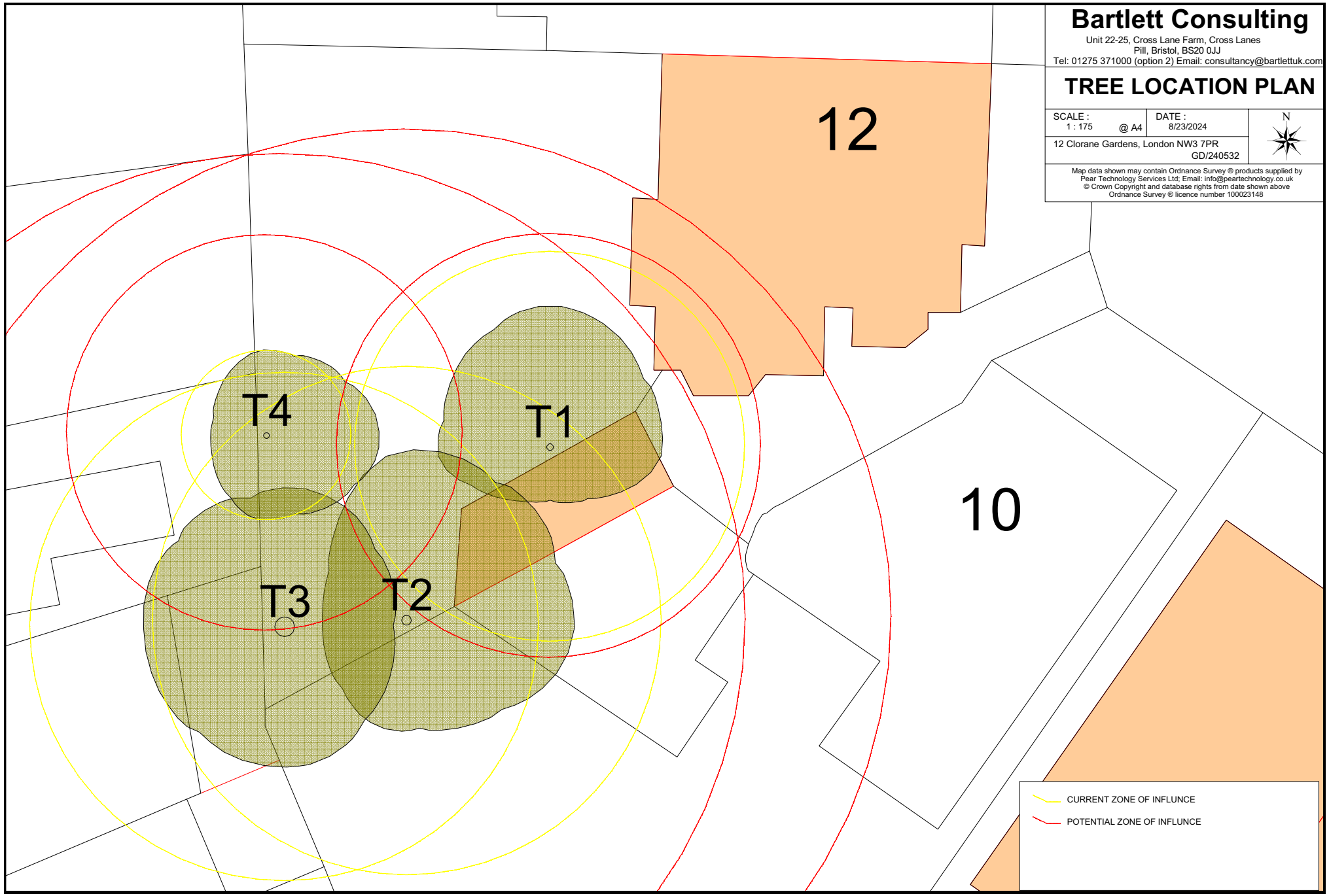
SIGNATURE: [redacted]

DATE: [redacted]**15th August 2024**

REPORT CHECKED BY: Ruth Le Poidevin
Bartlett Tree Experts Administrator- Consultancy

SIGNATURE: [redacted]

DATE: **28th August 2024**



Bartlett Consulting

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TREE LOCATION PLAN

SCALE :	DATE :	N
1 : 175 @ A4	8/23/2024	
12 Clorane Gardens, London NW3 7PR	GD/240532	