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10th February 2015

Alex McDougall
Regeneration and Planning
Development Management
London Borough of Camden
Town Hall
Judd Street
London WC1H 8ND

Dear Mr McDougall

PLANNING APPLICATION REF 2014/5117/P

I have already objected to the certificate of lawfulness referenced above however, as the applicant has resubmitted plans - I am resubmitting and expanding my objections.

Engineering Operation

We have already submitted our legal argument with regard to basements being an Engineering Operation and therefore falling outside the criteria for Permitted Development. This is supported by the independent assessment by Chelmer Consultancy Service September 2014, para 3.3.2 states the requirement for

an appropriately competent ground engineer who complies with the relevant professional qualification requirements with CPG4 and/or a member of the Register of Ground Engineering Professionals at Specialist or Adviser grade to be retained by the applicant for the duration of the groundworks

In addition the attached report from Eldred Geotechnics indicates the complexity of the engineering challenge involved as a consequence of the hydrological and ground conditions that exist in Briardale Gardens. Indeed the applicants' proposed engineering design fails to demonstrate that the basement could be safely excavated without substantial damage to properties on either side or the developers own property.

Impact on Trees in a Conservation Area

The Arboricultural Impact Assessment produced by ATS fails to fully address the impact of the basement development on the Magnolia Tree. The proposal includes foundations under the

extension to basement level which will potentially have not been assessed and insufficient boreholes to examine the impact on tree roots. The attached report by Landmark Trees highlights the omissions in the ATS report and concludes that there is sufficient evidence that the Magnolia Tree will be adversely impacted and that therefore Permitted Development should not be granted.

Existing Footprint of the Building

The revised plans indicate that the planned development is outside the footprint of the existing building. The plans include:

- Excavation of the single storey extension foundations stepped to basement level (without the proposed basement development this would not be necessary)
- An additional inspection chamber for drainage at the end of the front basement passage
- The attenuation tank beneath the rear extension
- Underpinning of the party wall

A certificate of lawfulness should be refused.

Given the severe structural damage that will result to neighbouring properties if this proposal goes ahead we will, we feel we have sufficient grounds,if necessary, to take our case to Judicial Review.

Yours sincerely

Penny Davis

3 x attachements report from Landmark Trees, First Steps and Michael Eldred GeoTechnics

31 BRIARDALE GARDENS NW3 7PN

A geotechnical and structural assessment of a basement planning application 2014/3668/P and its potential impact on Nos. 29 and 33 Briardale Gardens

Report reference G1422-RP-01-E1

Edition	Date	Detail
E1	28/01/15	Draft 1 for client review.
E1	29/01/15	Draft 2 for client review with Appendix A figures added
E1	09/02/15	Final

Eldreds

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Summary

Summary of brief and conclusions

The brief

1. This report concerns planning application 2014/3668/P to Camden Council (Camden) which proposes a basement extension below the existing footprint of 31 Briardale Gardens NW3 7PN. I am instructed to advise Penelope Davis of 29 Briardale Gardens and her neighbours Nicole Sochor and Rupert McNeil of 33 Briardale Gardens (collectively the Client) about the following matters in relation to the revised application.

(i). Whether the application provides sufficient information to satisfy the engineering aspects of planning policies DP23 and DP27. (The policies are given in Section 10.)

(ii). Whether estimates within the application of the damage that the proposed development has the potential to cause in Nos 29 and 33 Briardale Gardens are reliable.

Conclusions

2. With regard to DP27, the scheme proposed by the application is not buildable. Consequentially it does not satisfy any part of requirement (a). Section 6 sets out the reasons that it is not buildable. Without diminishing the fundamental importance of this conclusion in any way, the following additional conclusions relate to the specific wording of DP27 and CPG4.

3. This assessment of the application has shown that the scheme proposed would fail to maintain the structural stability of either No.31 or Nos. 29 and 33 Briardale Gardens. The permanent works design for No.31 fails in the several ways described in Section 4 to satisfy the basic requirements of structural stability even to the extent necessary at planning stage. The structural design does not work.

4. Section 5 shows that the proposed method of construction and temporary support would be dangerous, leave perimeter walls unsupported during some excavation stages, allowing them to move in, and that groundwater issues capable of affecting the stability of the construction have not been considered by the design.

5. One of the groundwater issues presents a significant risk of causing damage to Nos. 29 and 33. That risk could be reduced only by either constructing a deep cut off wall around the entire area of the proposed excavation or by pumping from specially filtered wells beyond the building. Neither is practically feasible in the circumstances, which means that the risk could not be ameliorated. (DP27, 27.3 refers)

6. The application attempts to demonstrate that damage to Nos. 29 and 33 would be less that the criterion of Category 2 damage set by CPG4. The analysis is invalidated by both the failure of the ground information to support assumptions made in that

respect, and the failure of the structural engineering scheme to provide an adequate design and a standard of temporary supporting works compatible with that assumed for the analysis.

7. Considering the failings described in the report and having regard for personal observation and research of schemes where damage has occurred, I would confidently expect a basement constructed in accordance with the current application to present a high probability of causing Category 3 or higher damage to Nos 29 and 33 Briardale Gardens.

8. With respect to requirement (b), reference should be made to the separate report by Dr M H de Freitas [1].

9. With reference to requirement (c), as far as is known there are no other habitable basements as opposed to cellars in the immediate vicinity. Cumulative structural impact is not of concern. Refer to the separate report by Dr M H de Freitas with respect to matters affecting the water environment.

10. The application fails also to satisfy Policy DP23 in which item (b) effectively requires schemes to limit the amount and rate of run-off and waste water entering the combined storm water and sewer network. The application proposes the use of rainfall attenuation to compensate for a small additional area of impermeable surface proposed but fails to compensate for the risk that significant amounts of ground water might penetrate the basement waterproofing and need to be pumped to the sewer intermittently over a long period.

1 Introduction and purpose of report

11. A June 2014 planning application 2014/3668/P to Camden Council (Camden) proposed a basement extension below the existing footprint of 31 Briardale Gardens NW3 7PN and a ground floor extension at the rear of the house. Camden posted a new version of the application, on the Council's website in December 2014. This has been revised technically without affecting the proposed accommodation. I am instructed to advise Penelope Davis of 29 Briardale Gardens and her neighbours Nicole Sochor and Rupert McNeil of 33 Briardale Gardens (collectively the Client) about the following matters in relation to the revised application.

(iii). Whether the application provides sufficient information to satisfy the engineering aspects of planning policies DP23 and DP27.

(iv). Whether estimates within the application of the damage that the proposed development has the potential to cause in Nos 29 and 33 Briardale Gardens are reliable.

12. I am Michael Eldred MSc. CEng. FIStructE MICE, Director of Eldred Geotechnics Ltd and a Consultant in the disciplines of Geotechnical, Geoenvironmental, Civil and Structural engineering. The assessment which follows is exclusively of matters falling within these disciplines. Dr Michael de Freitas has reported separately on geological aspects of the proposals [1] and comments in this report on such matters are based upon Dr Freitas' advice.

2 Information sources

13. In addition to references listed at the end of the report I have referred to the following documents.

(v). Revised application items published by Camden 19/12/2014

(vi). Superseded basement impact assessment published by Camden 11/6/2014

(vii). Historical maps referred to but not provided in the application

(viii). A 14th July 2014 letter of objection by KMASS Consulting Engineers.

(ix). Drawings of 29 and 33 Briardale Gardens published by Camden

(x). Digital terrain maps derived from commercially available data not forming part of the application.

(xi). Selected objections published by Camden.

3 Conceptual ground model

14. Arguably, the conceptual ground model is the most fundamentally important part of any basement impact assessment. It describes the existing situation or setting into

which it is intended to introduce the basement extension. Developed in stages, it is the eventual outcome of CPG4 [2] Stages 1 to 3; Screening, Scoping and Investigation, and it shows how the site works ([3] section 6.3.3). If the model cannot be adequately defined by the end of Stage 3, it is impossible to make a reliable assessment of the potential impact of the basement proposed on the built and natural environment. There is no model explicitly described in the application and this part of the report examines the extent to which information provided or publicly available enables a model to be defined.

3.1 Topography

15. The surface of Briardale Gardens slopes down to the west at a gradient of 1:20 at Nos 29-35 and steepens to1:9 from there to Finchley Road. Ground north of the road slopes down to the bottom of a shallow depression at the rear boundary of the houses at 1:20 before rising towards Pattison Road (Figure1). Very approximately, the depression follows the curved line of the property and Borough boundary as it slopes down to Finchley Road. The resultant north west ground slope at Nos 29 – 33 Briarley gardens is thus about 1:15. Rear gardens have been levelled and stepped at boundaries between houses to accommodate the slope.

3.2 Briardale Gardens – Odd Nos.

16. Houses on the north side of Briardale Gardens were built as semidetached pairs with numbers ascending downslope to the west. Nos. 29 and 31 are a pair as are 33 and 35. Pairs of houses step down to follow the ground slope but floor levels follow through in each pair so that the ground floors of 31 and 35 are high enough above the ground to have prompted partial use of the space below as cellars. In contrast, Nos.29 and 33 have only shallow ventilation spaces below their ground floors.

17. As far as can be ascertained by scaling the application drawings, Nos 33 and 35 are set about 1.2m lower than 29 and 31. No 31 has a cellar along its west side with an external access passage against the boundary with No 33. There is also a narrow cellar extending across the width of the house at its centre, which makes the middle 2m length of the 29/31 party wall a retaining wall. Descriptions on the trial pit diagrams in the ground investigation report suggest that the party wall was locally underpinned to achieve this arrangement. Ground level in the rest of the underfloor void coincides approximately with the ground slope.

18. Figure 2 gives an approximate sketch section of the existing and proposed situations at the 29/31 and 31/33 boundaries.

3.3 Geological records

19. Several separate observations affecting the nature of the geology have to be reconciled.

(xii). Mapped geology (Figure3) indicates that the Claygate Member of the London Clay Formation outcrops at the surface and extends from the east to about the location of No 31 Briardale Gardens. Unit D of the London Clay Formation, the recognisable "London Clay" extends below and to the west of the Claygate Member, where it is the shallowest natural deposit. A later edition of the 1:50,000 scale map suggests the likelihood that west of the Claygate Member the London Clay is covered by Head or Hillwash.

(xiii). A note on the 1870s Ordnance Survey maps shows that a brickfield existed somewhere in the vicinity of Briardale Gardens (Figure 4).

(xiv). British History online [4] refers to the brickfield having an area of about 9.5 acres, which is approximately the area of the triangle of land contained by Finchley Road, Platts Lane and the Borough boundary. The O.S. Brickfield annotation is in the centre of this area.

(xv). An ornament on the 1:10,000 British Geological Survey map depicting worked ground places the northern edge of the brickfield opposite Lyndale Avenue, which is some 65m south of Briarley Gardens.

(xvi). A record of a borehole in the front garden of No 31 and close to the house describes the ground to a depth of 1.4m as Made Ground of soft wet clay. A record of a borehole in the rear garden of No.31 describes the ground to a depth of 3.2m as soft clay Made Ground.

(xvii). Records of trial pits excavated in the cellar of No 31 show the excavations extending to about 2.7m below external ground level without encountering natural ground.

(xviii). A planning drawing (Figure5) prepared in 1937 for the rear extension of No 29 by builders based in Finchley Road suggests that they might have expected the foundation to be deeper than normal shallow strip footings.

(xix). The 14th July 2014 letter of objection submitted by KMASS refers to No.33 being founded originally on shallow strip footings. I am informed that KMASS were the structural engineers for the refurbishment of No.33.

(xx). Boreholes excavated in No. 31 indicate that the concealed upper surface (horizon) of the London Clay dips northward with a 1:9 gradient. If this is combined with the 1:20 slope to the west it suggests the resultant slope of the concealed horizon in a direction slightly west of north could be 1:8. Although the material subsequently deposited has a stabilising effect, 1:8 is a critical gradient where clay surfaces are exposed.

20. These observations prompt the following questions:

(xxi). Did the brickfield extend to the Borough boundary and if so are Nos 29 31 and 33 all founded in Made Ground?

(xxii). Was the brickfield limited as shown by the geological map and is the soft shallow clay described as made ground in reality naturally deposited Claygate, Head or Hillwash material below a thin covering of disturbed soil?

(xxiii). Does the material described as Made Ground indicate a local feature; for example, an infilled trench in the natural ground such that No 33 and perhaps part of No 29 are founded in natural ground close to the sloping side of the feature?

(xxiv). How probable is a 1:8 buried slope in the London Clay, what is the probability that it contains relict shear surfaces formed by movement before the slope was stabilised by its current overburden and what is the risk that these will weaken the material during excavation?

21. None of these questions are considered by the application or capable of being answered by the information provided. They are of fundamental significance for the model and thus for engineering design.

3.4 Engineering properties of the ground

22. Two methods were used to drill the boreholes described in the ground investigation report. The method used for Borehole 1 in the rear garden permitted samples to be taken from measured depths and strength tests to be made as the hole progressed. In soft or loose ground, care is necessary to prevent mixing of the shallow soil by allowing near surface material to be carried down. Borehole 2 in the front garden was made using a flight auger (a continuous Archimedean screw). Samples are taken from the flight as they reach the surface, the depth from which they came and their undisturbed condition in the ground being matters entirely for the judgement of the driller.

23. Tests in Borehole 1 gave values of undrained shear strength varying from 27KPa at 1.2m depth, 36KPa at 2m, 48KPa at 3m and 72KPa at 5m. The increase of strength is linear through the Made Ground and natural clay, which would not ordinarily be expected.

24. One of the borehole records describes the clay encountered below the material logged as Made Ground as “very stiff high strength” while the second provides the description “very stiff medium strength”. The descriptions are meaningless and misleading. Strength classes for clay are, in ascending order, very soft, soft, firm, stiff, very stiff and hard. Tests recorded for the first borehole show the clay at 3.2m to be only firm, that it becomes stiff at about 7.5m, but never becomes very stiff within the 15m depth investigated. The descriptions provided for this material bear no relation to any system of classification and throw doubt on other reported descriptions.

25. Foundation design recommendations in section 5 of the ground investigation report rely on the false assertion that the soil between 2m and 4.5m deep is stiff high strength clay.

3.5 Surface water and ground water

26. The local topography creates a shallow valley depression and a natural westward drainage path near the alignment of the rear property and Borough boundary. Historical maps place the latter 4 feet from a hedge. It is reasonable to suppose that the boundary was formed by a drainage ditch fed by water running off what are now the gardens of Briarley Gardens and Pattison Road. Figure 6 shows the depression fall line and the local catchment area for the depression. An Environment Agency map indicates a moderate risk of surface water flooding at the boundary; the same map indicates a high risk of such flooding in the carriageway of Briardale Gardens

27. Such ditches were fed by shallow ground water as well as surface water run off and they, as well as the “lost rivers,” were originally piped to improve public health. The practice continued later in order to facilitate urban development. The Thames Water drain close to the garden boundaries appears to be such a pipe. At No.31, the invert (the running channel) of the pipe at the north boundary is at approximately 80.70m above Ordnance Datum, which is most likely to be the level at which surface and ground water flowed before the pipe was installed.

28. The Environment Agency map also indicates a high risk of such flooding in the carriageway of Briardale Gardens.

29. When measured on 20/10/2014, ground water stood at approximately 2.6m below ground (81.15mOD) in the rear garden of No 32 and 2.0m below ground (81.75mOD) in the front garden. On 29/10/2014, the front garden water level had dropped by 0.3m to 81.45mOD while that in the rear garden was unchanged. Daily rainfall records provided by the Hampstead Scientific Society show 82mm of precipitation from 11th to 20th October and only 6.2mm from the 21st to 29th of that month. Ground water level in front of the property thus responds to rainfall pulses and it should be noted that October is normally the month when ground water is lower than at other times of the year.

30. Trial pits excavated for the first application encountered ground water at cellar foundation level but the date of excavation is unknown. The application documents record only the date on which the pits were specified by the engineer. No ground water was encountered during re-excavation of the same pits on 7/10/2014, which followed a week in which only 16mm of rainfall is recorded.

31. Borehole measurements showed that the hydraulic ground water gradient from front to back of No.31 varied from 1:46 to 1:23 according to rainfall intensity. Considering the westward slope of Briardale Gardens down towards Finchley Road, the true

ground water gradient is likely to be steeper and its flow rate higher, but that cannot be calculated from the available information.

32. The Claygate Member is classed as a secondary aquifer, with a permeability high enough for the deposit to yield groundwater to feed rivers and streams. Hillwash and Made Ground have a similar capacity. Unable to penetrate the much more impermeable London Clay below, water draining through these materials frequently issues close to the edges of such deposits as springs.

33. The ground investigation report includes some details of rising head permeability tests in the two boreholes. Comment in the Basement Impact Assessment document.is to the effect that the results apply to the shallow ground above the London Clay. They do not; if the test readings are re-interpreted to estimate the permeability of the shallow ground only, the result is a permeability more than 10 times greater than shown by the report. That is to say water can flow through the shallow ground more than 10 times more quickly than suggested by the application.

3.6 Conceptual model

34. Attempts to establish even the most basic ground model fail because ground conditions have not been sufficiently defined by the application to allow confident statements to be made about the variation of naturally and anthropologically deposited ground in in the area affecting Nos.29 to 33. There are too many unanswered questions for those responsible to know with reasonable certainty the ground and water conditions that would be encountered during the proposed excavation or that exist within neighbouring property. In consequence, reliable engineering designs and construction method statements are not possible. Furthermore, even if new investigations of good quality were to be undertaken, it would not be possible to obtain the required information without extending investigation into and below neighbouring property.

4 Proposed permanent basement structure

4.1 Scope of works

35. In broad terms the structural alterations proposed by the scheme engineers Mann Williams that are relevant to this assessment involve the following work: lowering the ground below the existing cellar and shallow underfloor space to create a basement, introducing a lightwell at the front of the basement, and removing the rear wall and a number of internal supports from the ground floor so that much of the building above is supported primarily by the party wall and external flank wall.

36. It is intended to extend the external walls down to a new foundation at the same depth as the underside of the new basement floor by traditional mass concrete

underpinning. Existing internal cellar walls would also be extended down and supported on small areas of basement floor constructed ahead of the remainder.

37. A reinforced concrete retaining wall would be cast against the insides of the party and external walls to resist forces from the soil beyond the walls. Finally the remainder of the basement floor would be cast.

4.2 Basement floor and internal foundation

38. There is uncertainty in the application about the structural function of the basement floor and how the building would be founded.

39. One part of the structural design statement refers to the need to ensure the slab bears fully on the London Clay, the inference being that it will be intended to act to some extent as a raft foundation. To some extent only because the basement floor shown would not be stiff enough to spread the building load fully.

40. Another part refers to the possibility of isolating the floor from the ground to prevent it being affected by clay heave. It is not considered in that case how the interior of the building would be founded and how the perimeter retaining walls would achieve the bearing upon the ground necessary for them to act as intended.

41. A third possibility suggested, that of monitoring the excavation to judge the effect of heave, seems impracticable; for example, clay heave below the Shell Centre showed no sign of ceasing 40 years after construction.

4.3 Underpinning party and external walls

42. Existing footings of the walls that would be underpinned seem likely to be about 0.85m wide. Applying the test results and the slightly lower than normal safety factor given in the investigation report, the allowable load on the existing footings may be calculated as approximately 100KN per metre length, which has proved to be adequate. (Calculations in the application estimate a wall load of 85KN/m.)

43. The proposal anticipates cutting the internal footing projections away. Underpinning the remaining width of the footings to the depth intended by the engineers' scheme and subsequently excavating the basement area to the same depth would reduce the foundation bearing capacity, notwithstanding the slightly increased soil strength at that depth. This is because the wall load would no longer act at the centre of the footing and because excavation inside the basement to the same depth as the underpinning would remove the majority of the ground bearing capacity.

44. The allowable bearing capacity would reduce from 100KN/m to 35KN/m., and the ultimate failure load would be 88KN/m. According to the basement impact assessment loads on the party wall and external flank wall after basement construction are expected to be 116KN/m and 110KN/m respectively. The walls would be unstable. In each case, the probability is that the clay supporting the

underpins would shear causing the base of the underpinning to kick in towards the basement and allowing both party and flank walls to settle significantly.

45. Calculations within the structural design submission include sketches showing an intention for the underpinning to be strengthened by tying it to the internal reinforced concrete walls with some form of reinforcement so the two act as one. But it would be the excavation of the basement that reduced the bearing capacity of the wall footings. Any consequent failure and settlement would occur before the reinforced concrete walls could be constructed.

4.4 Reinforced concrete retaining walls

46. The intention to tie the reinforced concrete and underpinning together conflicts with the structural design statement. This anticipates that the primary waterproofing of the basement would be by a tanking barrier passing below the basement slab and rising between the reinforced concrete walls and the underpinning. Ties indicated by the calculations would penetrate the barrier nullifying its protection. Structural adequacy of the ties would be doubtful when the underpinning and retaining walls were separated by a membrane and when the ties might be corroded by water.

47. The calculations also show that the perimeter reinforced concrete retaining walls need to be restrained horizontally at their top edge. It is proposed that a number of steel beams be inserted within the ground floor for this purpose. In the rear portion of the basement beyond the entrance passageway the intention is to carry the beams across the width of the building so that the east party wall is braced against the west external wall. But whereas the ground below No.29 would exert force against the party wall, the west wall would be above ground and unable to provide the required bracing force. The party wall and external wall would be unstable.

48. In the front part of the basement, the external passage is at cellar level. Steel bracing has been shown fitted against the party wall with the intention of forming a horizontal girder in the floor thickness capable of supporting the wall. To act as intended, the ends of the girder would have to be anchored to some other parts of the structure. In fact, the girder is shown anchored to the wall it is supposed to support. The girder would not work and the configuration of the basement walls would make it difficult to improve matters. The party wall would be unstable

4.5 Buoyancy

49. The calculations show it is intended to design the basement floor to resist upward ground water pressure below the floor. Waterproofed as proposed by the structural design statement, the basement floor and walls would constitute a box separate from the external and party walls and held down against flotation by its own weight and the weight of construction it supported. The notional weight of the reinforced concrete box would seem to be about the same as the potential ground water uplift; both are

close to 1000KN (100tonnes). The factor of safety (normally at least 2 in overall terms) would have to be provided by the weight of construction bearing upon the box being about 100tonnes. From brief examination of the construction shown by the drawings it seems unlikely that the building fabric of the house would provide the necessary weight. The structural design statement and calculations offer no comment.

4.6 Existing concrete underpinning

50. In order to place the reinforced concrete retaining walls against the central underpinned section of the party wall it will be necessary to remove the projecting part of the underpin. The record of trial pit 3B in the ground investigation report indicates that this would require a substantial amount of concrete to be cut or broken from the wall. The consequent noise and vibration experienced in No.29 could be very significant and, conceivably, damaging, depending on how and when it was done

4.4 Summary of Section 4

51. The permanent works design fails to satisfy the basic requirements of structural stability even to the extent necessary at planning stage. The structural design does not work.

52. It does not define an adequate foundation for the interior of the building.

53. Underpinned party wall and external wall foundations are unstable.

54. The designed method for allowing underpinning and retaining walls to act as one is impracticable, impairs resistance to water penetration and is the subject of conflicting statements.

55. The party wall with No.29 and external wall next to No.33 are laterally unstable because the designed method of supporting the top edge of the reinforced concrete retaining walls does not work.

56. It does not define an adequate safety factor against flotation uplift (about 100tonnes) of the basement floor/walls box.

5 Construction method and temporary works of support

5.1 Access to working area and underpinning internal walls

57. The plan outlined by section 5 of the structural report – Temporary Works and Phasing – would be initially to create a working access below the front bay and then for excavation to be carried out to allow internal walls to be founded at the lower depth. This would be done while leaving earth in place around the perimeter of the basement area as a means of preventing the party wall and external walls from being undermined.

58. *Comment*. The working access would need to extend to or near the new basement level. That would immediately reduce the existing earth support to the party wall because the internal ground surface there is close to ground floor level. Considering the phase 1 plan in the structural report it would also be very difficult to excavate for the internal walls from the varied ground levels that exist and to dewater the excavations without disturbing ground near the perimeter walls.

59. *Outcome*. The front section of the party wall would become unstable and there would be a significant probability that ground supporting the remainder of the party wall and external walls would move sufficiently to cause foundation settlement.

5.2 Underpinning party and external walls

60. Phase 2 of the work would involve excavating around the perimeter in short lengths, cutting off the footing projections, extending the excavations below the footing and constructing the underpin legs in lengths of approximately 1m. The work would take place in a predetermined sequence with water pumped out as necessary and each leg would be propped back against the internal side of the excavation to resist external earth and water pressure. When underpinning was complete, there would be a trench around the perimeter and close by would be excavations for the internal wall foundations.

61. *Comment*. The basement area is small, much of the excavation would be about 2m in depth and would be carried out with only about 1m headroom below the ground floor. The bunds of earth left between the underpinning trench and internal foundation trenches would be narrow and consist of made ground, according to the ground investigation report. There is considerable probability that they would be unstable and dangerous, and it is certain they could not provide the lateral resistance required to support the underpinning so as to prevent it from moving significantly.

62. *Outcome*. Dangerous working conditions and high probability that the method proposed for propping the underpinning would not prevent inward movement of the party and external walls.

5.3 Excavation of remainder of the basement area

63. The plan for the second part of Phase 2 suggests that the remaining ground in each of the small areas contained by the internal and party or external walls should be excavated down to the formation level on which the basement floor would be constructed. As this happened struts would be installed to re-support the perimeter walls. They would in turn be supported at their other ends by posts driven into the ground below the basement. The retaining walls and remainder of the basement floor would then be constructed, leaving pockets in both walls and floor to allow the props to stay until the concrete had gained strength.

64. *Comment*. The raking struts and posts could not be installed before the ground against which the underpinned walls was propped had been excavated. At some point the party and perimeter walls would be unsupported. The posts driven into the ground would not support the struts sufficiently to prevent significant movement.

65. It is difficult to see how the tanking barrier could be effectively installed below the floor and behind the walls. Quite apart from the difficulty of applying a barrier to the face of underpinning between and below which water was seeping, the task of waterproofing pockets in the walls and floor effectively after the struts were removed would appear demanding.

66. *Outcome*. Inward movement of underpinned party and external walls and risk of water ingress.

5.4 Ground water control

67. The construction statement refers to the need to anticipate groundwater entering the excavation, whilst the basement impact assessment considers that the low permeability of the ground will prevent the occurrence of free flowing water. As previously noted, the permeability and thus the ingress of water are likely to be rather greater than claimed in the ground investigation report.

68. The ground investigation report and the BIA refer to the possibility that water entering the excavation might bring with it fine soil particles from the surrounding ground. Each document also notes that if this happens it will increase the risk of settlement damage to neighbouring properties. Care is recommended but without advice about methods of exerting such care.

69. In contrast, the construction statement, in referring to the possibility of fine material being washed out expresses concern only about the need to restrict loss of fines from the excavation and compromising disposal of pumped water to the sewer. It proposes the use of sumps and appropriate pumping equipment.

70. In considering this it has to be realised that several discrete excavations below ground water level would be open at any one time and each one might need to be pumped from an internal sump to enable the excavation to be bottomed out ready for concrete. Between 40 and 50 underpin legs are indicated by the drawings and each one would require a separate excavation which would quite possibly need to be baled or pumped out to keep the water level down as the hole progressed. In these circumstances it is unrealistic to suppose that the extraction of fines could be controlled.

71. It has been shown that the ground investigation has not provided reliable information about the geology and physical nature of the soils that would be encountered during excavation or that exist below neighbouring properties. Pumping water from within

the excavation would increase the local hydraulic gradient and any fine material dislodged from the surrounding ground by the flow, no matter how slow it might be, would be carried into the excavation. There would be no preventing that. If the ground is such that fine material can become unstable during increased flow of water, the risk to neighbouring property can be severe.

72. This is a well known form of hazard and one which I consider made a significant contribution to severe damage within two properties in Camden for which I have researched cause and effect. One of these suffered Category 4 damage and the other, in which the damage was Category 5 has since been demolished.

73. This type of groundwater action and hazard can be ameliorated only by either installing a cut off wall around the excavation or by pumping from specially filtered external wells. Neither is possible in the present case.

74. It has also been shown that groundwater levels fluctuate quite quickly according to the amount of rainfall that occurs in a short period. For another property in Hampstead, I reported on a planning application in conjunction with Dr de Freitas, who predicted similar conditions and consequent groundwater difficulties. Subsequent observation, while acting as party wall surveyor for adjoining owners, was of storm conditions causing excavations to flood with groundwater and of consequent intensive pumping weakening ground to cause Category 3-4 damage in both the host and adjoining buildings.

5.5 Summary of Section 5.

75. Consecutive stages of construction and respective inadequate proposals for temporary supports would allow the party and external walls to move inward under pressure from the ground and water beyond the excavation.

76. The risk of fine material being washed out of the ground so as to cause settlement of neighbouring properties during dewatering of the excavation is noted by the ground investigation and BIA reports but without recommendations for lessening the risk. The risk is not considered by the engineering report.

77. This form of groundwater risk is well known and examples have been given. But in the circumstances of this application it is not possible to ameliorate that risk of damaging neighbouring property.

78. Variation of groundwater levels following rainfall presents the possibility of the basement excavation flooding during storm periods and giving rise to increased risk of damage to the host and neighbouring properties.

6 Buildability

79. An engineering scheme does not have to be presented in its final form including all of the detail needed for construction at the planning stage. It must however demonstrate that as well as satisfying planning policies it is a practicable method of engineering the scheme proposed by the application, and that it can be developed for construction without significant change. It has to be buildable.

80. Section 4 shows that there is no foundation defined for the interior of the building; underpinned party wall and external wall foundations are unstable; the proposed method for allowing underpinning and retaining walls to act as one is impracticable; the designed method of supporting the top edge of the reinforced concrete retaining walls does not work and that the party wall with No.29 and external wall next to No.33 are consequently laterally unstable.

81. Section 5 shows that the proposed method of construction and temporary support would be dangerous, leave perimeter walls unsupported during some excavation stages, allowing them to move in, and that groundwater issues capable of affecting the stability of the construction have not been considered by the design.

82. I accept that the method of construction and temporary works design would eventually be decided by contractors but my concern in this respect is that it is quite probable that quite apart from Section 4 comments, the permanent construction would have to change to allow a viable scheme of temporary support to be designed.

83. I conclude that the scheme proposed by the application is not buildable.

7 Ground movement and structural damage

7.1 Analysis provided by the basement impact assessment

84. In November 2014, Applied Geotechnical Engineering provided an analysis of ground movement and damage risk likely to affect Nos.29 and 33 in consequence of the basement construction. They relied upon ground investigation information provided by SAS (the full SAS report is not cited), together with foundation load information, a June 2014 basement impact assessment and emailed correspondence by Mann Williams. Their report predates the current basement impact assessment and structural design reports and so does not account for their content.

85. The analysis was made largely by interpretation of industry standard publications. Use of these normally requires a number of assumptions to be made about construction methods and engineering ground properties. In this case, the analysis is qualified as a whole by an assumption that the basement perimeter retaining walls would be stiffly and safely propped at all stages of construction in accordance with good practice. It is a normal qualification but it is important to understand that it controls the validity of the analysis. A caution is added to the effect that inadequate

propping is likely to result in increased ground movements and damage to adjacent properties; preloading of props and monitoring of prop loads are recommended.

86. The construction method and temporary support work described by the application are far from what would be required to comply with the qualification and the analysis is immediately invalidated.

87. A further assumption is made about the Young's moduli of the soil, which control estimates of the amount by which ground below adjacent buildings will heave following excavation of the basement. No estimate is offered of the amount by which ground within the excavation would be expected to heave; that was not part of the analysis. The assumption is stated to be based on information gained elsewhere but the source is too vague to be examined. Without better justification the Moduli values assumed appear high and serve to reduce heave estimates.

88. During excavation the perimeter retaining walls will be formed of a mixture of brickwork and concrete underpinning. There are no published case studies of the amount of ground and structural movement caused by the installation of underpinning and the lateral force subsequently exerted upon it by retained soil.

89. To estimate these effects the analysis assumes that case histories for an entirely different type of wall construction which is supported in a completely different way can be used. Furthermore, it assumes that the movement to be expected can be typified by measurements made on such walls constructed under a class of control never applied to residential basements, let alone those which, like that proposed, are retrofitted under difficult working conditions.

90. Although such assumptions are sometimes made when underpinning is entirely in clay and above groundwater level there are, as noted above, no published case studies that justify them. In the present case they, together with the failure of other parts of the application to provide the assumed standard of support, make the estimates of ground movement and damage provided meaningless.

91. The reality is that even in good well defined "dry" ground conditions basements constructed with underpinned retaining walls have a history of causing at least some damage to neighbouring property. In poor or inadequately investigated ground in which excavation extends below ground water level the risk of excessive ground movement and structural damage occurring is greatly magnified, as is the risk to workers. It is understood that the Construction (Design and Management) Regulations (CDM) are shortly to be extended to residential projects largely in consequence of HSE concerns about basement construction. Further evidence of the problem is a publication entitled "Guidelines on safe and efficient basement construction directly below or near to existing structures" which the Association of Specialist Underpinning Contractors felt it necessary to produce in the light of "a

significant rise in health and safety incidents linked to basement construction including fatalities, injuries and damage to buildings".

92. In the light of experience in Hampstead and elsewhere in Camden I would confidently expect a basement constructed in accordance with the current application to present a high probability of causing Category 3 or higher damage to Nos. 29 and 33 Briardale gardens.

8 Surface water and ground water disposal

93. The drainage design statement within the structural report anticipates compensating for the surface water flow from the proposed additional impermeable surface area by attenuating the flow of rainwater from part of the roof. The need to anticipate the risk of significant volumes of groundwater being disposed of to the sewer is not considered.

94. A two tier system of basement waterproofing is proposed. The outside of the basement box would be tanked and the inside would be lined with a Delta membrane system that would catch and drain any water leaking through the tanking to a pumped sump. The possible difficulties associated with installation of the tanking are discussed in Section 4 above and the possibility of significant failure of the tanking and flow into the Delta membrane should be countenanced when considering SUDS provisions.

95. This acquires further importance when it is considered that the Environment Agency identify the carriageway of Briardale Gardens as high risk with respect to surface water flooding.

9 Compliance with planning policy DP23

9.1 The policy

96. Policy DP23 states that *The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by:*

a) incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;

b) limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding;

c) reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring developments in the areas identified by the North London Strategic Flood Risk Assessment and shown on Map 2

as being at risk of surface water flooding are designed to cope with the potential flooding;

d) ensuring that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present; and

d) encouraging the provision of attractive and efficient water features.

9.2 Application response

97. The application goes some way towards satisfying the requirements of item (b) and thus item (a) but full compliance should include provision for long term groundwater discharge. Item (c) relates in part to (b) and otherwise to conditions that would not affect the development. Item (d) is not relevant to the proposal.

10 Compliance with planning policy DP27

10.1 The policy

98. This policy has 11 itemised requirements. Only the first three of these are relevant to this report. The policy states that *In determining proposals for basement and other underground development, the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability, where appropriate. The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability. We will require developers to demonstrate by methodologies appropriate to the site that schemes.*

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run-off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area;

10.2 Application response to requirement (a)

99. The scheme proposed by the application is not buildable. Consequentially it does not satisfy any part of requirement (a). Section 6 above sets out the reasons that it is not buildable. Without diminishing the fundamental importance of this conclusion in any way, the following additional conclusions relate to the specific wording of DP27 and CPG4.

100. This assessment of the application has shown that the scheme proposed would fail to maintain the structural stability of either No.31 or Nos. 29 and 33 Briardale Gardens. The permanent works design for No.31 fails in the several ways described in Section

4 above to satisfy the basic requirements of structural stability even to the extent necessary at planning stage. The structural design does not work.

101. Section 5 shows that the proposed method of construction and temporary support would be dangerous, leave perimeter walls unsupported during some excavation stages, allowing them to move in, and that groundwater issues capable of affecting the stability of the construction have not been considered by the design.

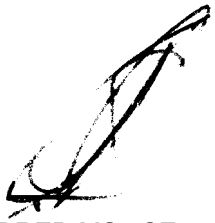
102. One of the groundwater issues presents a significant risk of causing damage to Nos. 29 and 33. That risk could be reduced only by either constructing a deep cut off wall around the entire area of the proposed excavation or by pumping from specially filtered wells beyond the building. Neither is practically feasible in the circumstances, which means that the risk could not be ameliorated. (DP27, 27.3)

103. The application attempts to demonstrate that damage to Nos. 29 and 33 would be less that the criterion of category 2 damage set by CPG4. The analysis is invalidated by both the failure of the ground information to support assumptions made in that respect, and the failure of the structural engineering scheme to provide an adequate design and a standard of temporary supporting works compatible with that assumed for the analysis. The estimate is unreliable; a risk of Category 3 or higher damage is more appropriate for the current application.

10.2 Application response to requirements (b) and (c)

104. With respect to requirement (b), reference should be made to the separate report by Dr M H de Freitas [1].

105. With reference to requirement (c), as far as is known there are no other habitable basements as opposed to cellars in the immediate vicinity. Cumulative structural impact is not of concern. Refer to the separate report by Dr M H de Freitas with respect to matters affecting the water environment.



MICHAEL ELDRED MSc.CEng.FIStructE.MICE
ELDRED GEOTECHNICS LTD
Date 9th February 2015

References:

[1] de Freitas M.H. Geology and ground conditions in the vicinity of 31 Briardale Gardens NW3 7PN – Substantive issues for rejecting the application. February 2015

[2] Camden Planning Guidance 4, Basements and Lightwells, (CPG4)

[3] Camden geological, hydrogeological and hydrological study – Guidance for subterranean development.

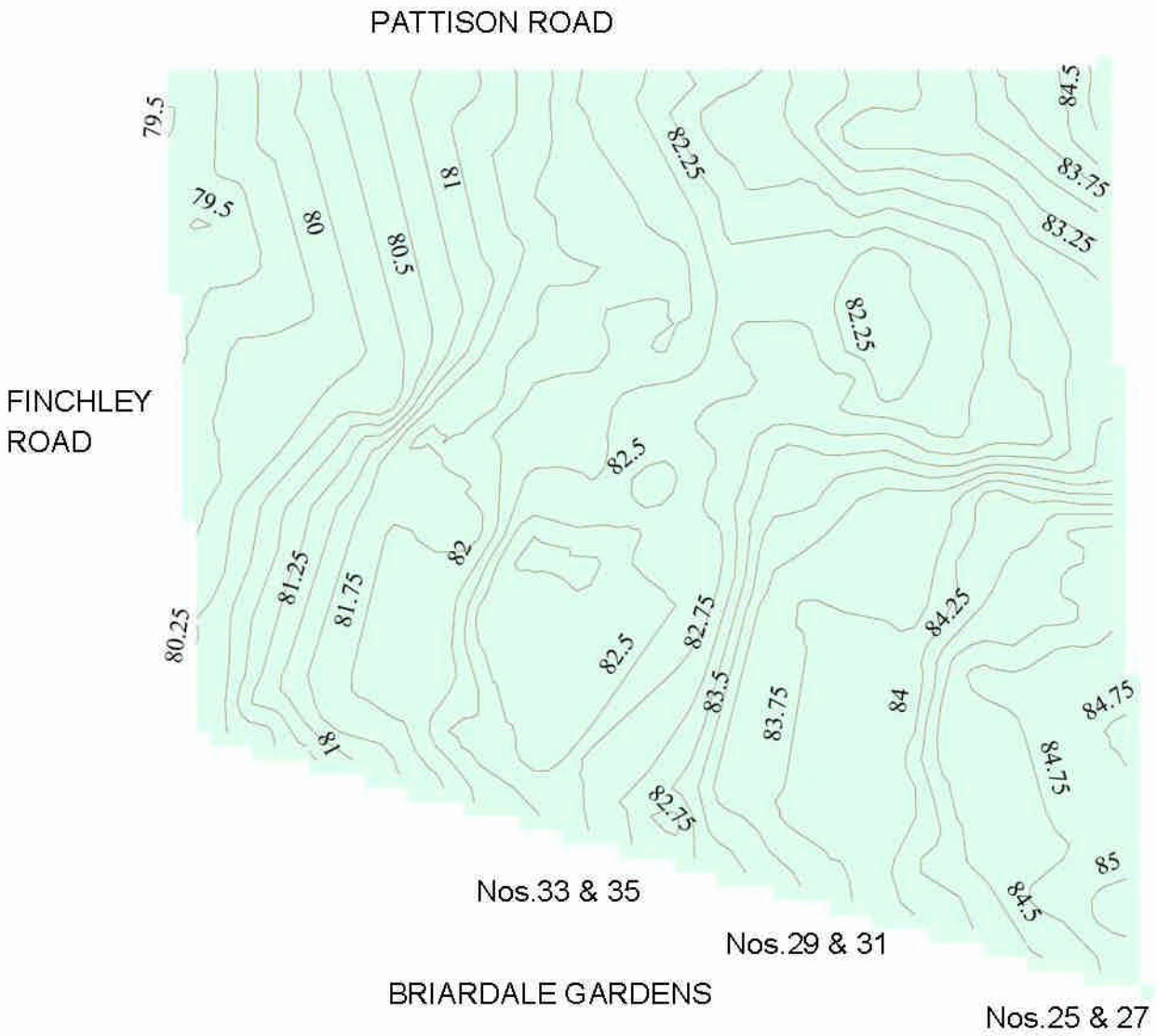
[4] http://www.british-history.ac.uk/vch/middx/vol9/pp73-75

31 BRIARDALE GARDENS NW3 7PN

A geotechnical and structural assessment of a basement planning application 2014/3668/P and its potential impact on Nos. 29 and 33 Briardale Gardens

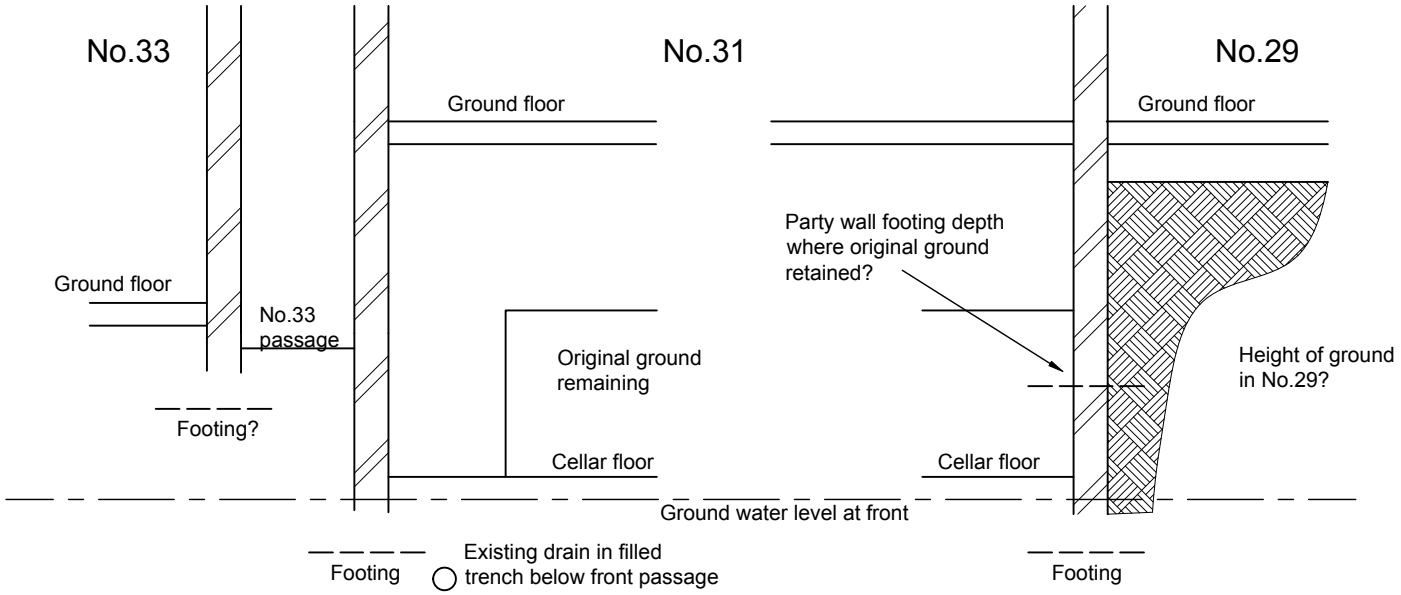
Appendix A – Figures 1 to 6

Project Ref.	Project Title.	Indicative North
G1422	**31 BRIARDALE GARDENS NW3 7PN**	N
Sheet Ref. **Figure 1**	**GROUND SURFACE CONTOURS RELATIVE TO O.S. DATUM**	

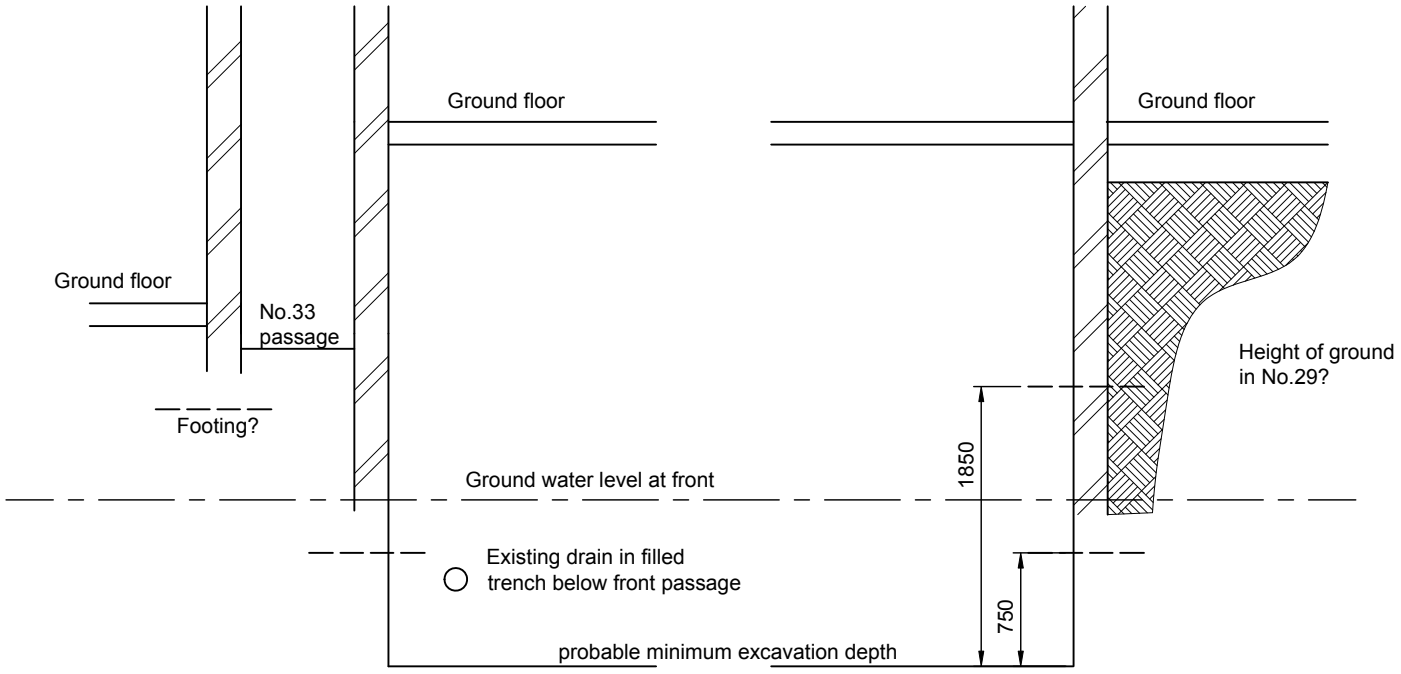


Contours derived from Digital Terrain Model (bare earth) based on 1m x 1m grid LIDAR data. The analysis software produces contours by interpolating between grid measurements so that sharp steps at property boundaries appear as closely spaced contours.

Eldred Geotechnics Ltd Telephone: 01689 869406 Email: mail@eldreds-geo.co.uk
2013 EGL MAP G1422 BRIARDALE NW3.GPJ ELDRED-2013.GDT 29/1/15



EXISTING
Approx on line of Architect Section B - B



PROPOSED
Approx on line of Architect Section B - B

Information for sketch measured from application drawings using Adobe software and otherwise from application reports.

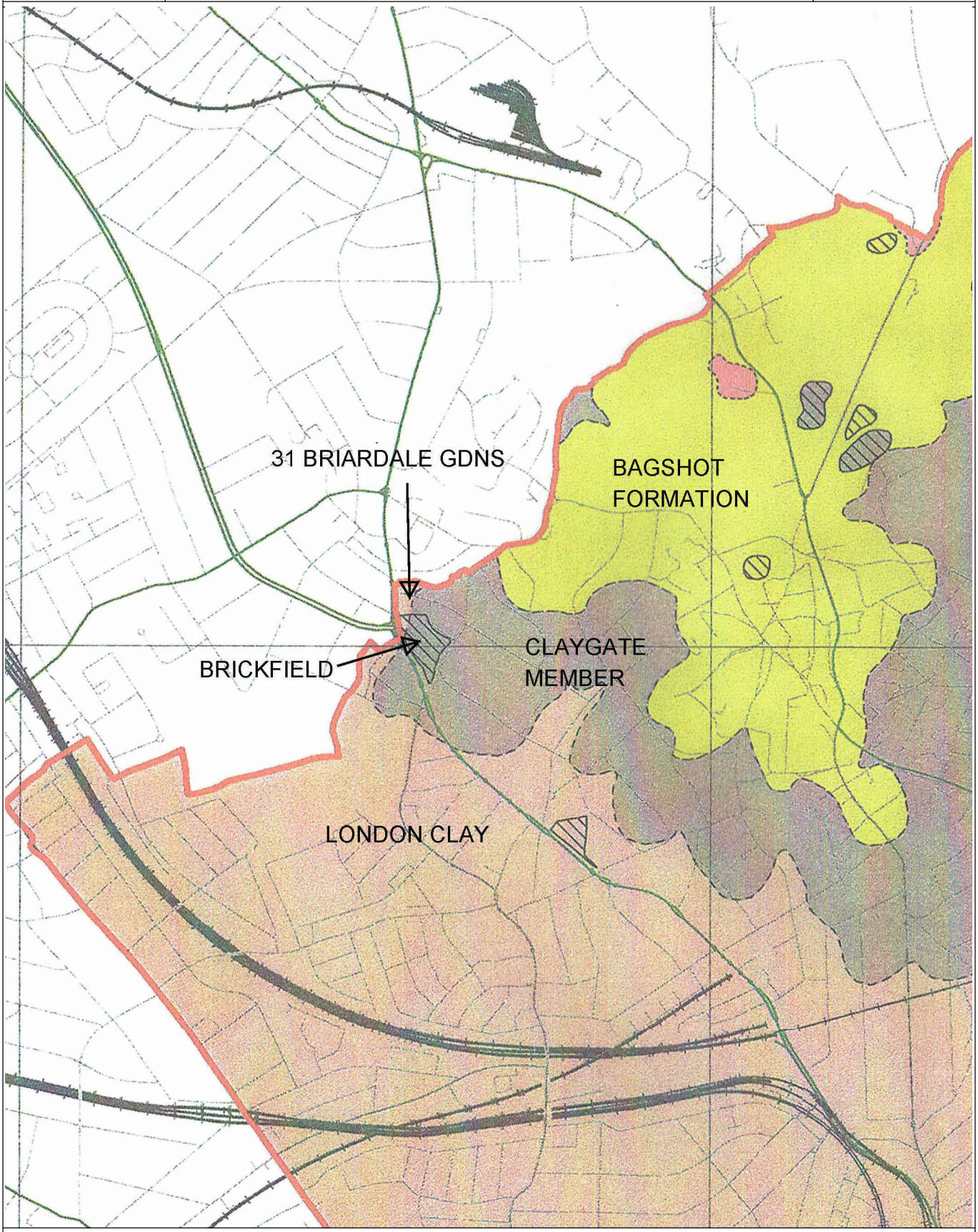
Figure 2

E1 01/15 First issue

ELDRED GEOTECHNICS *Consulting Environmental & Geotechnical Engineers* 11A Woodside Chelsfield Orpington Kent BR6 6HY Tel. 01689 869406	REVIEW OF PROPOSED BASEMENT EXTENSION 31 BRIARDALE GARDENS NW3 7PN	G1422-SK-01-E1
	SKETCHED EXISTING AND PROPOSED SECTIONS WITH REFERENCE TO PLANNING APPLICATION 2014/3668/P	01/15

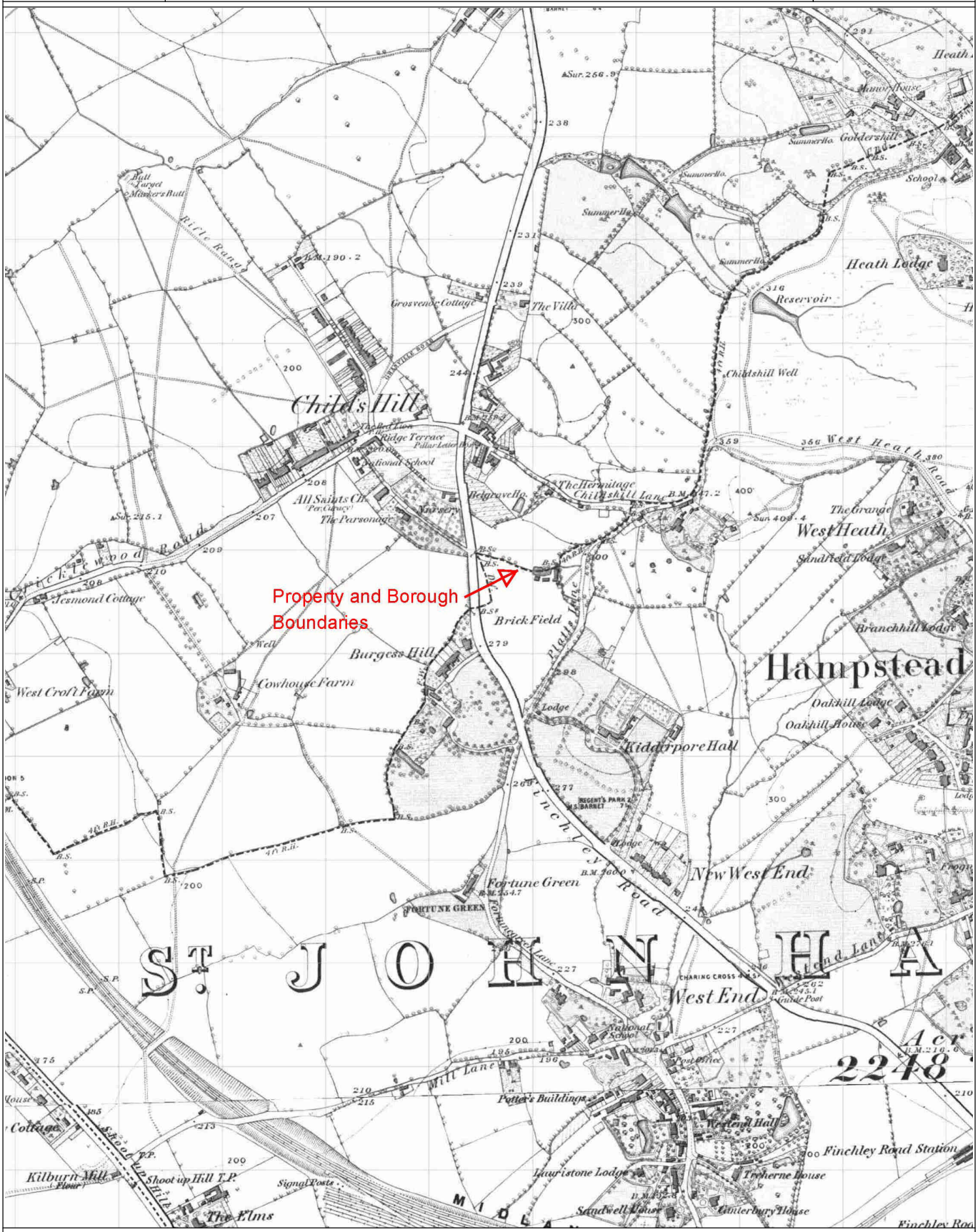
Eldreds

Project Ref.	Project Title.	Indicative North
G1422	**31 BRIARDALE GARDENS NW3 7PN**	N
Sheet Ref. **Figure 3**	**EXTRACT FROM 1:10,000 BGS MAP - NORTH CAMDEN AREA**	



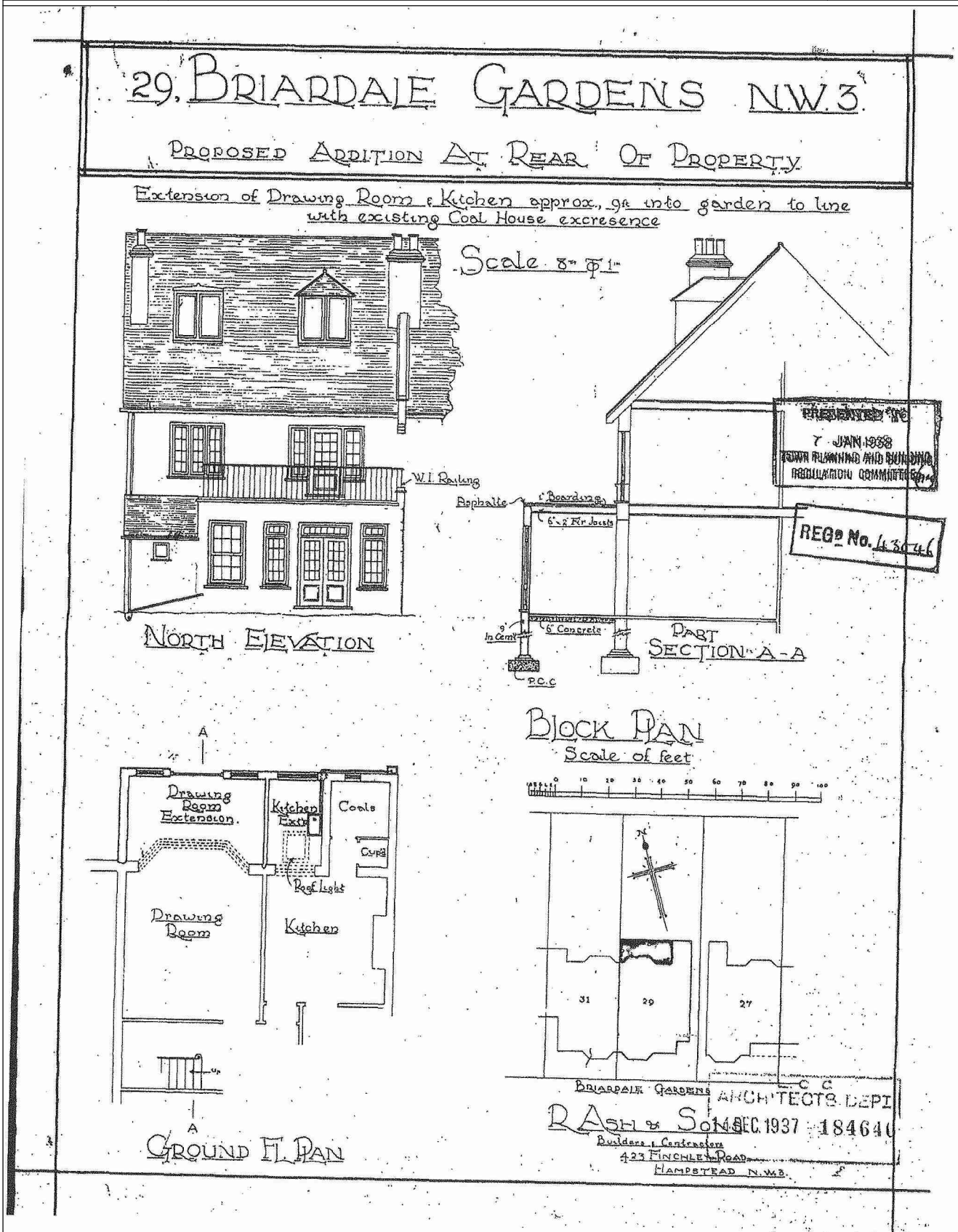
Eldred Geotechnics Ltd Telephone: 01689 869406 Email: mail@eldreds-geo.co.uk
2013 EGL MAP G1422 BRIARDALE NW3.GPJ ELDRED-2013.GDT 29/1/15

Project Ref.	Project Title.	Indicative North
G1422	**31 BRIARDALE GARDENS NW3 7PN**	N
Sheet Ref.	**EXTRACT FROM 1:10560 O.S.MAP 1874**	
Figure 4		



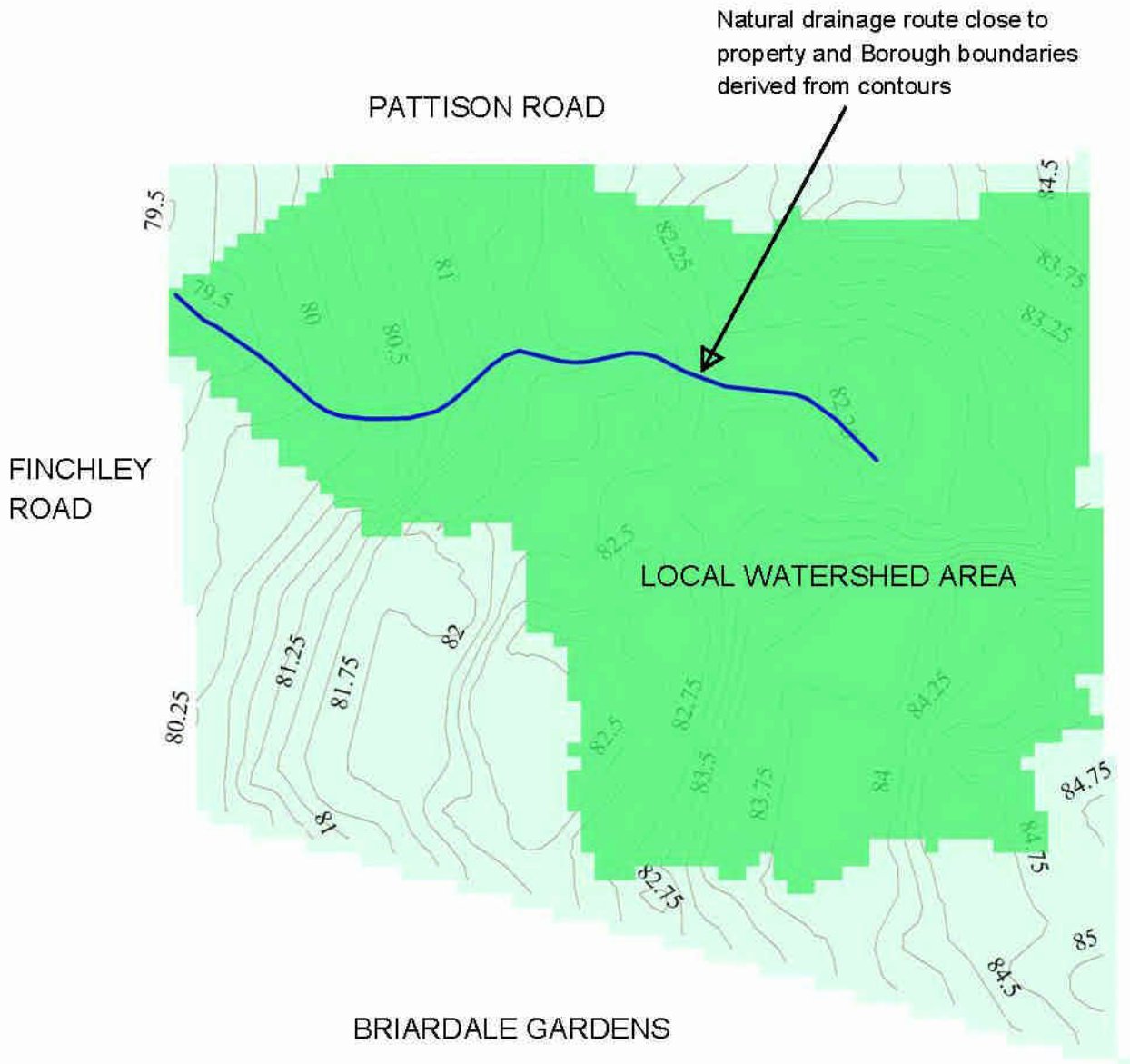
Eldred Geotechnics Ltd Telephone: 01689 869406 Email: mail@eldreds-geo.co.uk
2013 EGL MAP G1422 BRIARDALE NW3.GPJ ELDRED-2013.GDT 29/1/15

Project Ref.	Project Title.	Indicative North
G1422	**31 BRIARDALE GARDENS NW3 7PN**	
Sheet Ref. **Figure 5**	**29 BRIARDALE GARDENS 1937 REAR EXTENSION**	



Eldred Geotechnics Ltd Telephone: 01689 869406 Email: mail@eldreds-geo.co.uk
2013 EGL MAP G1422 BRIARDALE NW3.GPJ ELDRED-2013.GDT 29/1/15

Project Ref.	Project Title.	Indicative North
G1422	**31 BRIARDALE GARDENS NW3 7PN**	N
Sheet Ref. **Figure 6**	**LOCAL WATERSHED AREA AND DRAINAGE PATH**	



Eldred Geotechnics Ltd Telephone: 01689 869406 Email: mail@eldreds-geo.co.uk
2013 EGL MAP G1422 BRIARDALE NW3.GPJ ELDRED-2013.GDT 29/1/15

FIRST STEPS LTD
To Success

Geology and ground conditions in the vicinity of
31 Briardale Gardens, London, NW3 7PN

Substantive issues for rejecting the application.
9th February 2015

Summary

Groundwater makes this application impossible to achieve as submitted. There is no means of managing it even though the location lies within an area of concern shown on Camden's flood risk maps.

The area has a long history of brickworkings going back to the early 1800's. The ground is therefore likely to be very variable yet the application is based on uninformative and incorrect descriptions of the ground. In short we do not know what is there.

Camden expects home owners to develop their property in accord with good engineering and I have to conclude that as far as an understanding of the ground is concerned the reassurances and calculations within the application are unfounded and its assessments are wrong.

Background

1. The geology and ground conditions relevant to Planning Application 2014/3668/P for a basement at 31 Briardale Gardens were initially presented in the Basement Impact Assessment (BIA) provided by Mann Williams in June 2014.

2. This BIA was heavily criticised by Chelmer Consulting Services, an independent reviewer appointed by the London Borough of Camden, for its absence of critical facts, its errors in understanding and interpretation of those facts it presented, and its use of inappropriately qualified persons for its authorship (BIA Verification Report, September 2014).

3. To remedy these shortcomings a site specific ground investigation was undertaken by Site Analytical Services in December 2014 and a revised BIA based upon it. This revised BIA also fails to appreciate key geotechnical issues which have the potential to undermine neighbouring properties at this site. Failure to address these issues with the application as submitted can cause the ground to move on which neighbouring properties are founded, initiating twisting and cracking of Nos. 29 and 33 both during and after construction.

4. **Four aspects of the ground in this area combine to make this site unique and pose dangers for properties adjacent to an excavation**, viz.;

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(i) the presence of a water channel at the back of the gardens of Nos. 29, 31, 33 and at the back of other gardens forming the northern side of Briardale Gardens, in an area shown on Camden's flood maps as liable to ponding.

(ii) the erodible and compressible nature of the near surface deposit described as Made Ground on which these properties are founded,

(iii) the former presence of local excavations for brick making materials, of unknown extent and possibly beneath existing properties, and

(iv) the geological history of shallow mudflows that moved down the slopes of Childs Hill and the Heath during the latter stages of the Ice Age lowering the strength of the ground.

5. Any one of these could pose a problem for basement excavation but all four raise significant issues that challenge the feasibility of the application proposed, as explained in brief below.

(i) The relationship of the drain to its surrounding groundwater are unknown; this particular spot is shown on Camden's map of Surface Runoff for Camden West as being a place where surface water can pond (Appendix D in Managing flood risk in Camden). A basement within yards of that drain (which this application proposes) will change the relationship of the drain with its surrounding groundwater and disturb what is already a delicate balance between ground water, the drain and ponding.

(ii) The Made Ground through which the basement of No.31 must pass, within yards of the drain, is not only susceptible to ponding (i.e. flooding) but to change in the pressure of water and moisture content of the ground such a change in its groundwater regime can create. It is also susceptible to erosion outside an excavation by ground water flowing to an excavation. Any of these will initiate differential settlement initiating twisting and cracking of Nos. 29 and 33 that could continue after completion of the basement.

(iii) The limits of the brickworks are unknown; they may exist in part under 29, 31 and 33. The disturbed ground associated with them can influence this site and thus the predictions made for ground movement and ground stability cannot be justified.

(iii) The ancient mudslides reduce the mechanical properties of the ground and it is the values of these that are relied on to guide the design of lateral support of excavations during construction. If these values have been overestimated deformation in neighbouring ground can be expected.

6. The rapidity with which dangerous conditions can be developed within an excavation in such ground means that the design details necessary to prevent that happening cannot be left to Conditional clauses, where there could be too little time to respond adequately before damage was done. This ground

requires construction within it to be designed and those designs to be submitted for approval.

Details regarding issue 4(i)

7.The first maps for this area, dating back to 1860's, record a well in the region of what is now the top of Platt's Lane and its junction with Hermitage Lane, approximately 200m to 250m uphill of 31 Briardale Gardens. This would accord with the geology of the area because it is in this region that the more permeable materials capping Childs Hill meet the much less permeable materials on which they sit which forms the ground to the west of Finchley Road.

8. Leading from this area is a 4ft ditch which was a feature of sufficient note to be taken as the municipal boundary of the time and remains the boundary between Camden and Barnet. This ditch forms the drainage works separating the back gardens of 29, 31 and 33 Briardale Gardens from those of Pattison Road to the north.

9. This feature has been researched and is known to be a present day carrier of water and on Thames Water records of existing services.

10. Although this ditch may appear a minor feature its importance is in the control it exerts on surrounding groundwater. It acts as a local shallow drain and indeed this may well have been its original purpose – to tap the shallow groundwater uphill of Finchley Road, so helping drain the brick fields of that area (see 4(iii) above) and providing a source of water for the Nursery that was at that time immediately opposite its junction with Finchley Road.

11. The water within that ditch system is now channelled into a 9inch sewer that was laid in it, along the back of the gardens, and intercepted by Thames Water close to Finchley Road. However this does not mean that ground water has gone away and is not flowing towards that ditch. All the sewer does is provide a permanent open and permeable drainage path for any groundwater that would have, and obviously still does naturally entered the ditch to be carried away, so helping to prevent water levels rising in wet weather.

12. Two boreholes (BH) have been drilled as part of the ground investigations but unfortunately the data provided on groundwater by them is insufficient to clarify the situation. The basic geology is of water bearing strata into which a 4ft ditch has been dug and drains laid, overlying clay; in other words stratified ground with a water bearing horizon sitting on clay. The boreholes have been instrumented in such a way that the natural stratification has been bridged and broken. This means the water levels measured within 2.63m of ground level (BH1) and 2.06m (BH2) are corrupt data – indeed ground level has not even been recorded so it is impossible to compare the two measurements in absolute terms of height above datum. Whatever their absolute values, the

water levels could be higher, as the presence of the ditch suggests they commonly are.

13. The gradient of water levels in the area cannot be calculated either, as the factual data provided shows the water levels have been measured at only two places, and levels at three places are needed for this calculation.

14. The presence of flowing groundwater in this upper layer of ground above the clay means that any fine material that can be washed from the ground by water diverted from its present natural course to the excavation will remove solids from the ground and initiate settlement. This happens quickly, almost instantaneously, once groundwater begins to flow to an excavation, and leaves little or no time for preventative actions to be taken, such as grouting (which is quite inappropriate) and pumping (which makes the condition worse than before). The only way to control this is to have the ability to pump from outside the limits of the excavation and at the same time limit the extent of drawdown away from the excavation so as not to initiate settlement by consolidation under neighbouring properties. The applicant has no evidence upon which to base such a system for ground water control; the water levels are corrupt data, the direction of flow is unknown, and the relationship between water levels in the ground, and recharge from rainfall and leakage from utilities remain completely uninvestigated. Further, it is most likely that recharge will be in pulses which could cause sudden rises in water levels – exactly the sort that could catch a contractor, even one with pumping in place, unawares especially if it occurs at night, or over a week end, or during a public holiday.

15. With groundwater management not being an option that can be justified by the applicant the only alternative for controlling groundwater is ground water exclusion, and that means a cut-off; an impermeable wall around the excavation taken into the clay at depth. The consequence of that will be the diversion of groundwater. But no calculation of the effect of such diversion either on the flow to the ditch or on its effects on groundwater levels upstream and downstream of the basement can be justified with the data at hand. An attempt at this has been made to calculate such a rise but the analyses misunderstand the stratified nature of the groundwater, use values of permeability which may not be appropriate and do not consider the likely presence of pulses of recharge which could elevate water levels from those measured to date.

Details regarding issue 4(ii)

16. The nature of the near surface deposit described as Made Ground and through which these changes initiated by changes to the groundwater regime may occur and through which the basement of No.31 must pass, cannot be discerned from the borehole logs. The descriptions provided are of poor quality and suggest they may not have been written by a qualified geologist, but possibly by the driller; the logs are not signed.

17. The long history of brickfields in the area suggests that the deposit described as “Made Ground”, i.e. what the British Geological Survey call “artificial ground” is in fact largely the remains of natural ground that has been worked by man. Where it has not been worked it will retain its natural state and the natural state of this superficial cover to the London Clay surrounding Hampstead Heath is that of a mixture of clay, silt and sand with occasionally some gravel, all derived from the strata higher up the slope from where it is found – in this case the strata formerly known as the Claygate Beds (now the Claygate Formation) and the Bagshot Beds, and transported when they were much wetter as shallow mudflows.

18. These deposits tend to be bedded with sands, silts and clays forming interbedded laminations some of which, depending on their age, are disturbed from their original sub-horizontal aspect by the actions of freezing and thawing during cold seasons in the Ice Age.

19. The response of this fabric to changes to changes in the natural groundwater regime are;

i) a softening of the ground when its moisture content increases beyond that already imposed by the natural fluctuation of ground water levels, as might occur on the upstream side of any basement,

ii) a hardening of the ground when its moisture content decreases beyond that already imposed by the natural fluctuation of ground water levels, as might occur on the downstream side of any basement

ii) these moisture content changes can also be accompanied by changes to the stiffness and shear strength of the ground generated by altering the pore water pressure within it as a result of excavation, and later by the diversion of groundwater around the excavation. The ground on which the neighbouring houses are built will not have experienced such changes since their construction, and as they appear to be founded in this deposit, the response of the deposit to such changes needs to be known before assurances of ground stability can be given. It is not addressed.

Details regarding issue 4(iii)

20. The presence of a “Brickyard” on the slopes of Childs Hill appears first on the Ordnance Survey map of 1822. By 1866 a “Brick field” was denoted just south of the future path of Briardale Gardens and by 1896 the site was shown as Burgess Hill Tennis Ground. The outlines of “worked ground” are shown on the present day geological maps with boundaries just to the south of Briardale Gardens. Thus Briardale Gardens lies within an area where for the better part of 70years brick makers have been “digging around” extracting what they want and backfilling the voids they created as and when needed. This might be the reason for the very large change in the thickness of this deposit (3.2m in BH1 and 1.4m in BH2) over the length of No. 31, a short distance of 17m.

That is an unnatural change given the genesis of the deposit in its natural condition.

21. This means that the neighbouring properties could be founded on very different thicknesses of this deposit, making predictions of any adjustments to their level following changes in the natural ground water regime an almost impossible task to achieve, given that the overall differences in thickness may be accompanied by different thicknesses of reworked material above material in its natural state.

Details regarding issue 4(iv)

22. During the warmer periods of the Ice Age ground thawed and ground formed predominantly from clays and silts would develop mudflows that crept down slope with sludge-like consistency. It can be imagined that the slopes surrounding Hampstead Heath, including those around Childs Hill, would be mantled by these deposits and it is for this reason that the British Geological Survey mark the area including that on which Briardale Gardens sits, as having a *"propensity for Head"* i.e. a likelihood of having these sorts of deposits. They form the deposits nearest to ground level and because these are disturbed by building and other man-made activity they tend to be miss-identified as "Made Ground", whereas often it is only their upper levels that should be described this way.

23. Some of these flows also affect the clay strata at depth and leave within it shear surfaces having a strength much lower than that of the surrounding clay in which they are found. These cannot resist the shear stresses from an excavation in the same way as their surrounding clay. If they are present they necessitate a strengthening of restraining elements proposed for support.

24. The descriptions in the BH logs are of poor quality (as mentioned earlier) and from them it is not possible to discount the presence of these surfaces. Normally clay ground involved in such processes is soft when encountered – soft enough to be penetrated by your fingers. The logs report the ground in BH1 at 3.20m as being "*Very stiff high strength....*"(an error in description in itself betraying an author who should not be describing soils) whereas the graph of test results presented in the Basement Impact report (p24) shows the shear strength at this depth to be around 30kPa; this is equivalent to what is described as Low Strength and compatible to "soft" soil – just as expected.

25. **Thus the log descriptions are not only uninformative they are also wrong** and so leave the question of whether such shear surfaces are present unanswered.

Conclusions

26. A number of natural features combine at this site to provide a unique combination of circumstances which should have been considered in the

design of the works but have been either ignored or misunderstood. They are as follows;

27. Groundwater has been discounted in the application by reason of its elevation in two BH's despite the presence of what is effectively an operating field drain that runs at the back of the gardens of Briardale Gardens, within yards of the proposed development. The water levels used in the application are corrupted by the methods used for measuring them in the BH's drilled and no attempt has been made to understand how water in the ground responds to periods of recharge even though the location is within an area of concern shown on Camden's flood maps. Further the management of groundwater is needed, yet is not proposed, but even if it was it is impossible to provide. External pumps can only be provided if the area of the basement is reduced and if they are not used the cut off required would the use of large machinery for which there is no space. **Groundwater, the subject that has been dismissed in the application, is in fact the subject that makes this application impossible to achieve as outlined.**

28. The ground carrying water and through which the excavation for the basement must penetrate is susceptible to erosion by flowing groundwater – so this parameter which is largely unknown has to be controlled. **There is no basis for designing a groundwater control system suitable for potentially erosive ground bearing in mind that pumping from outside the perimeter of the excavation will induce consolidation and settlement beneath neighbouring properties.**

29. **A cut-off will thus be required around the basement.** Its affects on water levels both upstream and downstream of the basement which would alter the porewater pressures and the moisture content of the neighbouring ground, are unknown.

30. **That ground is likely to be a mix of undisturbed and disturbed material by reason of the long history of brickworkings the area has had since the early 1800's**. The nature of the ground is therefore likely to be very variable and indeed some evidence for that is provided by the two BH's sunk at number 31, just 17m apart.

31. **Added to these difficulties are those that come from uninformative and incorrect descriptions of the ground**. The potential weakness of the ground and its need for support remain unknown. In short we do not know what is there for sure.

32. Given that Camden expects home owners to develop their property in accord with good engineering I have to conclude that as far as an understanding of the ground is concerned, good engineering is far from achieved. **The reassurances and calculations within the application are unfounded and its assessments are wrong.**

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Site Analytical Services Ltd (2014). 31 Briardale Gardens NW3 7PN, Report on Ground Investigation. (Ref 14/22633) Prepared for Mann Williams Consulting Civil and Structural Engineers on behalf of Mr and Mrs Patel.

SHORT BIOGRAPHY (2014)
Dr Michael Henry de FREITAS C.Geol., C.WEM
UK Registered Ground Engineering Adviser (RoGEP)

Present position: Emeritus Reader in Engineering Geology,
Imperial College London and Director of First Steps Ltd.,

Higher Education: BSc (Hons) 1st Class. Geology. London 1964
PhD. Engineering Geology. London 1982 DIC 1982

Chartership: Chartered Geologist. 1990
Chartered Water & Environmental Manager 2009

Awards: Sir Henry Miers Prize of the Mineralogical Society; 1964.
Safety in Construction medal of the Institution of Civil Engineers; 1997.
Chevalier L'Ordre des Palmes Academiques; 2001
Rudolph Glossop medal of the Geological Society; 2008

Publications: The authorship of two text books, contributor to four books, editor of seven books, author of 48 refereed papers in geotechnical journals, and of 24 un-refereed publications in conferences.

Membership of Professional Bodies, Learned Societies, etc.:
Geological Society of London (F) 1960 – onwards
International Soc. Rock Mechanics 1967 – onwards
Institution of Water & Environmental Management (M) 1969 – onwards
Royal Geographical Society (F) 1974 – onwards
International Assoc. Engineering Geologists (M) 1979 – onwards
International Assoc. Hydrogeologists 1983 – onwards
British Geotechnical Society (M) 1985 – onwards
Geologists' Association (M) 1989 - onwards

Learned Society (Geological Society) & Professional service

2012 – onwards Lead Author; Geol Soc Working Party Report (Glacial & Periglacial EG)
2012 Panel Member for the 2012 audit for C.Geol
2011 – onwards Panel Member for the Register of Ground Engineering Professionals
2010 Panel Member for the 2010 audit for C.Geol
2009 – onwards Chairman London Basin Forum Working Gp. of the Geol. Soc. London
2008 Glossop Lecturer
2005 – 2007 Chairman of the Fellowship and Validation Committee
2004 – 2005 Member of the Fellowship and Validation Committee.
1998 – onwards Provider of Continuing Professional Development courses
1993 – onwards Scrutineer for status of Chartered Geologist
1990 – 1994 Member of the Geological Society Awards Committee.
1990 – 19922 Chairman Engineering Group, Geological Society
1988 – 1990 Vice Chairman. Engineering Group of the Geological Society,
1981 – 1984 Editor Quart. Jour. Engineering Geology for the Geological Society.
1978 – 1979 Vice-President of the Geological Society.
1971 – 1984 Editor Geological Society Handbooks.
1976 – 1979 Member of Council of Geological Society and Chairman for the Promotion Co-ordinating Committee

International Society (Int. Assoc. Engineering Geologists) service

1996 – 2003 Chairman for International Assoc. Engineering Geologists Commission on Teaching and Training.
1994 – 1996 Secretary for International Assoc. Engineering Geologists

Research Council and national bodies

1996. – 1997 Chairman of the CIRIA working party report for British Stratigraphical Nomenclature
1991 – 1994 Member of ICE (Ground Board Committee) on Inadequate Site Investigation
1991 – 1993 Member BSI Committee: Ground Investigation, for the revision of BS 5930
1986 – 1988 Panel Member Natural Environment Research Council Research Grants Committee for Geology.

International invitations

1984 – onwards External Examiner for the Technical University of Delft & Hong Kong, and many universities in the UK.
1974 - onwards Visiting lecturer to Technical University of Athens; University of Complutense. Madrid; University of Stockholm (KTB); Guest lecturer, Beijing and Wuhan. University of Wuhan & University of Seoul.
touring
1997 Commission 4 Rapporteur for Int. Assoc. Eng. Geol. (Athens)
1994 Rapporteur. 7th Int. Congr. Int. Assoc. Eng. Geol. (Lisbon)

Personal consulting

1974 – onwards Widely on practical matters of engineering geology to contractors, designers and regulators both in the private and the public sector, in the UK and overseas. Work involving the practical solutions of problems arising from groundwater, stability and materials at surface and below ground. Recent contracts include:- Brighton Outfall tunnel; Dublin City Corporation (Dublin Port Tunnel); Railway Procurement Agency (Ireland) (Metro North Tunnel & surface works); ARUP Geotechnics (Havant Thicket reservoir); South African Council of Geoscience (Nuclear power sites), United Utilities Penrith UID scheme (for consortium Kier Murphy Interserve), London Borough of Camden, Donaldson Associates (various tunnels and pipelines).

Of particular relevance to Basements;

Advice to and involvement with ARUP, the Heath and Hampstead Soc and London Borough of Camden with the drafting and implementation of CPG4
Advisor on hydrology to Heath and Hampstead Soc
Consultant for 19 basements to date within the London Borough of Camden, and others within the Royal Borough of Kensington & Chelsea, with particular reference to the practical assessment of ground water management and ground response both on site and below surrounding properties.
Expert witness for the basement at 9 Downshire Hill and 2 Green Close

Research experience

Over 40 years experience with rock and soil slopes, the shear strength of clean and infilled rock surfaces, comminution in shear zones, rock and mineral reaction to water, weak rocks and the nature of boundary layers. Also the influence of basement tectonics and their reactivation on the sedimentation and geotechnical characters of cover rock sequences.

Present employment

My time is divided between teaching on the MSc in Engineering Geology in the Dept. Civil Engineering at Imperial College London, working at First Steps, the company I founded with a

colleague in 2000, consulting as outlined above and continuing research with colleagues at Imperial and elsewhere. All major consultants and many contractors have sent staff to our courses at First Steps; in-house courses are also provided, the largest being to the Royal Engineers at Chatham. Web-based learning systems have also been developed to train those involved with creating Ground Models, the latest being Lapworth's Logs. All courses are endorsed by the Geological Society of London.

Landmark Trees

ADDENDUM ARBORICULTURAL IMPACT ASSESSMENT REPORT:

Proposed Development at 31 Briardale Gardens

London

NW3 7PN

REPORT PREPARED FOR:

Nicole Sochor

33 Briardale Gardens

London

NW3 7PN

REPORT PREPARED BY

Adam Hollis

MSc ARB MICFor FArbor A MRICS C Env

Ref: SCR/31BG/AIA/01c

Date: 9th February 2015

Appendices

Caveats

This report is primarily an arboricultural report. Whilst comments relating to matters involving built structures or soil data may appear, any opinion thus expressed should be viewed as qualified, and confirmation from an appropriately qualified professional sought. Such points are usually clearly identified within the body of the report. It is not a full safety survey or subsidence risk assessment survey. These services can be provided but a further fee would be payable. Where matters of tree condition with a safety implication are noted during a survey they will of course appear in the report.

A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter.

Tree works recommendations are found in the Appendices to this report. It is assumed, unless otherwise stated ("ASAP" or "Option to") that all husbandry recommendations will be carried out within 6 months of the report's first issue. Clearly, works required to facilitate development will not be required if the application is shelved or refused. However, necessary husbandry work should not be shelved with the application and should be brought to the attention of the person responsible, by the applicant, if different. Under the Occupiers Liability Act of 1957, the owner (or his agent) of a tree is charged with the due care of protecting persons and property from foreseeable damage and injury.' He is responsible for damage and/or nuisance arising from all parts of the tree, including roots and branches, regardless of the property on which they occur. He also has a duty under The Health and Safety at Work Act 1974 to provide a safe place of work, during construction. Tree works should only be carried out with local authority consent, where applicable.

Inherent in a tree survey is assessment of the risk associated with trees close to people and their property. Most human activities involve a degree of risk, such risks being commonly accepted if the associated benefits are perceived to be commensurate.

Risks associated with trees tend to increase with the age of the trees concerned, but so do many of the benefits. It will be appreciated, and deemed to be accepted by the client, that the formulation of recommendations for all management of trees will be guided by the cost-benefit analysis (in terms of amenity), of tree work that would remove all risk of tree related damage.

Prior to the commencement of any tree works, an ecological assessment of specific trees may be required to ascertain whether protected species (e.g. bats, badgers and invertebrates etc.) may be affected.

1. SUMMARY OF ADDENDUM REPORT

1.1 This report should be read alongside our initial arboricultural impact assessment of the proposals for 31 Briardale Gardens, London NW3 7PN, reference SCR/31BG/AIA/01. This addendum specifically deals with the information provided by Advanced Tree Services (ATS) in the Revised Arboricultural Impact Assessment, which was submitted to update and replace the earlier ATS report. The revised report was noted as reflecting the information incorporated in responses following submission of the application, including the results of site investigations as to the root protection area.

1.2 In brief, the additional information does not address the concerns raised over the protection of this tree. This addendum will highlight areas of concern relating to the following issues:

- The impact of the foundations noted for the proposed extension, which are highlighted as being stepped down to basement level; this excavation would occur within 1m of the stem of the Magnolia Tree T1 (very close to the tree and closer than the trial trench).
- The impact of the proposed underpinning of the party wall within the RPA of T1, which has not been addressed in the revised arboricultural impact assessment (or trial trench).
- The omission of mitigation for the proposed terracing within the RPA of T1, which should be no-dig and permeable.
- The inadequate trial pit information / investigation (as per bullet points above). Additional trial pits should be dug to demonstrate that excavation for the proposed foundations within 1 meter of the stem and underpinning of the wall will not affect significant roots.
- The absence of a standard AIA plan to BS5837:2012 that illustrates the potential canopy encroachment over the proposed extension.
- The minimal information within the AMS regarding construction techniques to be used for the extension and relevant tree protection measures.
- The absence of information regarding the location of on-site storage, which will be required in accordance with the Construction Management Plan.
- The omission of clear identification of the RPA and canopy on the Tree Protection Plan.
- The absence of information and mitigation required to address the likely secondary impacts of leaf litter and organic deposition on the sky-lights/glass roof and guttering, likely to result from the over-hanging canopy. This is a significant omission that may lead to pressure to crown reduce/fell this tree in the future.
- The omission of details regarding the location of the off-site tree T6, from which two branches will be removed (subject to the owner's consent).

1.3 It is accepted that the ATS report deals adequately with the proposed lowering of the existing basement. Furthermore, the proposed protective hoarding around the stem is a significant improvement on the previous tree protection. To ensure the tree is not harmed, it is recommended that ground protection is extended across the whole of the CEZ, thus ensuring that any accidental breach of the 'orange hazard fencing' does not harm the tree.

1.4 Given the limited space in the garden at 31, there are justifiable concerns that the tree exclusion zone will push such construction activities such as concrete mixing to the back of the garden, adjacent to No. 33. Naturally, the neighbours are concerned about toxic materials being spilled and leaching downhill to their garden and trees. A risk assessment and management plan to protect the trees in adjacent gardens should form part of the method statement.

1.5 There has been some question on whether the potential development pressures on T1 from the lowering of the basement under permitted development rights will require a full planning application. There is now evidence that the party walls will be underpinned as part of the proposal, which appears to be directly related to the basement as opposed to just the extension. As noted in our previous report, the permitted development rights and Camden's own Planning Policy Guidance include impacts to trees during the construction of the basement as well as direct RPA encroachments. It is clear that the interpretation of the guidance on 'harm' to trees is open, although given the confined nature of the site and omissions in the ATS report to-date, the 'construction pressure' on T1 is still likely to be sufficient to warrant the removal of the permitted development rights for the basement proposal.

1.6 Overall, there remains sufficient justification in terms of lack of evidence in regard to the actual impact on the magnolia. There remains evidence to substantiate a potential impact on T1 from the construction of the basement, particularly underpinning the party walls, therefore this should not be considered under permitted development rights. Accordingly, the basement proposals should form part of a full planning application, with additional appropriate arboricultural evidence to demonstrate that this category B tree will not be harmed from either the basement or the extension.

1.7 Similarly, the size and height of the extension pose potential primary and secondary impacts to the magnolia. For permitted (no-harm) development, it would be appropriate to scale down its proportions, given that the size and height of the extension have prompted several objections, including two from local Conservation societies.

* British Standards Institute: Trees in relation to design, demolition and construction BS 5837: 2012 HMSO, London

2.0 BACKGROUND

2.1 Terms of reference

2.1.1 LANDMARK TREES were asked by Nicole Sochor, of 33 Briardale Gardens, London NW3 7PN to review the additional information provided to support the proposals for the site: 31 Briardale Gardens, London NW3 7PN. Specifically, Advanced Tree Services (ATS) have provided a Revised Arboricultural Impact Assessment, which was submitted to update and replace the earlier ATS report. The revised report was noted as reflecting the information incorporated in responses following submission of the application, including the results of site investigations as to the root protection area. This addendum considers the information contained in the report, in the light of other reports including the Basement Impact Assessment by Mann Williams Consulting Civil and Structural Engineers and the Construction Management Plan.

2.1.2 There are two current applications under consideration; the first is referenced 2014/5117/P, which is seeking a certificate of lawfulness for permitted development for a basement extension only under the existing footprint of 31 Briardale Gardens. The second application is a request for full planning permission to provide a rear extension to the property (Reference 2014/3668/P).

2.1.3 I am a Registered Consultant and Fellow of the Arboricultural Association and a Chartered Forester, with a Masters Degree in Arboriculture and 25 years' experience of the landscape industry - including the Forestry Commission and Agricultural Development and Advisory Service. I am a UK Registered Expert Witness, trained in single and joint expert witness duties. I am also Chairman of the UK & I Regional Plant Appraisal Committee, inaugurated to promote international standards of valuation in arboriculture.

2.2 Drawings supplied

2.2.1 The drawings supplied by the client and relied upon by Landmark Trees in the formulation of our survey plans are contained in the revised Advanced Tree Services (ATS) Report (See Appendix 3). It is important to note that in the absence of a full topographical survey, tree positions may be approximate only.

2.3 Scope of survey

2.3.1 As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on and around the site on 1st September 2014, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations [BS5837:2012]. This survey verified the findings of the Arboricultural report prepared by Advanced Tree Services in that the on-site tree is a category B (see Appendix 1).

2.4 Planning Policy and Guidance

2.4.1 The relevant planning policy and guidance includes the Guidance note 'New Basement Development and Extensions to Existing Basement Accommodation' published by London Borough of Camden in December 2008, which was recently updated by The Camden Planning Guidance CPG4 – Basements and Lightwells published in September 2013 (see Appendix 2 of previous report). CPG4 highlights the following guidance in relation to permitted development rights for basements:

PERMITTED DEVELOPMENT

Permitted development is governed by the Town and Country Planning (General Permitted Development) Order 1995 (as amended) which permits "the enlargement, improvement, or other alteration of a dwellinghouse" within the limits laid down for extensions.

In certain situations such 'Permitted Development' rights are removed, such as:

- For listed buildings;
- Within a conservation area if there are any trees which will be affected by the development;
- Outside a conservation area if any protected trees are to be affected (further guidance on the protection of trees is contained in Chapter 6 Landscape Design and Trees in this CPG); and
- For works classified as 'engineering operations'.
- You should also check any relevant Article 4 Directions which may remove Permitted Development rights. For guidance on permitted development rights, please visit the Camden Council website.

2.4.2 The relevant planning policy and guidance includes the Guidance note 'New Basement Development and Extensions to Existing Basement Accommodation' published by London Borough of Camden in December 2008, which was recently updated by The Camden Planning Guidance CPG4 – Basements and Lightwells published in September 2013. CPG4 highlights the following guidance in relation to permitted development rights for basements:

Groundwater flow

2.36 Basement development may affect groundwater flows, and even though the displaced water will find a new course around the area of obstruction this may have other consequences for nearby properties, trees, etc.

Planning and design considerations

2.53 We recognise that there can be benefits from basement development in terms of providing additional accommodation, but we need to ensure that basement schemes:

- *do not harm the recognised architectural character of buildings and surrounding areas, including gardens and nearby trees, and that conservation area character is preserved or enhanced;*

Size of development

2.54 Often with basement development, the only visual features are lightwells and skylights, with the bulk of the development concealed wholly underground and away from any public view. However, just as overly large extensions above the ground level can dominate a building, contributing to the over-development of a site, an extension below ground can be of an inappropriate scale. There may be more flexibility with the scale of a development when it is proposed underground, but there are a number of factors that would mean basement development would be overdevelopment.

2.55 These include, for example, harm caused to any trees on or adjoining the site, where the development would restrict future planting and mature development of trees typical to the area, and any impact to the water environment. The permissible size of a basement development will therefore be guided by the characteristics of the site.

2.56 A basement development that is modest in size such that it does not extend beyond the footprint of the original building and is no deeper than one full storey below ground level (approximately 3 metres in depth) is often the most appropriate way to extend a building below ground, provided that the internal environment is fit for the intended purpose, and there is no impact to any trees on or adjoining the site, or to the water environment or land stability.

Trees, landscape and biodiversity

2.65 …. Sufficient margins should be left between the site boundaries and any basement construction to enable natural processes to occur and for vegetation to grow naturally. These margins should be wide enough to sustain the growth and mature development of the characteristic tree species and vegetation of the area. The Council will seek to ensure that gardens maintain their biodiversity function for flora and fauna and that they are capable of continuing

to contribute to the landscape character of an area so that this can be preserved and enhanced.

2.67 Consideration should be given to the existence of trees on or adjacent to the site, including street trees and the required root protection zone of these trees (further information on the protection of existing trees in included in CPG in this document on Landscaping and trees).

ROOT PROTECTION ZONE
The area around the base or roots of the tree that needs to be protected from development and compaction during construction to ensure the survival of the tree.

3.0 OBSERVATIONS

3.1 Site description

Photograph 1: Street View and aerial view of site from Briardale Gardens (Source: Google Maps)

3.1.1	The site comprises a semi-detached residential property situated on Briardale Gardens, with a small courtyard garden to the front and a compact rear garden.
3.1.2	The site slopes to down to the rear of the garden.
3.1.3	In terms of the British Geological Survey, the site overlies the Claygate Member / Beds (see dark area on plan extract overleaf). As the youngest part of the London Clay, they form a transition between the clay and the sandier Bagshot Beds above (shown in yellow). Unlike the Bagshot Beds, more typical of Hampstead Heath, the associated soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such highly plastic soils are prone to movement: subsidence and heave.
3.1.4	Obviously, the actual limits of soil series are not as clearly defined on the ground as on plan and there may be anomalies between them. Further advice from the relevant experts on the specific soil properties can be sought as necessary.
3.1.5	Clay soils are prone to compaction during development. Damage to soil structure can have a serious impact on tree health. Design of foundations near problematic tree species will also need to take into consideration subsidence risk.

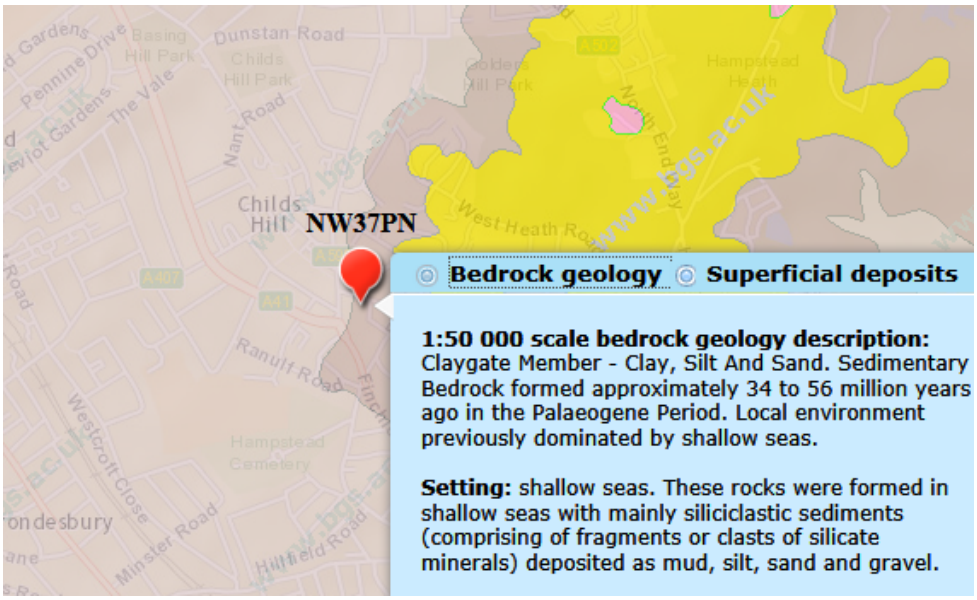


Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject trees

3.2.1	There is 1 category B (Moderate Quality) mature magnolia on site (T1), with a category C early mature plum within the neighbouring garden (No. 29) situated to the north of T1. There is also a relatively young Monterey cypress within the rear garden of No.29, and recently planted birch trees within that of No.33.

3.2.2	Full details of the surveyed trees can be found in Appendix 1 of this report.

Photographs 2 & 3: T1 within the rear garden of 31 & Newly Planted trees to the Rear of 33.

3.3 Planning Status

3.3.1	We are not aware of the existence of any Tree Preservation Orders, but understand the site stands within a Conservation Area, which will affect the subject trees: it is a criminal offence to prune, damage or fell such trees without permission from the local authority.
3.3.2	There are two current applications relating to No.33 Briardale Gardens, comprising 2014/5117/P, which is seeking a certificate of lawfulness for permitted development for a basement extension only under the existing footprint of 31 Briardale Gardens; the other is a request for full planning permission to provide a rear extension to the property (Reference 2014/3668/P).

4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary constraints

4.1.1 BS5837: 2012 gives Recommended Protection Areas (RPA's) for any given tree size. The individual RPA's are calculated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of that RPA, based on a circular protection zone. The prescribed radius is 12-x stem diameter at 1.5m above ground level, except where composite formulae are used in the case of multi-stemmed trees.

4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, as shown in the diagram below (Figure 2). Alternatively, one need principally remember that RPA's are area-based and not linear – notional rather than fixed entities. **No modifications have been made in this instance (please see ATS report in Appendix 3). The existing trial pit evidence is considered inadequate in the light of the proposed underpinning and the proposed extension foundations within 1 meter of the stem of T1.**

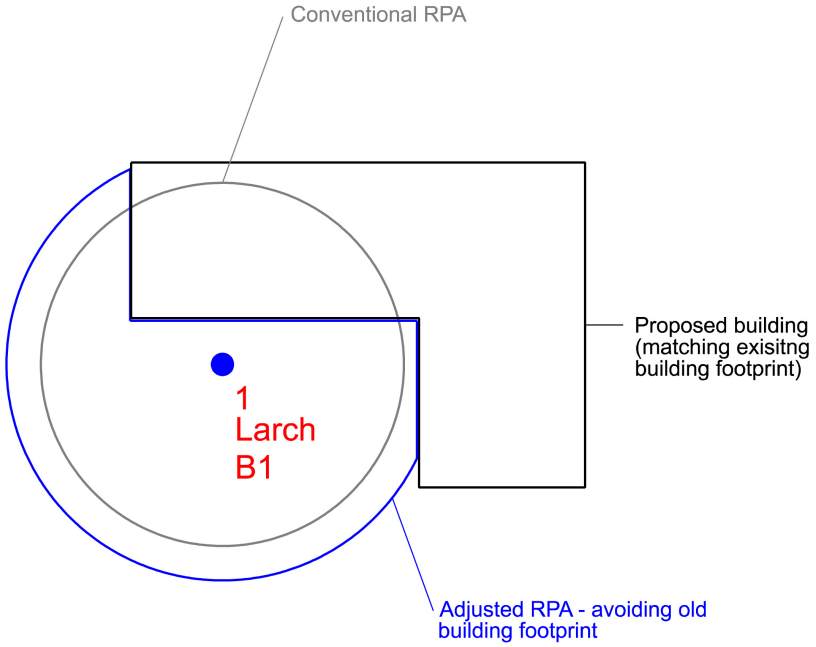


Figure 2 – Generic BS 5837 RPA Adjustments

4.1.3 The quality of trees will also be a consideration: U Category trees are discounted from the planning process in view of their limited service life. Again, Category-C trees would not normally constrain development individually, unless they provide some external screening function.

4.1.10 In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees would comprise a constraint in aggregate, in terms of any collective loss / removal, where replacement planting would be appropriate.

4.1.11 As noted in the first ATS report, there is one category B magnolia tree that will be a material constraint to potential development on this site.

4.2 Secondary Constraints

4.2.1 The second type of constraint produced by trees that are to be retained is that the proximity of the proposed development to the trees should not threaten their future with ever increasing demands for tree surgery or felling to remove nuisance shading (Figure 3), honeydew deposition or perceived risk of harm.

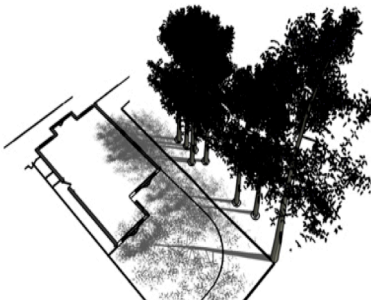


Figure 3 –
Generic Shading Constraints

4.2.2 The shading constraints are crudely determined from BS5837 by drawing an arc from northwest to east of the stem base at a distance equal to the height of the tree, as shown in the diagram opposite. Shade is less of a constraint on non-residential developments, particularly where rooms are only ever temporarily occupied.

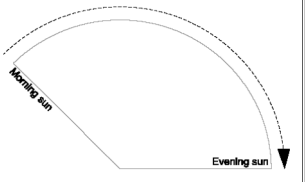


Figure 4 – Shading Arc

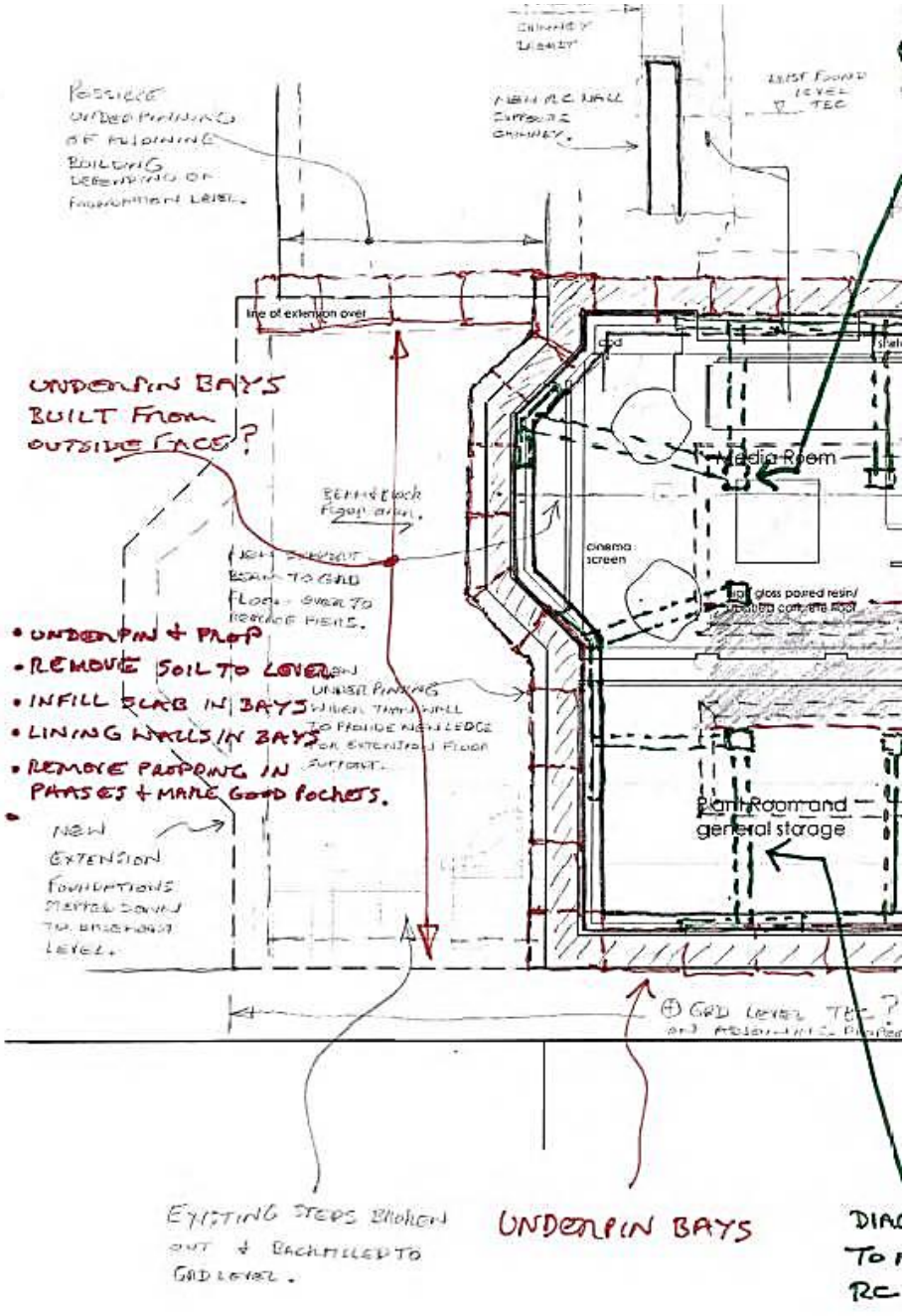
4.2.3 This arc (see Figure 4) represents the effects that a tree will have on layout through shade, based on shadow patterns of 1x tree height for a period May to Sept inclusive 10.00-18.00 hrs daily.

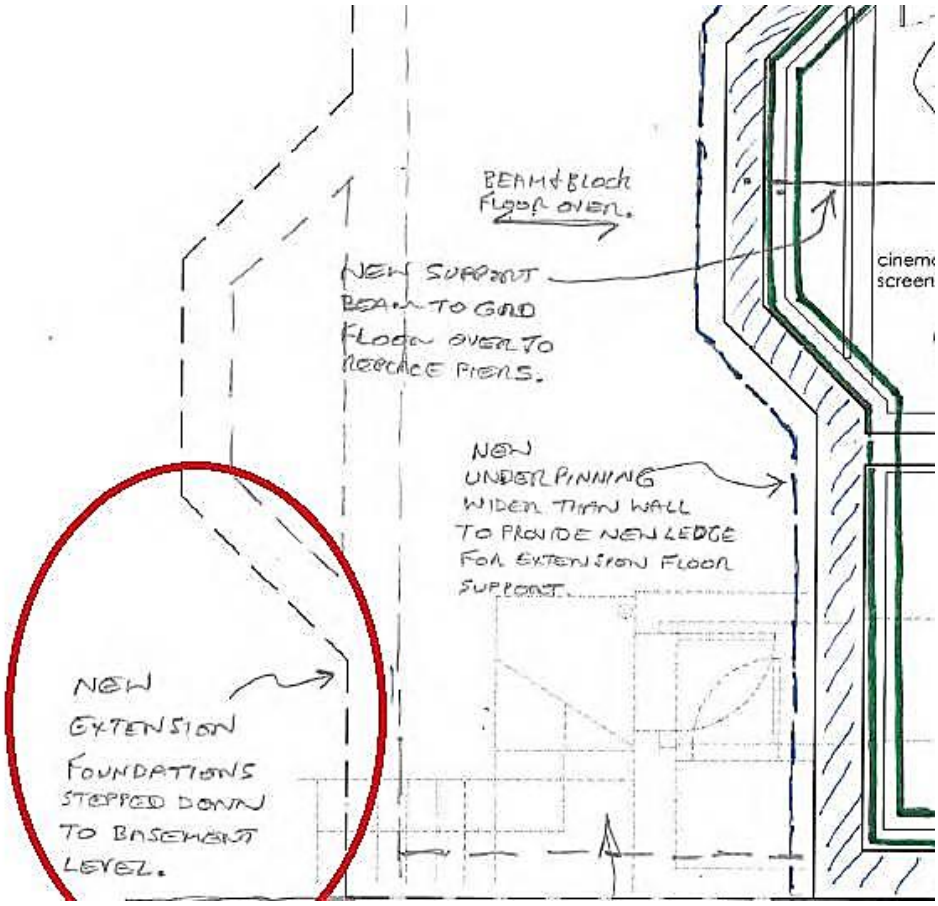
4.2.4 As noted in the ATS report, the orientation of T1 will ensure that shading constraints are minimal. However, Landmark Trees believe further investigation regarding the leaf deposition and other organic deposition is required, as mitigation will be required to reduce these effects.

5.0 DISCUSSION

5.1 Impacts of the Proposed Development

5.1.1 The national policy guidance on permitted development rights and Camden's own Guidance in CPG4 is clear in that such rights will be withdrawn if trees are effected by the basement proposals. Furthermore, CPG4 specifically identifies that such impacts include construction within the RPZ (paragraph 2.67). The extracts below from the original and recently revised structural design document notes that the extension foundations will be 'stepped down' to basement level, adding underpinning of the neighbouring boundary wall within the RPA:



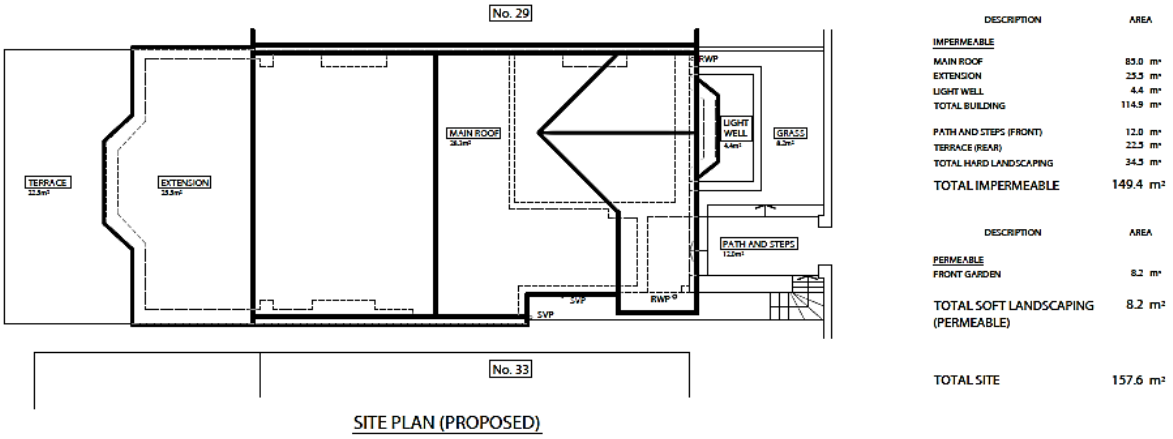


Extracts 1 & 2: Plans within the Basement Impact Assessment by Mann Williams Consulting Civil and Structural Engineers (Date: June 2014 ref: 7060) and subsequent amended assessment

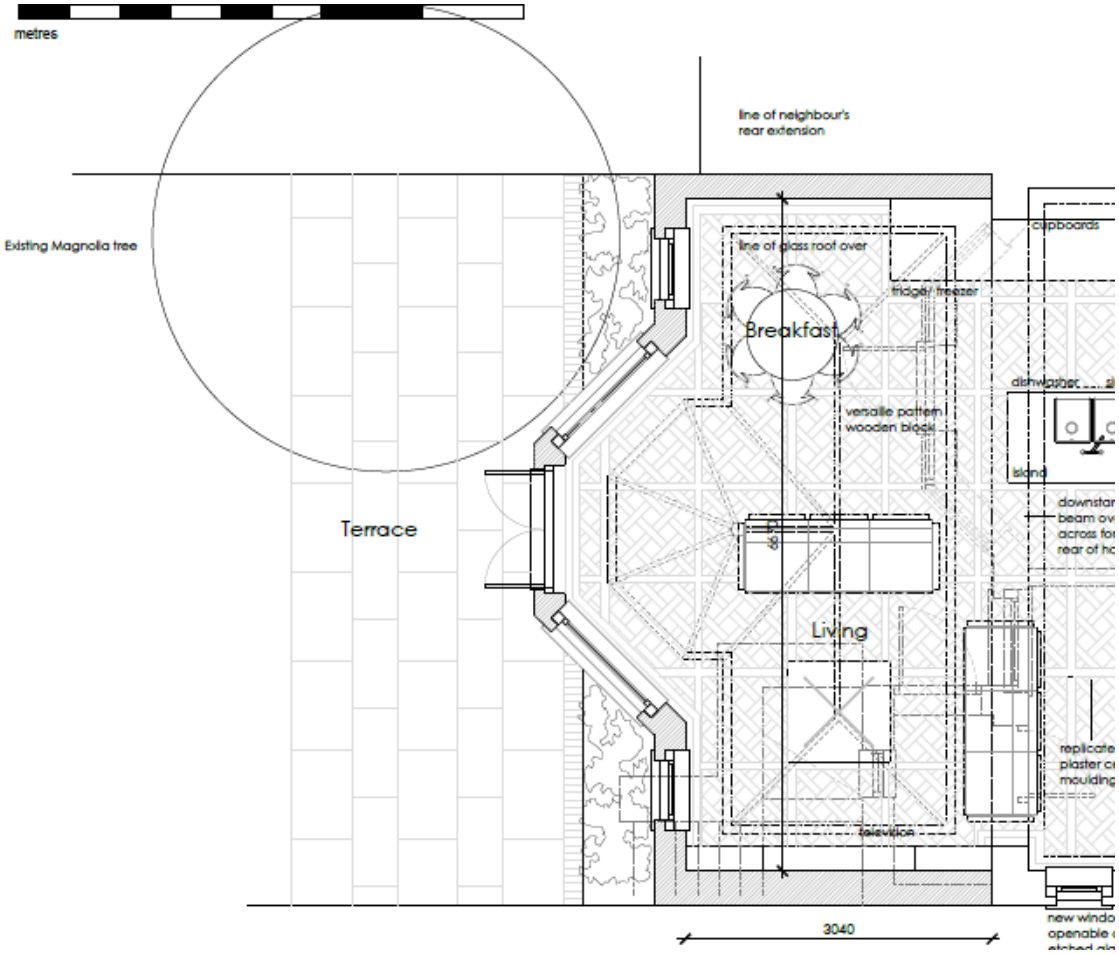
5.1.2 This inextricably links the basement to the extension proposals, along with the proposed breaking out and filling in of the existing steps down to the basement.

5.1.3 The additional information provided by ATS does not address the concerns raised over the protection of this tree. In summary, the main omissions are as follows:

- The impact of the foundations noted for the proposed extension, which highlighted as being stepped down to basement level; this excavation would occur within 1m of the stem of the Magnolia Tree T1 (see Extracts 1 & 2 above).
- The impact of the proposed underpinning of the party wall within the RPA of T1, which has not been addressed in the revised arboricultural impact assessment.
- The omission of mitigation for the proposed terracing within the RPA of T1, which should be no-dig and permeable (see Extract 3 below).

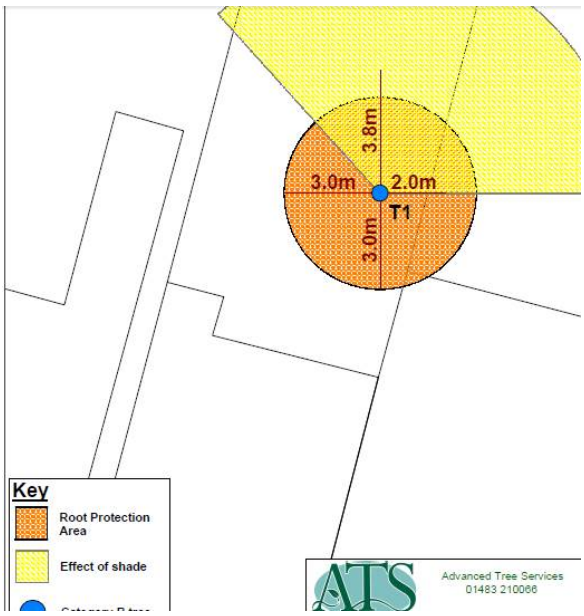


Extract 3: Proposed Impermeable Terrace (Source: Mann Williams Consulting Civil and Structural Engineers subsequent amended assessment)



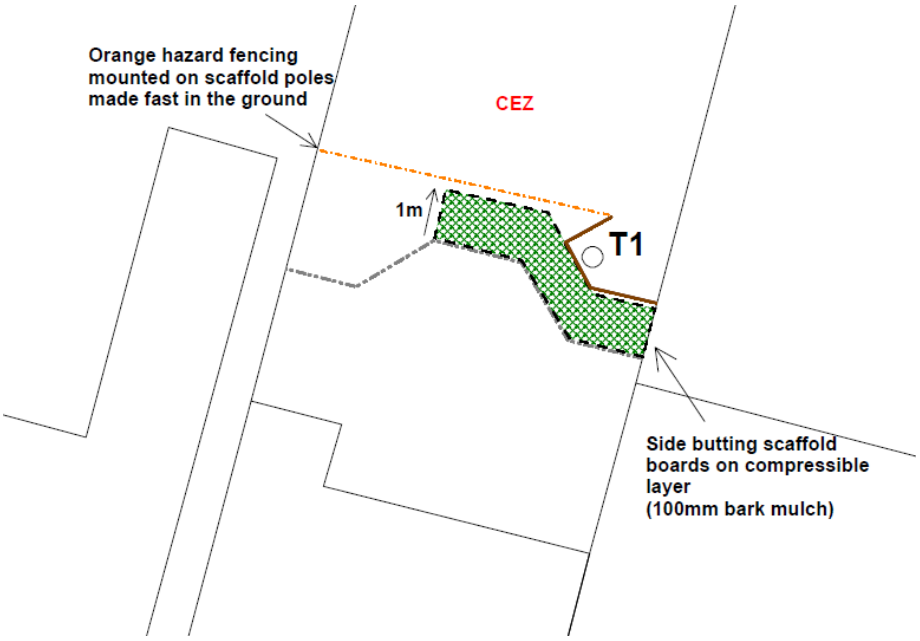
Extract 4: Proposed Impermeable Terrace Detail (Source: Mann Williams Consulting Civil and Structural Engineers subsequent amended assessment)

- The inadequate trial pit information. Whilst it is clear that there are very few roots, there is no plan showing how the pit relates to the RPA and it is not situated on the edge of the patio (where the extension foundations are going down to basement level within 1m of the stem as demonstrated in Extracts 1 and 2 above). Therefore further information and more accurate trial pits are required, or details of low invasive foundations. If the proposed foundations are to be dug within 1m of the stem, there will clearly be significant damage to the tree.
- The absence of an AIA plan to BS5837:2012 that illustrates the canopy in full detail and its relationship with the proposed extension. The extract below is the only plan available with the canopy, which should have the extension highlighted.



Extract 5: Extension should be indicated on AIA plan

- The minimal information within the AMS regarding construction techniques to be used for the extension and relevant tree protection measures.
- The absence of information regarding the location of on-site storage, which will be required in accordance with the Construction Management Plan.
- The omission of clear identification of the RPA and canopy on the Tree Protection Plan (see Extract 6 below). The revised AMS has provided slightly better tree protection; however, it is still insufficient in that it does not show the canopy overhang or the RPA. These must be shown in order to get a full understanding of the protection necessary. If the tree is not rooting under the patio as suggested by the current trial pits, a modified RPA is required and must be fully protected.



Extract 6: Tree Protection Plan from Revised ATS Assessment (RPA and Canopy required)

- The absence of information and mitigation required to address the likely secondary impacts of leaf litter and organic deposition on the sky-lights/glass roof and guttering, likely to result from the over-hanging canopy. This is a significant omission that may lead to pressure to crown reduce/fell this tree in the future. There is no mitigation for leaf litter/organic deposition either, which could prove problematic with the proposed design. Photograph 4 below illustrates this point.

Photograph 4: Existing canopy encroachment from T1 (Source: ATS Report)

- The omission of details regarding the location of the off-site tree T6, from which two branches will be removed (subject to the owner's consent).

5.1.4 Given the limited space in the garden at 31, there justifiable concerns that the tree exclusion zone will push such construction activities such as concrete mixing to the back of the garden, adjacent to No. 33. Naturally, the neighbours are concerned about toxic materials being spilled and leaching downhill to their garden and trees. A risk assessment and management plan to protect the trees in adjacent gardens should form part of the method statement.

5.1.5 The size and height of the extension pose potential primary and secondary impacts to the magnolia. For permitted (no-harm) development, it would be appropriate to scale down its proportions, given that the size and height of the extension have prompted several objections, including two from local Conservation societies.

6.0 CONCLUSION

6.1 There remains insufficient evidence in regard to the actual impact on the magnolia, both in terms of the construction of the basement and the proposed extension. There is evidence to substantiate a potential impact on T1 from the construction of the basement in terms of the proposed underpinning of party walls, therefore this should not be considered under permitted development rights. Accordingly, the basement proposals should form part of a full planning application with appropriate arboricultural evidence to demonstrate that this category B tree will not be harmed.

6.2 Additional evidence is also required in terms of revised AIA/TPP plans showing the RPA (as modified to reflect existing trial pit evidence) and canopy, appropriately sited trial pits, suitable extension foundations, mitigation for future organic deposition and details on the off-site T6 noted as requiring the removal of two branches within the ATS report.

8.0 REFERENCES

- British Standards Institute. 2012. Trees in Relation to Design, Demolition and Construction - Recommendations BS 5837: 2012 HMSO, London.
- Camden Planning Guidance CPG4 – Basements and Lightwells (September 2013)
- Centre for Ecology & Hydrology. 2006. Tree Roots in the Built Environment, HMSO, London.
- Helliwell R (1980) Provision for New Trees; Landscape Design; July/August issue
- International Society of Arboriculture (ISA). 1994. The Landscape Below Ground. ISA, Champaign, Ilinois. USA.
- Lonsdale D 1999. Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management, HMSO, London.
- Matheny, N; Clark, J. R.1998. Trees and Development: A Technical Guide to Preservation of Trees during Land Development. ISA, Champaign, Ilinois. USA.
- Mattheck C. & Breloer H. 1994. Research for Amenity Trees No.2: The Body Language of Trees, HMSO, London.
- Thomas P, 2000. Trees: Their Natural History, Cambridge University Press, Cambridge.
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APPENDIX 1

TREE SCHEDULE

Notes for Guidance:

1. Height describes the approximate height of the tree measured in metres from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
3. Ground Clearance is the height in metres of crown clearance above adjacent ground level.
4. Stem Diameter (Dm) is the diameter of the stem measured in millimetres at 1.5m from ground level for single stemmed trees. BS 5837:2012 formula (Section 4.6) used to calculate diameter of multi-stemmed trees. Stem Diameter may be estimated where access is restricted and denoted by '#'.
5. Protection Multiplier is 12 and is the number used to calculate the tree's protection radius and area
6. Protection Radius is a radial distance measured from the trunk centre.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat refers to (British Standard 5837:2012 section 4.5) and refers to tree/group quality and value; 'A' – High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for retention. The following colouring has been used on the site plans:
    - High Quality (A) (Green),
    - Moderate Quality (B) (Blue),
    - Low Quality (C) (Grey),
    - Unsuitable for Retention (U) (Red)
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and Commemorative.
12. Useful Life is the tree's estimated remaining contribution in years.

Landmark Trees

Site: 31 Briardale Road

Date: 5th September 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: **SCR/31BG/AIA**

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
1	Magnolia	8	4233	3.0	250	Early Mature	3.0	Normal	Good	B	1	20+	Remote survey only
2	Plum , Myrobalan	8	3	3.0	330	Mature	4.0	Normal	Good	C	1	20+	
3	Cypress, Monterey	8	3	3.0	270	Mature	3.2	Normal	Good	C	1	20+	

APPENDIX 2

REVISED ARBORICULTURAL IMPACT ASSESSMENT BY ADVANCED TREE SERVICES (ATS)

Introduction

1. I have been instructed by Mr & Mrs Patel to produce an Arboricultural Impact Assessment (AIA), Tree Constraints Plan (TCP), Arboricultural Method Statement (AMS) and Tree Protection Plan (TPP) for a proposed extension at 31 Briardale Gardens, NW3 7PN. This report updates and replaces my earlier report so as to reflect information incorporated in responses following submission of the application, including the results of site investigations as to the root protection area.

2. The purpose of the Method Statement is to demonstrate how works will be undertaken at 31 Briardale Gardens to avoid unacceptable arboricultural impact and provide an adequate level of protection for those trees shown to be retained. This is shown diagrammatically on the TPP, indicating the positions of protective fences delineating the Construction Exclusion Zones (CEZ).

3. The client has provided an existing site plan and a proposed site plan.

4. I have not seen any plans indicating service runs or detailed landscaping at this moment in time.

5. I undertook the BS 5837:2012 tree survey on the 23rd May 2014.

Proposed Development

6. It is proposed to construct a single storey rear extension to the existing property and to enlarge the existing basement under the deemed permission under permitted development rights.

Tree Survey

7. I assessed the trees with due regard to the recommendations and guidelines contained in BS 5837:2012 – 'Trees in relation to design, demolition and construction – Recommendations'. The tree details were recorded in tabular form (appendix a) and have been categorised in accordance with the cascade chart for tree quality.

8. The survey detail provides the data to arrive at the Root Protection Areas for the trees shown to be retained.

9. No soil samples were taken as a part of the original survey in May but I have caused soil samples to be taken for the purpose of updating this report (see below).

10. The trees were inspected from the ground utilising the Visual Tree Assessment method as developed by Mattheck and Breloer (The Body Language of Trees, DoE leaflet No.4).

General Site/Tree Condition

11. 31 Briardale Gardens Denali is a large, semi detached residential property. All the surrounding properties are of a similar size and age.

12. The rear garden is mainly set to lawn with mature shrub borders. The closest tree to the rear of the property is a mature Magnolia.

13. It is clear that the garden has been well maintained.

Arboricultural Impact Assessment

Presence of Statutory Protection

14. The website for Camden Council shows that a Conservation Area notification was made in 2005 (ref: 2005/0635/T) for proposed works to the Magnolia. Records show no objection was raised. The Magnolia is not the subject of a Tree Preservation Order.

Above & Below Ground Constraints

15. The extension covers approximately 30% of the total area of the RPA for the Magnolia. However, in my opinion, the combination of the existing basement area and the existing patio will mean most of the rooting material from the Magnolia will be growing into the garden area. Therefore the percentage of the RPA encroached upon, in reality, will be considerably less. Still no mention of the distance from the stem.

16. A trial hole was excavated in close proximity to the Magnolia by Site Analytical Services Ltd on the 1/12/2014. The location of this trial hole is shown on the attached plan at appendix F. Soil analysis was undertaken as well as the uncovering of roots present in the excavation. Photographs (appendix D) taken on site clearly show some roots being present however they are very sparse in number and of small diameter. All the roots discovered were 20mm diameter or less. This falls below the 25mm threshold stipulated in BS 5837:2012.

17. No formal root identification was carried out to ascertain whether the roots were from the Magnolia or the other mature shrubs nearby. However even if all the roots were from the Magnolia the number and size or roots does not constitute a significant proportion of the rooting area.

18. The roots from the Magnolia will be exploiting the more favourable rooting habitat in the rest of the rear garden rather than seeking moisture and nutrients from underneath the existing patio. This suggests that the Magnolia will not be harmed by the excavation and construction works for either (1) the ground floor rear extension or (2) for the proposed enlargement of the existing basement which is within the present footprint of the dwelling and which will be well behind the line of the existing patio and the proposed rear extension. Consequently the garden area will require protection during the construction process as detailed in the Arboricultural Method Statement.

19. It is my opinion that given the result of the soil investigation and the number of roots found therein clearly negates the need for specialist foundations for either the proposed enlargement of the existing basement beneath the dwelling of for the rear extension to which the planning application relates.

20. The orientation of the property means that the Magnolia will not block any direct sunlight.

21. The branches extending towards the south will require a minor reduction in length to prevent contact with the new extension both during and after the build. This particular work will have no long term effect on either the health or stability of the Magnolia. Should the magnolia be put under such pressure - definitely not 'status quo'.

22. The existing basement is already 1.5m deep and it is to be lowered by a further 0.5m within the footprint of the existing building. Due to the fact that it is not proposed to extend the basement further into the garden it is my opinion that there will be no impact on the root system of the Magnolia from these works.

Effect of Development on Amenity Value

23. Whilst the Magnolia can be viewed from nearby surrounding properties, it cannot easily be seen from a public thoroughfare or vantage point, although there may be glimpses through gaps between surrounding buildings; therefore its contribution to the wider visual amenity and to the character and appearance of the conservation area is limited. However, I am of the view that this tree will not be harmed by the proposed development and therefore its existing value and significance as part of the conservation area will not be harmed.

24. No trees require removal to accommodate the proposed development or will be harmed by it. Therefore, there will be no effect on the wider visual amenity or the character or appearance of the conservation area whatsoever subject to compliance with the precautions identified in this report. Any 30% encroachment will need mitigating - at least with hand excavation of foundation pits.

Site Access Constraints

25. The main access for the development will be through the house.

26. There are no access constraints which require arboricultural intervention.

The Construction Process

27. Due to the lack of space on site, it will not be possible (nor practicable) to erect protective fences to figure 2 in BS 5837:2012. The ground immediately adjacent to the tree will be afforded a protective covering (see AMS). Protective measures should be erected prior to any aspect of the development process. This means they should be the first thing to be installed on site and the last thing to be removed prior to soft landscaping.

28. A logical sequence of events must be adhered to in order to ensure the smooth running of the construction and all parties are aware of the need to recognise the importance of the CEZ.

29. The site (at the rear of the property) is not large enough to accommodate large scale material storage and site facilities without encroaching into the RPA for the retained tree/garden area.

Infrastructure Requirements

30. As mentioned previously I have not seen any plans relating to the location of drainage or service runs. I would anticipate that the existing infrastructure will be utilised. If new runs are required and they need to pass within the CEZ, careful positioning must be given consideration from the outset. Any installation must be carried out in strict accordance with National Joint Utilities Guidelines (NJUG) Volume 4 - *Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees* and BS 5837 section 7.7.

Proximity of proposal to trees

31. The lower two branches on the north side of T6 should be removed (with the owner's consent) to prevent accidental damage during the construction process in relation to the rear ground floor extension. This work will not unduly affect the health of T6.

32. The trees in the rear garden will cast shade upon the new extension. However it will be no greater than is currently being experienced as the orientation of the building is not changing.

Impact of Proposal on Trees

33. As mentioned previously, due to confinement of the basement enlargement works and the rear extension within respectively the existing basement area and patio, the impact of the proposed works on the RPA will be significantly reduced and therefore the building works should not unduly affect the long term health of T1.

Modifications Proposed to Accommodate Building/Trees

34. I do not see that any modifications will need to be made to the design of the proposal to accommodate any trees, particularly the magnolia tree (T1), because for the reasons set out in this report I do not think that the proposed development will cause any significant harm, provided the Arboricultural Method Statement (AMS) described below is carried out before and when the works commence.

Mitigation Planting

35. No trees are to be lost; therefore mitigation planting will not be required.

Arboricultural Method Statement (AMS)

Pre-development works (ground-floor rear extension only)

36. The following works should be carried out by a duly qualified tree contractor prior to the development taking place;

    T1 – Magnolia – reduce the length of the branches extending south towards the existing property by 2m.

37. It will be the responsibility of the tree contractor to ensure that all the necessary consents have been sought from the local authority.

Timing of operations

38. A logical sequence of events is to be observed as follows;

    - Pre – commencement site meeting
    - Remedial tree works
    - Installation of protective measures
    - General demolition/excavation/construction phase
    - Final inspection and handover

39. In general, no tree pruning works are to take place in early spring (bud break) or autumn (leaf fall) so as to minimise stress levels on the trees in question.

Pre-Commencement Site Meeting

40. A pre-commencement meeting will take place on site, with the appointed arboricultural consultant, the tree contractor, the site manager and the local authority arboricultural officer in attendance. The purpose of this meeting is to ensure that everyone fully understands the implications of the Arboricultural Method Statement and to agree on finer points of detail prior to any works commencing.

Site Monitoring

41. All site monitoring will be undertaken by a suitably qualified and experienced Arboriculturalist. Key operational points will be agreed in writing with the client and LPA prior to commencement of works. Typically these will include;

    - Remedial tree works
    - Installation of protective measures (fences and ground)
    - Demolition works
    - Installation of services
    - Landscaping within RPA's
    - Site completion

42. Monitoring will be undertaken at intervals requested by the LPA. A checklist will be completed and a copy will be retained by the Site Manager with a copy sent to the LPA.

43. Any defects requiring attention will be notified to the Site Manager and Client (copied to the LPA by e-mail). Any emergencies will be notified to the Client and LPA by phone.

44. Day to day site supervision will be the responsibility of the Site Manager. They will be aware of the tree protection measures and significant steps in the development process which have arboricultural implications. To ensure compliance the Site Manager will undertake a site briefing with the retained Arboriculturalist before the commencement of works.

45. A final sign off visit will be carried out at the end of the development and a formal letter sent both to the client and the LPA to indicate the end of the monitoring period.

Where responsibilities lie

46. It will be the responsibility of the Site Manager to ensure that the AMS is adhered to at all times by site operatives, sub contractors and hauliers during the construction process.

47. Should any problems arise the Site Manager will immediately inform the arboricultural consultant who will assess the situation and make recommendations accordingly. If modifications to the AMS are proposed the arboricultural consultant will immediately advise the local authority arboricultural officer.

Erection and Location of Protective Measures

48. It will not be possible to erect fencing in accordance with BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations.* Therefore the main stem of T1 will be afforded protection prior to any development works on site.

49. To guard against impact damage, the stem of T1 shall be protected by timber hoarding. The protective hoarding must be freestanding and not attached to the tree in any manner. It will consist of a vertical and horizontal frame well braced to resist accidental impact. Either weldmesh panels or hoarding should be securely fixed to the framework. It should not be possible to move the protective cladding. The hoarding should reach up to a height of at least 3m up the main stem or to the main crown break (whichever is greater).

50. The remainder of the garden will be fenced off using orange hazard fencing mounted on poles made fast in the ground.

51. **All such fences will not be moved without the express permission of the local authority Arboricultural Officer.**

52. All site operatives will be made fully aware of the function of the protective fencing and its importance in the construction process as part of their site induction.

53. In order to safeguard against further compaction, side butting scaffold boards shall be placed on a compressible layer (100mm bark mulch) shall be placed adjacent to T1 (see TPP). These boards must remain in situ for the duration of the construction process.

Surplus Arisings

54. No demolished material will be stockpiled against any protective fencing.

55. No fires shall be lit on site.

Service runs/installation

56. If existing utilities are not to be used, the routeing of all the drainage and services needs to be considered from an early stage. This will ensure that any encroachment into the CEZ is avoided or kept to an absolute minimum. If the CEZ cannot be avoided then it will be a contractual requirement that all excavations are undertaken by hand and in strict accordance with the 'National Joint Utility Guidelines (NJUG) Volume 4 – Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to trees' and BS 5837 section 7.7.

57. All excavations for service runs in this area must be undertaken by hand. No roots larger than 25mm diameter will be cut. If any roots smaller than 25mm require pruning to facilitate installation, this will be done by a suitably qualified and experienced Arboriculturalist using sharp bypass secateurs/handsaw. Roots larger than 25mm should only be severed following consultation with an Arboriculturalist as such roots might be essential to the trees health and stability. Any exposed roots should be immediately wrapped or covered to prevent desiccation. Any wrapping should be removed prior to backfilling.

Site Deliveries / Storage space

58. Consideration should be given to staggered deliveries to guard against stockpiling on site and the temptation to move protective fences to gain more room.

Location of huts, toilets

59. No site huts or toilets will be placed within any CEZ.

Potential effect of slopes

60. Storage and/or mixing of materials which have the potential to spill and contaminate the soil (such as concrete and fuel) will not take place within 5m of any tree shown to be retained.

Use of Herbicides

61. It is not proposed to use any herbicides on the site.

Compaction avoidance and mitigation

62. As mentioned previously, all CEZ's are to be clearly marked on site and will be avoided. If for any reason the CEZ is compromised it will be the duty of the site supervisor to contact the arboricultural consultant immediately. Remedial measures will be discussed and an agreed course of action implemented in consultation with the local authority arboricultural officer.

Use of sub-contractors

63. Any sub-contractors will be made fully aware of the AMS and the importance of the offsite trees as a part of their site induction by the site supervisor.

Fence removal

64. The protective fences shall be the last item removed from site prior to the implementation of the soft landscaping.

Final Inspection

65. Prior to handover, following the completion of the development an Arboriculturalist will inspect the trees on site to check for any indications of accidental damage or change in the condition of the Magnolia tree.

66. A schedule of remedial works will be drawn up to ensure that there are no outstanding tree work issues prior to handover.

Remedial tree works

67. Any tree works must be undertaken in accordance with BS 3998 – 2010 Tree Work – Recommendations and only once the necessary procedure has been undertaken with the Local Authority.

68. Under the Wildlife and Countryside Act 1981(Section 1) it is an offence to take damage or destroy the nest of any wild bird while that nest is in use or being built. Planning consent for a development does not provide a defence against prosecution under this act. Trees and scrub are likely to contain nesting birds between 1 March and 31 July. In order not to contravene the Wildlife and Countryside Act 1981 the timing of the tree surgery works should avoid the bird nesting season (March – May).

69. Under the Wildlife & Countryside Act 1981, The Countryside Rights of Way Act 2000 and The Conservation Regulations 1994 (known as the Habitats Directive) it is an offence to:

- Intentionally kill, injure or take a bat.
- Possess or control a live or dead bat, any part of a bat, or anything derived from a bat.
- Intentionally or recklessly damage, destroy or obstruct access to any place that a bat uses for shelter or protection.
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.

70. If a bat roost is suspected please contact the Bat Conservation Trust on 0845 1300 228 or at www.bats.org.uk.

Conclusion

71. No trees are to be removed so the wider visual amenity will remain unaffected.

72. The proposed extension does infringe upon the RPA for T1 but the existence of the basement and patio area reduce the impact considerably.

73. Site investigations have revealed the presence of very few, small diameter roots in the line of the proposed foundations. The diameter of the roots falls below the threshold stipulated ion BS 5837:2012 and by no way represents a significant proportion of the rooting area for the Magnolia. Consequently calls for specialist foundations would be superfluous and fears over widespread root damage are unfounded.

74. Only minor pruning works will be required to accommodate the extension. This will not prove detrimental to the health of the Magnolia.

75. Magnolia is a slow growing species and should not cause a conflict with the new extension. Although it is accepted that the canopy will require periodic pruning to prevent encroachment.

76. If the recommendations listed in the AMS and shown on the TPP are adhered to, I see no reason why this development should not be able to proceed without undue pressure on the existing tree cover.

Signed

Dominic Blake PD Arb (RFS) MArbor A
Consultancy Manager
December 2014

Appendices

a) Survey schedule
b) Tree Constraints Plan (1:100)
c) Tree Protection Plan (1:100)
d) Site Photographs
e) Site monitoring checklist
f) Plan showing trial pit location

References

- *BS 5837:2012 – Trees in relation to design, demolition and construction – Recommendations*
- *BS 3998:2010 – Tree Works - Recommendations*
- *National Joint Utilities Group (NJUG) Volume 4*