PINDORIA ASSOCIATES
Consulting Civil & Structural Engineers
213D Station Rd, Harrow
Middx, HA1 2TP
Tel 020 8863 8400

kp/2122

STRUCTURAL ENGINEERING REPORT
3 Copse Wood Way, Northwood, HA6 2TP

K. PINDORIA
BSc (Hons) CEng MICE FConsE

Contents

1.0 Introduction

2.0 Scope & Inspection

3.0 Other Investigations and Reports

4.0 Building Form, Structure and Use

5.0 Soil Conditions and Foundations

6.0 Vegetation

7.0 Obervations of Distress

8.0 Remedial Works

9.0 Summary and Recommendations

10.0 Appendix A – Soil Investigation Executive Summary

11.0 Appendix B – General Site Photos

1.0 Introduction

1.1 Pindoria Associates have been appointed to advise on the extent of cracking and the viability structural repairs for an ageing building.

2.0 Scope and Inspection

2.1 The survey was undertaken on the 26th March 2021. A number of photographs are appended.

2.2 Except where specifically noted, the inspection was limited specifically to a non-intrusive visual inspection of exposed and readily accessible, structural and load-bearing elements of the property.

2.3 Except where noted, external works, perimeter walls and fences were not inspected.

2.4 In addition, unless specifically noted, the inspection did not cover non-structural items i.e. drainage, electrics, plumbing, damp or timber decay.

2.5 This report is for the use of Mr. M Reeves in connection with this appointment and the benefit is not to be extended to any third party without the written permission of Pindoria Associates Ltd.

3.0 Other Investigations and Reports

3.1 The following investigations and reports have been made available.

a) 2006 – Crawfords: Intrusive structural investigation, comprising soil tests, drainage survey, monitoring of cracks.

b) 2009 – Planning permission allowing 30% crown reduction of the Oak Tree.

c) 2013 – Crawfords: Completion report of the underpinning and structural reairs to the garage.

d) 2021 – GHA's: Arboricutural and Planning Integration Report

4.0 Building Form, Structure and Use

4.1 The property is a larged two storey detached house with a single storey garage to the left of the main house.

4.2 The main house comprises two storeys with a gable end to the left and a hipped roof to the right eaves. The garage is single storey with a lean to tiled roof at the front of a flat roof.

4.3 The structure of the building is traditional load bearing brick external walls which support tiled roof. The internal walls are loadbearing spine and staircase walls with non-load bearing partitions forming various rooms.

5.0 Soil Conditions and Foundations

5.1 Report by Crawfords indicate:

a) The foundations to the main house are of shallow depth, approximately 600mm deep. Trial holes show root activity at the bearing level of the foundation.

b) The soil conditions are described as slightly sandy silty CLAY which is of high plasticity index and is therefore susceptible to changes in moisture contents from extraction of water from tree roots. The clay depth is down to 8m, overlying stable gravelley sand below.

6.0 Vegetation

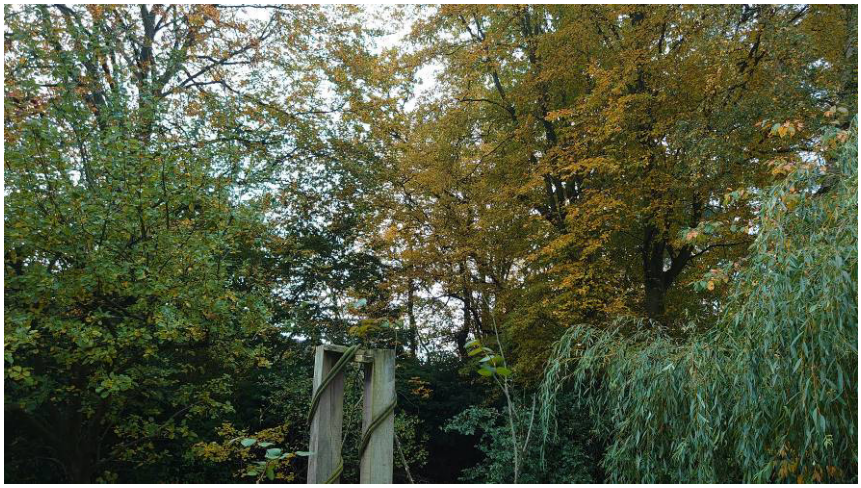
6.1 Refer to attached tree survey which shows the site has a lot of vegetaion all round the site in close proximity to the house.

6.2 This has resulted in the cracking that is evident both externally and internally.

6.3 The trees on site have a life expectancy ranging from 10 to 40 years and more for the more hardy trees such as Oaks and Willows. (See attached Table from Tree Report)

Trees at front and left side

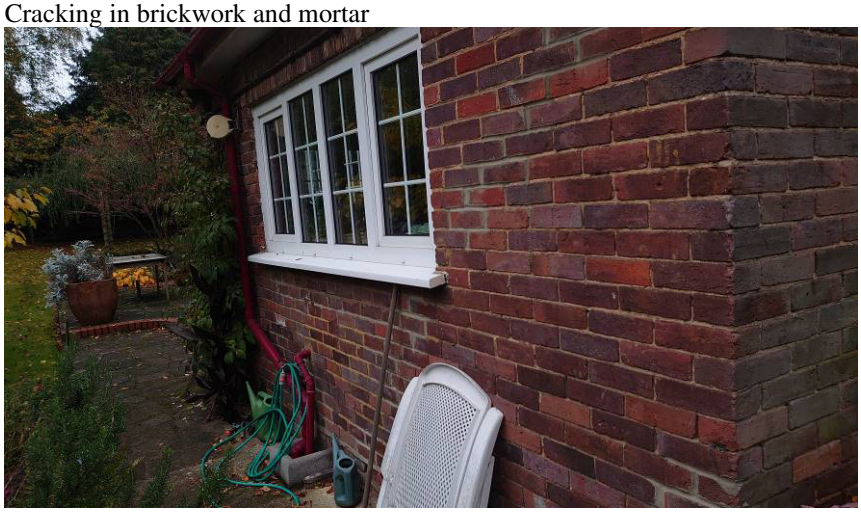
Trees right rear side



7.0 Observations of Distress

Signs of repair – opening up again

Cracking in brickwork and mortar



Previous repairs showing signs of opening up

Settlement of wall below dpc

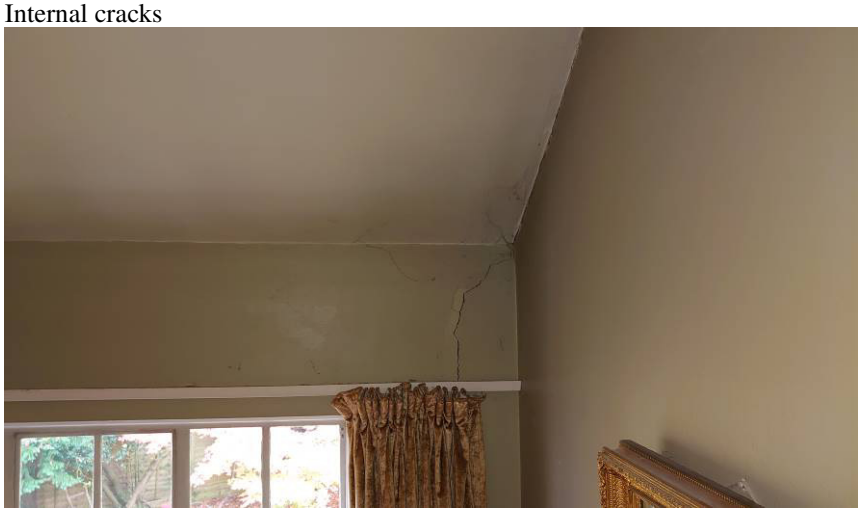
Rear elevation

Cracking below window cill

Gap at roof eaves and soffit due to outward movement of the roof

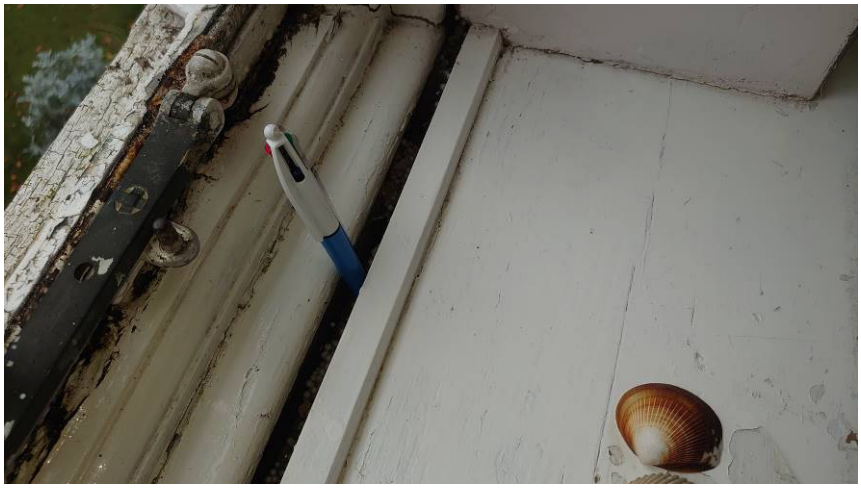
Outward movement of the wall

Internal cracks

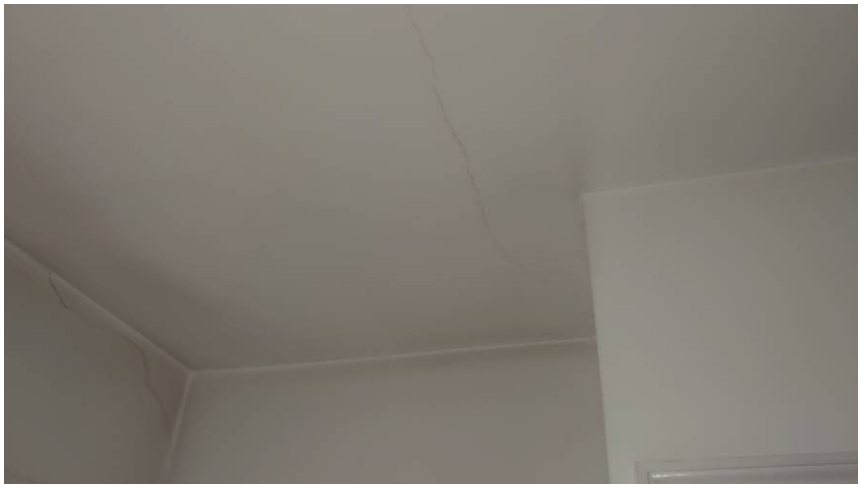


Internal cracks

Outward movement of wall



Large gap at window



More internal cracks

More internal cracks

More internal cracks

Cracking in ground floor

8.0 Remedial Works

8.1 The photos above show how extensive the cracking is, both internally and externally. The cracking would be described as ***moderate to severe*** as described in BRE Digest Classification.

Crack Width	Description	Repair Considerations
(H) upto 0.1mm	***Hairline*** – generally considered to have negligible structural implications.	*Hairline* cracks can be filled or covered by wall covering and redecorated.
(F) 0.2 to 1mm	***Fine*** - generally have some structural implication but are not deemed serious. More visible inside buildings than in external brickwork. Would generally be located at points of structural weakness eg window/door openings.	*Fine* cracks can be filled or covered by wall covering and redecorated.
(M) 2 to 5mm	***Moderate*** – most likely to have structural significance and will always occur at points of weakness or hinge points. Generally, will be visible externally and internally and will indicate foundation movement enough to distort door and window frames.	*Moderate* Internal cracks are likely to need raking out and repairing and may need chopping back and repairing with expanded metal/plaster, then redecorated. External cracks will require raking out and repointing, cracked bricks will require replacement.
(SE) 6 to 15mm	***Serious*** – There will be some serious compromise of the integrity of the structure and weather tightness will be impaired. Serious distortion will be occasioned to door and window frames.	*Serious – underpin if movement is progressive unless cause of damage can be removed.* Internal cracks repairs as Moderate External cracks may require reconstruction of panels and/or resin bonding and/or joint reinforcement.
(SV) 16-25mm	***Severe*** – Structural integrity severely compromised, floors sloping, walls leaning or bulging, bearings of beams/lintels suspect	*Severe– underpin if movement is progressive unless cause of damage can be removed.* Major reconstruction works to both internal and external wall skins, realignment of doors and windows.
(VSV) > 25mm	***Very Severe*** – Potential danger from failed or fractured structural elements and for instability.	*Very Severe – underpin or rebuild on new foundations.* Major reconstruction works, plus possibly structural lifting or sectional demolition and rebuild. Replacement of doors, windows and other structural elements.

8.2 Remedial works will be extensive and would be summarized as follows:

a) Strip roof covering complete, provide temporary roof cover, replace existing roof structure (rafters and ceiling joists).

b) Install structural restraint measures to alleviate roof spread of rear elevation.

c) Rebuild two sections of brick wall either side of both dormers.

d) Remove distorted dormers and replace with new timber dormers and lead cheeks and flat roof coverings.

e) Subsidence – mindful of proximity of TPO Trees

- External walls: allow for underpinning of all elevation wall to an average depth of 2.5m.

- Internal load bearing walls: allow for underpinning to an average depth of 2.0m.

- Garage: Underpin 2No. internal spine walls and flank wall of original house to an average depth of 2.5m

- Replace concrete ground floor slab

- Replace wall plates embedded in walls and replace 25% of floor joists and level up floor boards.

NOTE:

- Traditional Underpinning would need to be taken down to stable soil which could be greater than 2.5m in depth in certain areas. This would be slow and impractical for traditional underpinning and very expensive.

- Piled and Beam Foundation would avoid the shoring and deep excavations but would require to be carried out by a specialist contractor and is also likely to be costly. A deep borehole investigation would be also required for pile design.

f) Brick leaf wall tie failure suspected – cut out, remove and replace ties.

g) Rake out and fully repoint entire house. Allow for 30% rebuild of walls.

h) Reinstate roof coverings and rainwater goods & fascia and soffits.

i) Remove all cracked plaster and re-plaster, skim and paint.

9.0 Summary and Recommendations

9.1 For a long-term solution, foundation strengthening is the only certain method of remedying the problem of ground movement. As this is a costly solution the following factors need to be considered:

a) Is the building safe

In our opinion the building would be considered safe *after extensive strengthening/rebuilding works i.e. foundations, walls, floors and roofs..*

b) What is a Long Term Solution

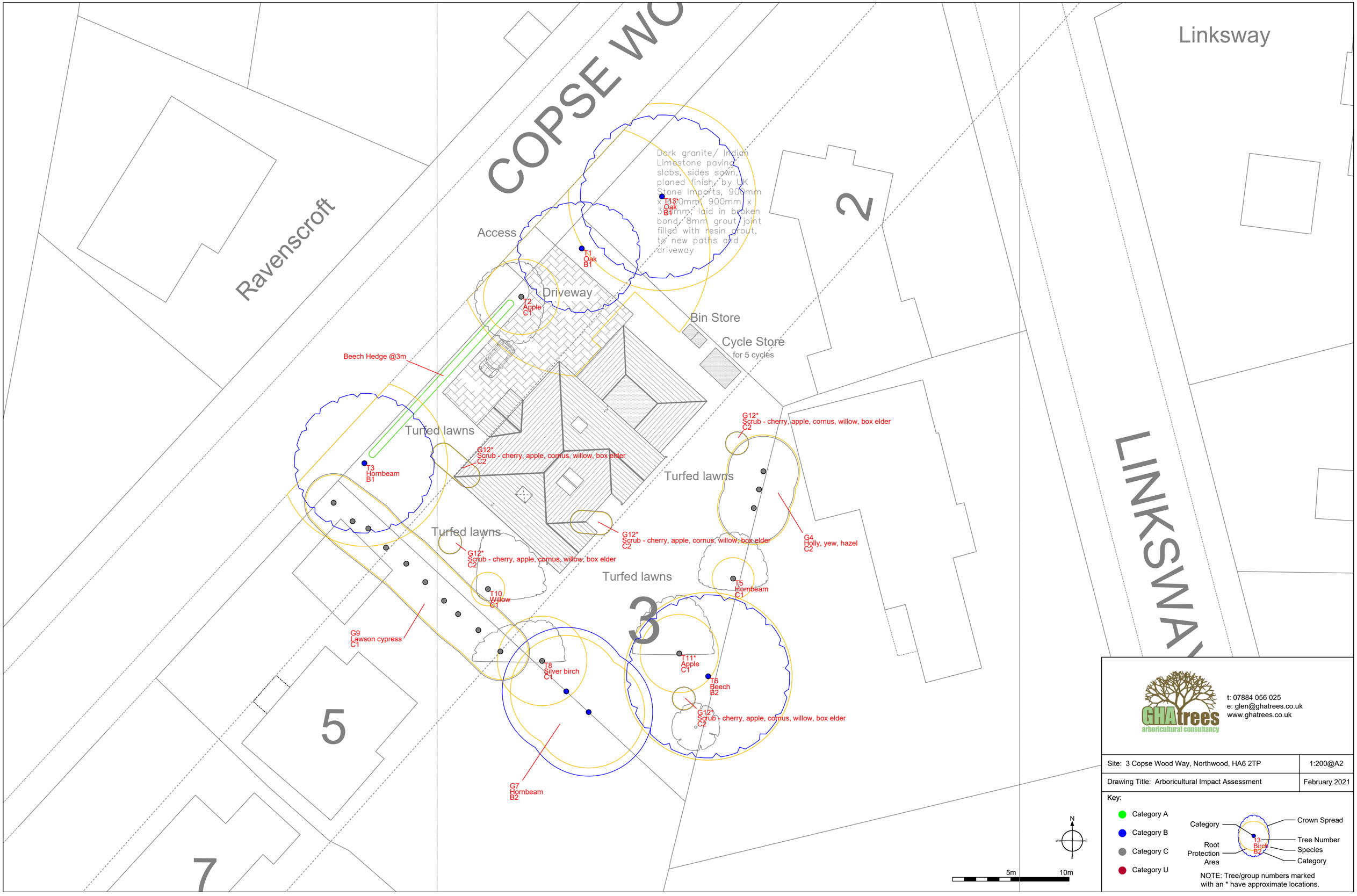
With many trees on site and some under TPO's it will be difficult to provide a workable tree management solution. **Therefore there is no cost effective long term solution.**

c) What is the Life Term of the Building

It is **not viable** *to carry out the above remedial measures due to the extent of current damage and restrictions imposed by proximity of trees.*

In our opinion the building has passed its useful life and should be **re-built**.

The cost of the repairs would be in the order of **£200,000 to £250,000** *which cannot be justified for its age as ongoing structural problems cannot be fully mitigated.*



GHAtrees
arboricultural consultancy

t: 07884 056 025
e: glen@ghatrees.co.uk
www.ghatrees.co.uk

Site: 3 Copse Wood Way, Northwood, HA6 2TP	1:200@A2
Drawing Title: Arboricultural Impact Assessment	February 2021

Key:

- Category A
- Category B
- Category C
- Category U

Category
Root Protection Area
Crown Spread
Tree Number
Species
Category
13
Birch
B2

NOTE: Tree/group numbers marked with an * have approximate locations.

Tony Michael Consulting

23 Dumpton Park Drive Broadstairs Kent CT10 1RQ
Tel 01843 864320
e : tm@tmcuk.org
www.tonymichaelconsulting.co.uk

3 COPSE WOOD WAY, NORTHWOOD

EXISTING OCT 20 1:100 @ A3
Drg. No. 04

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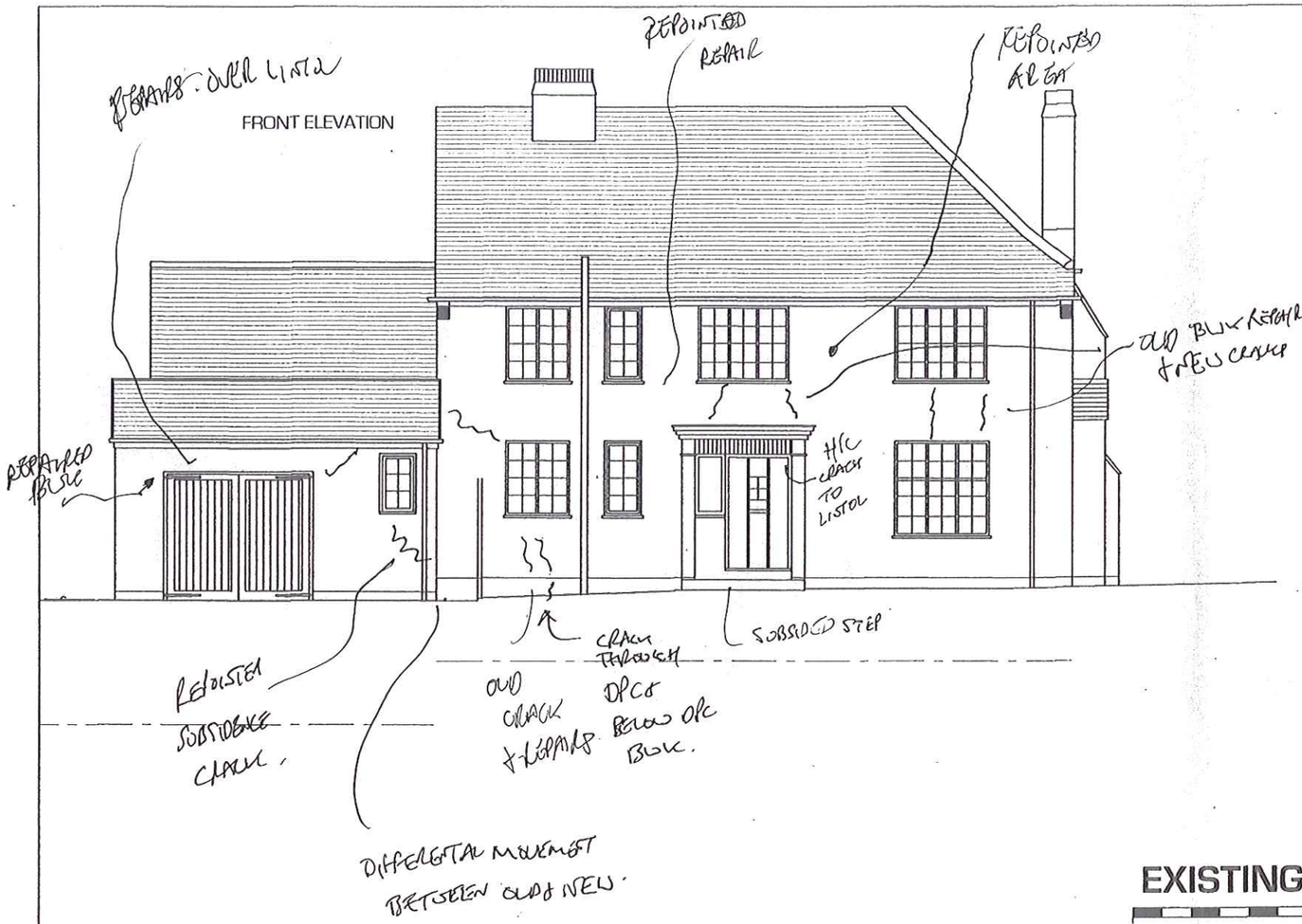

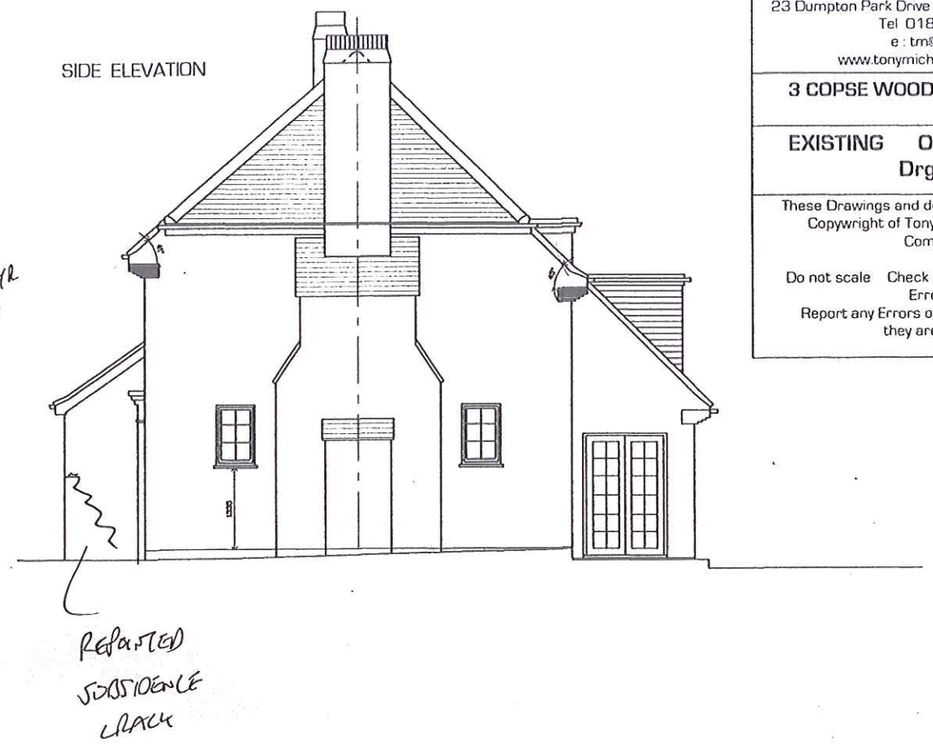

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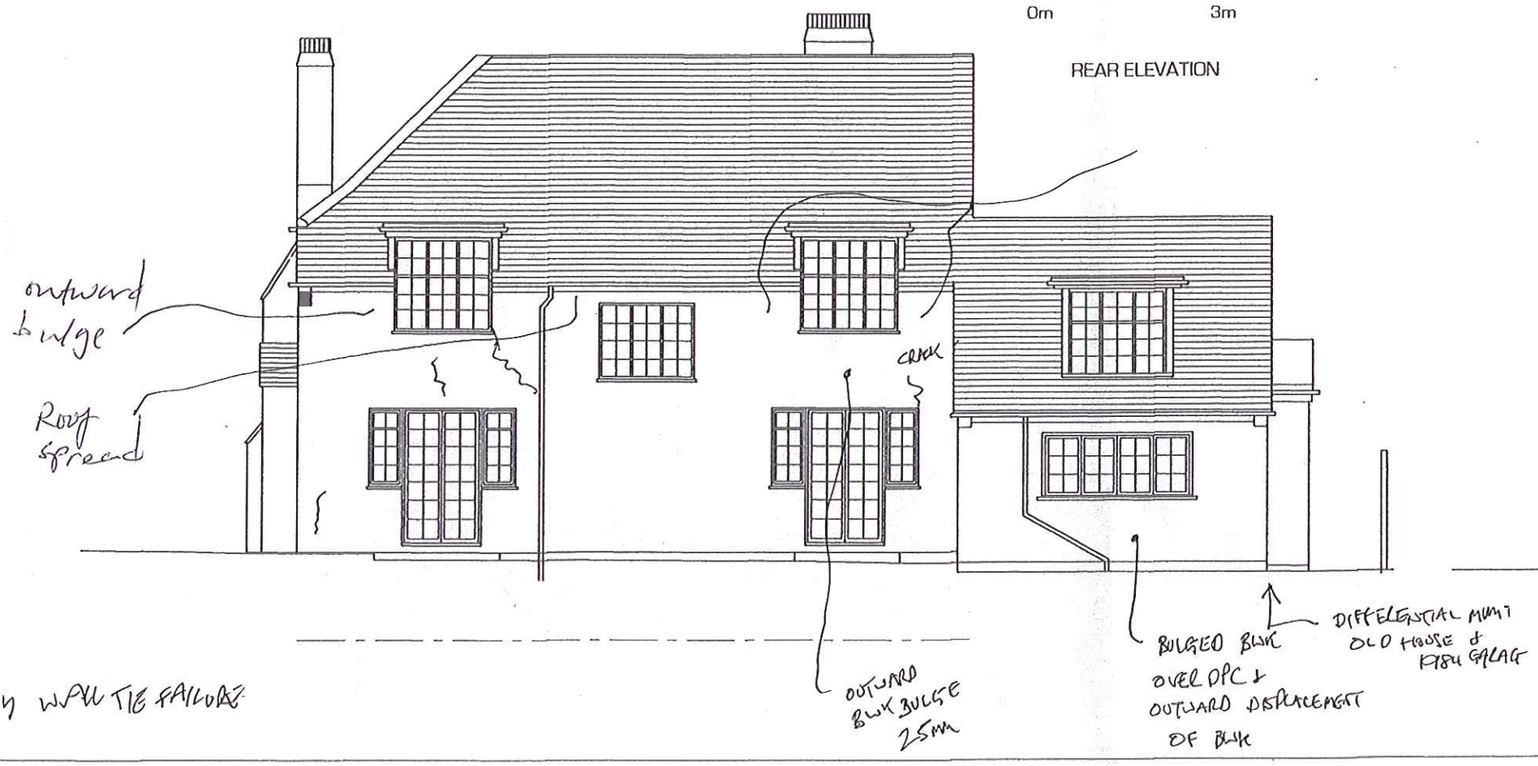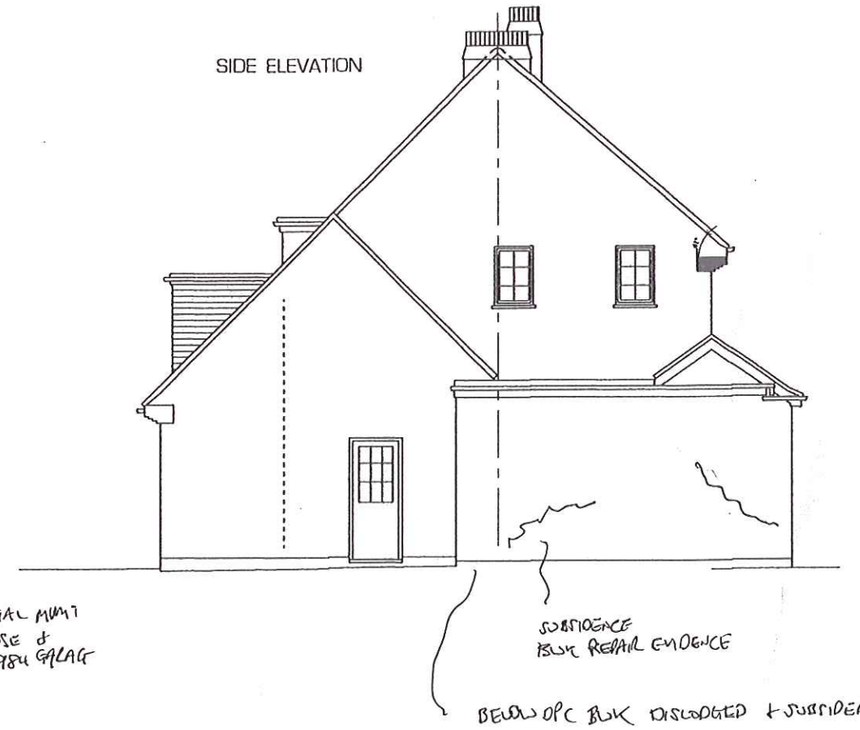
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