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19 Woodchurch Road London NW6

SUMMARY REPORT

For

London Borough of Camden

Ref: E&M Summary Report **Revision A** 2019-11-19 - 19 Woodchurch Rd

19/11/2019

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INDEX **Page**

APPENDICES

1.0 INTRODUCTION AND BRIEF

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1.1 A number of investigations have been undertaken at 19 Woodchurch Road which have included a CCTV Survey of the drains and a soils investigation.

1.2 The purpose of this report is to summarise the investigations and make recommendations with regards to the structural movement that has occurred to the building.

1.3 All directions in this report assume that the observer is standing on Woodchurch Road and facing the building.

2.0 OBSERVATIONS, DISCUSSION AND RESULTS

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2.1 Visual Inspection

a) We visited 19 Woodchurch on 8 November 2019 gaining access to the front and rear gardens, the common internal areas and all the flats (Flats 1, 2, 3, 4 and 5).

b) The building is a three-storey, including Loft Floor, detached house of Victorian architectural features (refer to Photographs 01 to 03 in Appendix B); the building is believed to have been constructed during that era.

c) The building has been converted into 5no flats; however, the date of the conversation works is not known.

d) Only significant defects are noted within the report, as evident at the time of our visit. Please also note that previous remedial works are evident to the building; the date of which is not known.

e) At the time of the visit, the locations of significant cracking were to the rear half of the building, particularly to the left-hand flank wall, the left-hand side of the rear façade and the internal corridor/stairs.

e) Externally, cracks of up to approximately 10mm maximum width were evident to the left-hand flank wall (full-height vertical crack) and the middle of the rear façade at 1st Floor level (refer to Photographs 04 to 06).

f) A selection of some other external cracks is shown in the Photographs 07-08.

g) Internally the cracks of greatest magnitude were evident within the 1st Floor Flat 4, adjacent to the kitchen window to the flank wall of 10mm maximum width (refer to Photograph 09). Also evident within the 1st Floor common hall, there is a full height vertical crack of approximately 6mmm maximum width to the right-hand partition wall and also within the common hall/stairs an approximately 5mm maximum wide crack below the 1st Floor window front bay (refer to Photographs 10 and 11).

h) A selection of other internal cracks are shown in the Photographs 12-17.

i) Please note that both Flats 1 and 5 were recently redecorated and the cracks were filled.

j) Within the front garden, there is an approximately 12m high tree about 4m from the right-hand side of the front façade; this tree was previously pollarded but has regrown.

k) Within the right-hand adjoining rear garden, there is an approximately 15m high tree about 8m from the right-hand side of the front façade; this tree was previously pollarded but has regrown. Within our rear garden, there is an approximately 8m high conifer tree about 5m from the middle of the rear façade. Also, within the rear garden, there is an approximately 15m-18m high tree about 10m from the left-hand side of the rear façade; this tree was previously trimmed but has regrown.

2.2 Syed Hussain's (of London Borough of Camden) Visual Inspection Report dated 7 May 2016

a) In Syed Hussain's report he confirms his opinion that subsidence has occurred to the rear of the building.

b) He therefore recommends that an annual cycle of crack monitoring is undertaken, a CCTV survey of the drains is undertaken and that a soils investigation is also undertaken. He also recommends that an Arboricultural Report is undertaken and the trees reduced accordingly.

c) The CCTV Survey of the Drains and the Soils Investigation were undertaken on 2 February 2017; however, we understand that the crack monitoring, the Arboricultural Report and tree reduction were not undertaken.

d) The purpose of the investigations was to provide the required information to enable confirmation of the cause of the movement, if the movement was ongoing and/or could be arrested by tree reduction or otherwise.

2.3 CCTV Survey of the Drains

a) Chelmer prepared a Drainage Report, dated 2 February 2017; refer to Appendix D for a copy of the report.

b) The drain runs were found to be located within the external gardens to the front and rear and, to the left-hand side of the building, to the left-hand flank.

c) No significant defective drains were evident in the location of the significant cracking to the building.

2.4 Soils Investigation

Trial Pits and Boreholes

a) Chelmer prepared a Factual Report, dated 2 February 2017; refer to Appendix E for a copy of the report.

b) The purposes of the soils investigation are to assess the suitability of the founding strata, assess the level of subsoil desiccation, locate what areas of the building in which subsidence is occurring and to identify which trees, if any, are contributing to the subsoil desiccation.

c) Chelmer Site Investigation's soils investigation's incorporated 2no trial pits to the rear and1no borehole. The soils investigation comprised a trial pit and borehole to the left-hand side of the rear façade (TP1/BH1) and a trial pit to the right-hand side of the rear façade.

d) A number of insitu and laboratory tests were carried out to the soil at differing depths. The level of testing for this soils investigation is sufficient to identify the subsoil under the foundations

and has enabled an assessment of subsoil desiccation.

e) The trial pit and borehole TP1/BH1, located to the left-hand side of the rear façade revealed a brick-corbel foundation sitting on 400mm thick of crushed brick. The depth of foundations is 0.80m with the edge of the concrete footing being approximately 200mm from the face of the brickwork. The foundations were found to be founded on silty clay made ground. The made ground was found to extend to 1m below existing ground level, i.e. 200mm below founding level. Below the made ground a clay stratum was found which went down to the bottom of the borehole at 5.0m below founding level. Tree roots were found to extend to 2.45m depth, i.e. 1.65m below founding depth. Various tree roots were identified however the root of most significance belongs to the Ash, which is approximately 15m-18m in height and approxmatel1y 10m from the rear façade within No19's rear garden.

f) The trial pit TP2, located to the right-hand side of the rear façade revealed a brick-corbel foundation sitting on 400mm thick of crushed brick. The depth of foundations is 1.15m with the edge of the concrete footing being approximately 200mm from the face of the brickwork. The foundations were found to be founded on silty clay made ground. The made ground was found to extend to the bottom of the pit at 1.35m below existing ground level, i.e. 200mm below founding level. Tree roots found were found below the foundations to the bottom of the pit. The tree root identified below the foundations belongs to an Ash, which is located within No19's rear garden.

<u>Soils Investigation Results</u>

There are a number of indicators of soil desiccation. These are considered below.

g) *Plasticity Index*

The Plasticity Index of the clay stratum to the Borehole BH1 at 1.0m depth (0.2m below founding depth), 1.5m depth (0.7m below founding depth) and 2.0m depth (1.2m below founding depth) respectively were found to be 60%, 59% and 54% respectively. The Plasticity Index is indicative of high volume change potential, i.e. susceptible to volumetric change due to desiccation or swelling (heave).

h) *Strength*

The Shear Vane tests to the clay founding stratum to the borehole revealed an elevated safe bearing pressures of 67N/m2 at 0.2m below founding depth, 76N/m2 at 0.7m below founding depth and 77N/m2 at 1.2m below founding depth. Shear vane tests were carried out to determine the strength of the soil. The results would be deemed typical of over-consolidated soil.

i) *Moisture Content*

The moisture content of the soil analysed to Borehole BH1 at 1.0m depth (0.2m below founding depth), 1.5m depth (0.7m below founding depth) and 2.0m depth (1.2m below founding depth) were found to be 32%, 34% and 32% respectively. The levels are relatively low and therefore may be indicative of subsoil desiccation and differential settlement.

j) *Driscoll*

According to R Driscoll in "The Influence of Vegetation on the Swelling and Shrinking of Clay Soils in Britain" (Geotechnique Issue 33, 1983, p93 -105) desiccation occurs when the soil's moisture content is less than 0.5 times the liquid limit and significant desiccation occurs when the soil's moisture content is less than 0.4 times the liquid limit. For BH1, the soil's moisture content at at 1.0m depth (0.2m below founding depth), 1.5m depth (0.7m below founding depth) and 2.0m depth (1.2m below founding depth) are 0.40, 0.43 and 0.41 times the liquid limit respectively. The subsoil would be described as significantly desiccated according to Driscoll.

k) *Filter Paper Suction Tests*

According to the BRE Digest 412 (1996), filter paper suction tests are considered to be the most fundamental desiccation indicator of all the various techniques. The filter paper suction tests were carried out to samples from borehole BH1. According to the Building Research Establishment in BRE Digest 412, moderate desiccation occurs when the actual suction is found to be about 100kN/m^2 (kPa) greater than the theoretical equilibrium suction, severe desiccation occurs when the actual suction is found to be between 250kN/m^2 – 500 kN/m^2 greater and very severe desiccation occurs when the actual suction is found to be more than 500kN/m^2 greater.

Conservatively assuming un-desiccated suction to 150kN/m2, than the excess suction in BH1 is 76 kN/m^2 at 0.2m below founding level and 182 kN/m^2 at 1.2m below founding level. We can conclude that moderate desiccation has therefore occurred to the subsoil at TP1/BH1.

3.0 CONCLUSIONS AND RECOMMENDATIONS

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3.1. Significant historic movement has occurred to the building which is exhibited by the sloping floors within the flats; please note that the floors slope down to both the left and right-hand flank walls and down to the rear wall.

3.2 However, more recent and possibly ongoing movement has occurred to the building, particularly to the rear half of the building and to the left-hand flank. We believe this recent movement is the result of subsoil desiccation. Please note that the soils investigation revealed the clay stratum to be significantly desiccated and revealed tree roots to a depth 1.65m below founding level.

3.3 The founding stratum was found to be clay based made ground overlying a virgin clay stratum. The nature of made ground is such that the extent of compaction at the time of construction and the consolidation of the soil over time is unpredictable. In addition, tree roots were found in the made ground below the founding level which is likely to have induced further movement due to subsoil desiccation.

3.4 Trees were noted within the zone of influence, and root analysis identified the Ash tree, which we believe correlates to the tree within No19's rear garden.

3.5 BRE Digest 251 (1995) sets out 6 categories of damage to walls in low rise buildings, "0" to "5. The damage categories are based upon the maximum crack width and relate to the ease of repair. The crack widths to all areas, being up to 10mm wide maximum, fall under the moderate Category of Damage of 3 of cracks and is described as follows in BRE Digest 251: "*Cracks which require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather-tightness often impaired. Typical crack widths are 5 to 15 mm, or several of, say, 3 mm."* As the movement appears to be ongoing, then it is likely that cracking will continue unless the cause is addressed or the foundations underpinned.

3.6 In Syed Hussain's report, he recommended crack monitoring and tree reduction, which we do not believe was undertaken.

3.7 We therefore recommend that the trees within the zone of influence are removed or significantly reduced cyclically in conjunction with the advice of an Arboriculturist. Once the trees are removed/reduced, we recommend an annual cycle of crack monitoring at 2 or 3 monthly intervals. With regards the cracks to be monitored, we have noted in Appendix B (Appendix of Photographs), cracks which suggest are monitored. If the monitoring following the tree reduction confirms that the movement has been arrested, then the specialist superstructure repairs should be carried out. The trees should also be on a programme of cyclical reduction.

3.8 The alternative to the above, or if the movement is found to be ongoing, is to underpin the foundations to the correct depth which will very likely to eliminate the movement. Following the underpinning, the specialist superstructure repairs can be undertaken.

3.9 We also understand that consideration is being given to replacing the existing windows. It was noted that there is a significant crack to the rear jamb of Flat 3's window in the kitchen, which is located to the left-hand flank wall. Therefore, we recommend that this window is not replaced until remedial works to the crack, and the property as a whole, are undertaken. With regards to window to Flat 4's rear bedroom, we recommend that the gap between the soffit of the cill and the brickwork is also made good before the window is replaced.

APPENDIX A

DISCLAIMERS

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1. This report does not constitute a full survey of the premises.

2. Except where specifically indicated in the report, woodwork, brickwork or other parts of the property or its services, which are covered, unexposed, or inaccessible, have not been inspected and this report does not constitute any warranty that any such parts of the property are free from defects.

3. This report is prepared for the use of the person, firm or company to whom it is addressed (and that of any other person, firm or company whose interest was disclosed to us prior to its preparation) and no responsibility is accepted by us to any other party whatsoever for the whole or any part of its contents.

4. We cannot report definitively that subsidence has occurred from a visual inspection alone. Investigations are required to establish the cause of the movement.

5. It is necessary as a result of specific changes in professional indemnity insurance to clarify the scope of our services in respect of asbestos, fungus and mould. For the avoidance of doubt this practice does not accept any liability or responsibility for or in connection with the detection, monitoring, treatment, eradication or removal of these substances either implied or otherwise within the scope of our services. Notwithstanding your legal obligations it is strongly recommended independent professional surveys be carried out on any existing building that is to be the subject of development, refurbishment or alteration works to identify the presence of such substances and give recommendations for treatment and or removal.

APPENDIX B

PHOTOGRAPHS

Photograph 01

Photograph 02

Photograph 03

Photograph 04

Photograph 05

Photograph 06

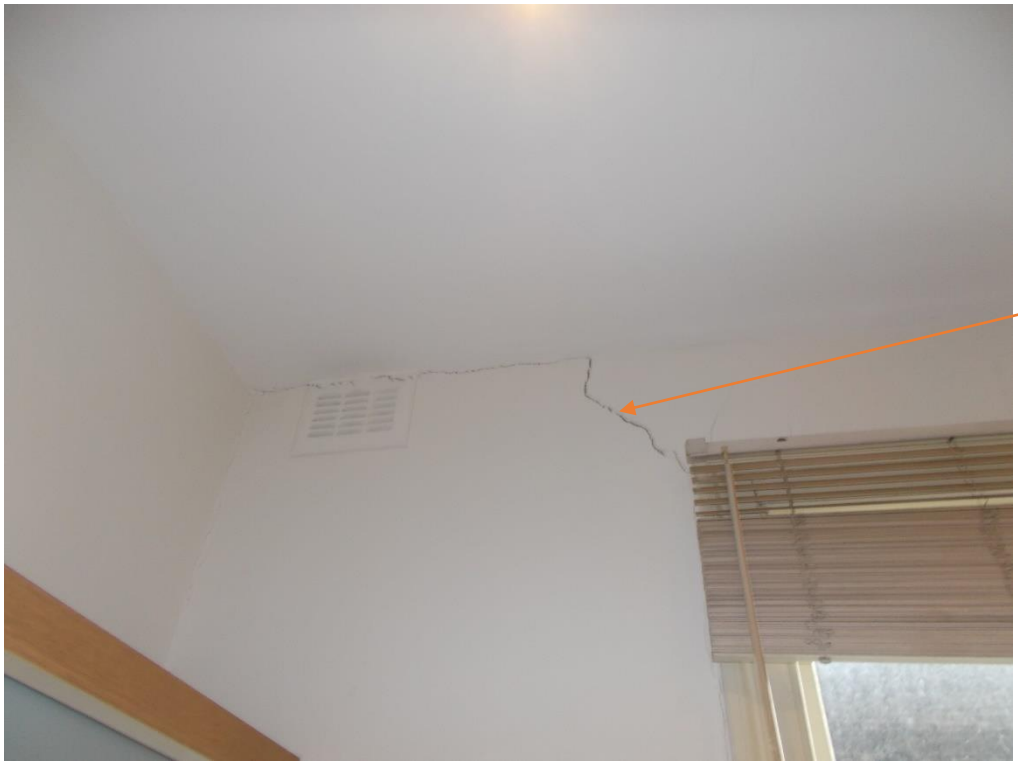
Photograph 07 (Rear Façade)

Photograph 08 (Rear Façade)

Photograph 09

Photograph 10 (Common Hall/Stairs)

Photograph 11 (Common Hall/Stairs)



Photograph 12 (Flat 4 Kitchen)

Photograph 13 (Flat 3 Rear Bedroom)

Photograph 14 (Flat 3 Rear Bedroom)

Photograph 15 (Flat 2 Rear Bedroom)

Photograph 16 (Flat 2 Hall)

Photograph 17 (Common Hall/Stairs)

APPENDIX C

SYED HUSSAIN'S (OF LONDON BOROUGH OF CAMDEN) VISUAL INSPECTION REPORT – 7 DECEMBER 2016

---------- Forwarded message ----------
From: "Hussain, Syed" <Syed.Hussain@camden.gov.uk>
To: "Palmer, Deon" <Deon.Palmer@camden.gov.uk>
Cc: "Thompson, Carson" <carson.thompson@camden.gov.uk>, "Durand, Matthew" <Matthew.Durand@camden.gov.uk>, "Barber, Ross" <Ross.Barber@camden.gov.uk>
Bcc:
Date: Wed, 7 Dec 2016 13:20:08 +0000
Subject: Flat 3, 19 Woodchurch Rd, NW6 3PL -Structural Rpt (Subsidence)
Further to an email request from Repairs Coordinator Deon Palmer, we carried out a structural inspection of the cracking to the above property, on 29.11.16. I attach a concise report of my findings, together with some annotated photographs.

INTRODUCTION:
This is a large Victorian 2-storey detached house, which has now been converted into 5 separate flats. Flat 3 is a 1-Bedroomed flat, situated on the 1st floor right hand side of the house.
The house comprises of solid 225mm thick brick perimeter walls with suspended timber upper floors, under a pitched timber roof. The rear garden has been divided into 5 separate areas (one for each flat).

OBSERVATIONS & DISCUSSION:
We noticed some large trees, growing around the house. There is a 15m high Lime tree (in the front garden) growing about 5m away from the building. At the rear of the house, there is a 15m high Lime tree (in the adjoining garden of Sidney Boyd Court) growing about 12m away. There is also a 6m high Conifer growing 7m away and a 15m high Ash tree growing about 13m away. There are 7 further trees (up to 12m high) growing at the bottom of the garden, which is up to 27m in length.

It is readily apparent that structural movement and cracking has affected the back of the house. The external brick face of the rear wall to the main house, exhibits extensive signs of movement and cracking (3-10mm wide) and disturbance of the brickwork.

Inside the house, there is a full depth vertical crack (8mm wide x0.7m long) which affects the main rear wall of the house, situated below the window on the 1st floor half-Landing. There is further cracking evident around this window, as well.

The partition wall (which divides the communal staircase /Flat 3) exhibits a vertical crack (3-7mm wide x2.5m long). The parapet wall to the service balcony on the top floor (at the rear of the house) exhibits a full depth vertical crack (3-5mm wide x0.75m long).

In the Bedroom to Flat 3, the main rear wall of the house exhibits a horizontal crack (1-3mm wide x0.9m long). This crack travels and also affects the junction of this wall /the partition wall. Other, less significant crackling is also visible elsewhere in the flat. The tenant (Mrs. J. Norman) has been living here since 2013. When she moved in, she redecorated the Bedroom: hence all the cracking in this room has taken place since 2013.

The British Geological Survey map for the locality shows the underlying subsoil to be London Clay. This is a shrinkable soil and we believe that in the past, it has become desiccated and shrunk. As a consequence of this, subsidence has affected the back of the house and it has moved /cracked. The subsidence has been exacerbated by the dehydrating effect of the large trees, growing in close proximity to the rear of the house.

We noticed that the paving slabs to the front garden are uneven –probably due to the root activity of the large Lime tree, growing in the front garden. These paving slabs should be taken up and re-laid to the correct line /level.

CONCLUSION:
The back of the house has been affected by cracking due to subsidence.

RECOMMENDATIONS:
1) Demec steel monitoring studs should be affixed to the principal cracks as follows:
a) 1st Flr Flat 3 (rear Bedroom) -horizontal crack to rear wall of main house.
b) 1st Flr half-Landing to Communal Staircase –vertical crack (to rear wall of main house) below window.
c) Communal Staircase (Partition Wall between Staircase /Flat 3) –principal vertical crack to Partition Wall.
d) Grd Flr Communal Passage (near the back door) –vertical crack (below window) to side wall.
e) Parapet Wall (to communal service balcony on the top floor -at the rear of house) –principal vertical crack to inside face of Parapet Wall.

These cracks should then be monitored at 2-monthly intervals, over a period of 12 months.

2) A CCTV Survey of the underground drainage should be carried out to locate the layout and condition of the underground drainlines. If any of these are found to be leaking, then they should be returned to a watertight condition.

3a) A Trial Pit (TP1) together with a 5m deep Borehole (BH1), should be opened up against the main rear wall of the house (in the paved rear garden of Flat 2, next to the rainwater downpipe). The soil should be analysed and the profile of the foundation should be determined. At least 3 roots should also be retrieved and identified.
3b) A Trial Pit (TP2) should be opened up in the rear garden of Flat 1. This should be sited in the corner (at the junction of the rear wall of the house / the 2m long side wall to the passage). The soil should be analysed and the profile of the foundation should be determined. At least 3 roots should also be retrieved and identified

4a) An Arboricultural Report should be commissioned to comment on all the vegetation situated around the house (particularly the large trees growing in close proximity to the rear of the property).
4b) Tree surgery should be carried out in accordance with the recommendations of the above Arboricultural Report.

5) Following the above, commission a suitably experienced Structural Engineer e.g. Ellis & Moore (contact: N.Georgis, Mob 07973 864 483) or similar, to design a suitable scheme of remedial work to permanently stabilize and repair the cracking to the property.

6) The uneven paving slabs to the front garden should be taken up and re-laid to the correct line /level (this should be done after Item 4b has been completed).

Kind Regards,
Syed Hussain
Structural Engineer, Housing Repairs.

APPENDIX D

CHELMER'S DRAIN REPORT – 2 FEBRUARY 2017

(see attached)

APPENDIX E

CHELMER'S SOIL INVESTIGATION REPORT – 2 FEBRUARY 2017

(see attached)