



2 The Boulevard, City West One Office Park, Gelderd Road, Leeds, LS12 6NY

Policyholder: [REDACTED]

Subject Property Address:

75 Ladygate Lane
RUISLIP
Middlesex
HA4 7QX

INSURANCE CLAIM

CONCERNING SUBSIDENCE DAMAGE

ENGINEERING APPRAISAL REPORT

This report is prepared on behalf of [REDACTED] for the purpose of investigating a claim for subsidence. It is not intended to cover any other aspect of structural inadequacy or building defect that may otherwise have been in existence at the time of inspection.

Date: 04/10/2024

Our Ref: 8767150

INTRODUCTION

This report has been prepared by our Building Consultant, Richard Wainwright BSc (Hons) MRPSA BDMA, and is being investigated in accordance with our Project Managed Service.

Unless stated otherwise all directions are referred to as looking towards the front door from the outside the property.

DESCRIPTION OF BUILDING

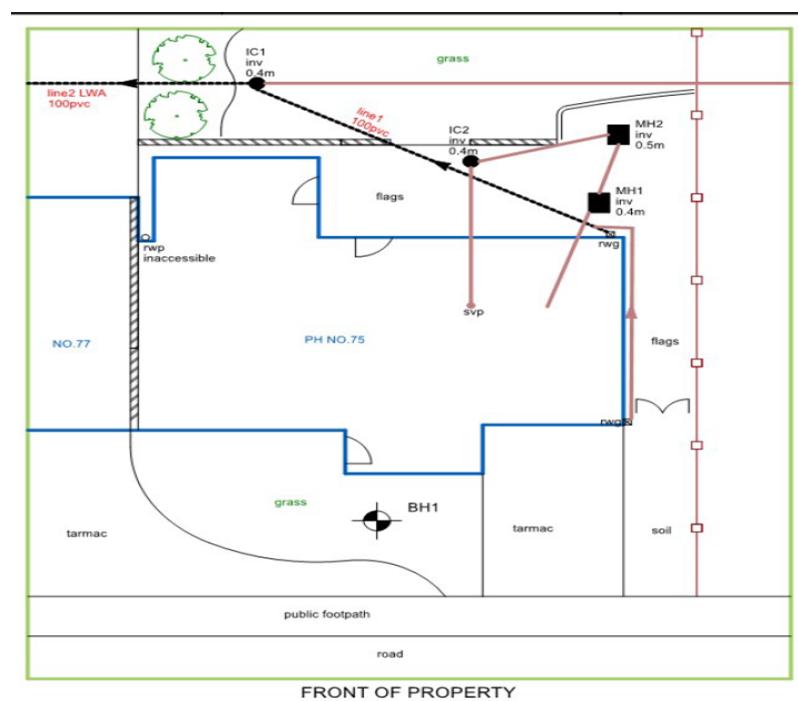
The subject property is Detached house constructed 1983 in a residential estate on a plot that is level.

The overall layout is recorded on our site plan below:



The property has a conservatory to the rear.

The general layout of the site is shown on our sketch plan below:



There are trees identified within influencing distance of the property that remain in-situ.

A 20.2m high Oak tree owned by a private third party and situated 10.9m from the property and subject to a Tree Preservation Order.

A 19.5m high Oak tree owned by a private third party and situated 10.0m from the property and subject to a Tree Preservation Order.

The drainage system is a combined system which is shown on the attached plan.

CIRCUMSTANCES OF DISCOVERY OF DAMAGE

The policyholder and homeowner, [REDACTED], first discovered the damage in November 2019.

The policyholder initially noticed some cracks to the conservatory with further cracks developing to the front elevation and damage internally. Upon becoming concerned the policyholder then notified insurers.

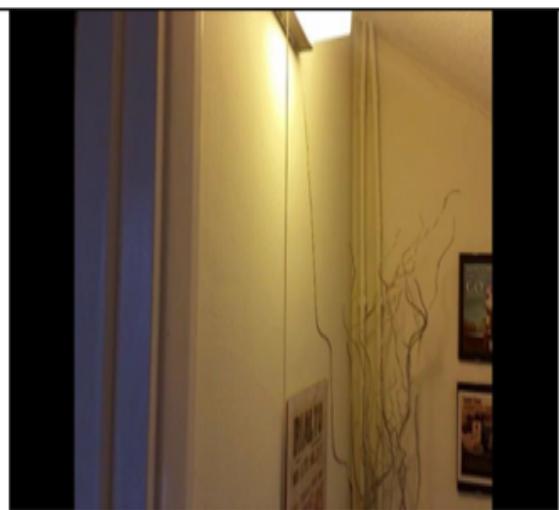
Since reporting the damage the cracking has become more extensive.

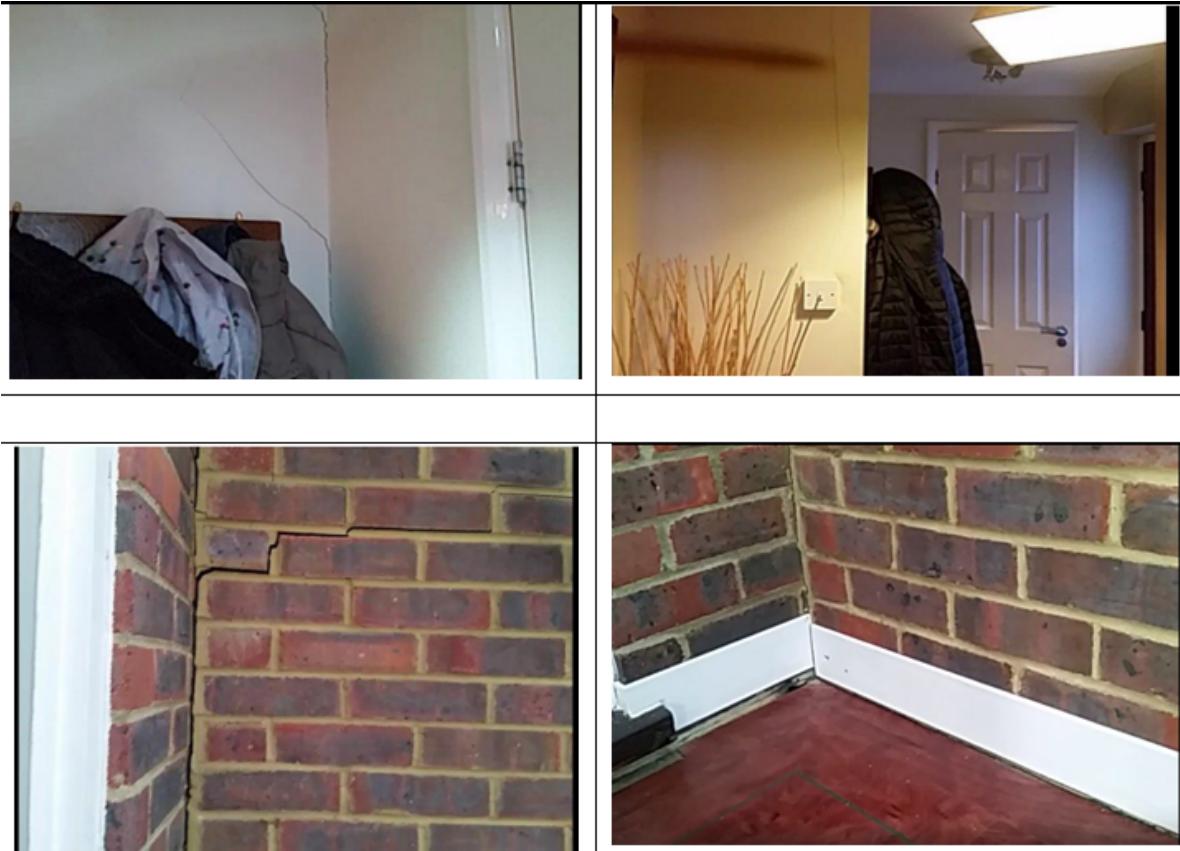
NATURE AND EXTENT OF DAMAGE

The main areas of damage is to the front outrigger & rear conservatory and takes the form of tapering external and internal cracks. The conservatory also has a sloping concrete floor.

This pattern of damage indicates a mechanism of rotational downwards movement to the front and rear of the property.

Details of some of the damage are shown in the following photographs:





Significance

The level of damage is moderate, and is classified as category 3 in accordance with BRE Digest 251 - Assessment of damage in low-rise buildings.

Onset and Progression

We consider that the damage has occurred recently. It is likely that movement will be of a cyclical nature with cracks opening in the summer and closing in the winter.

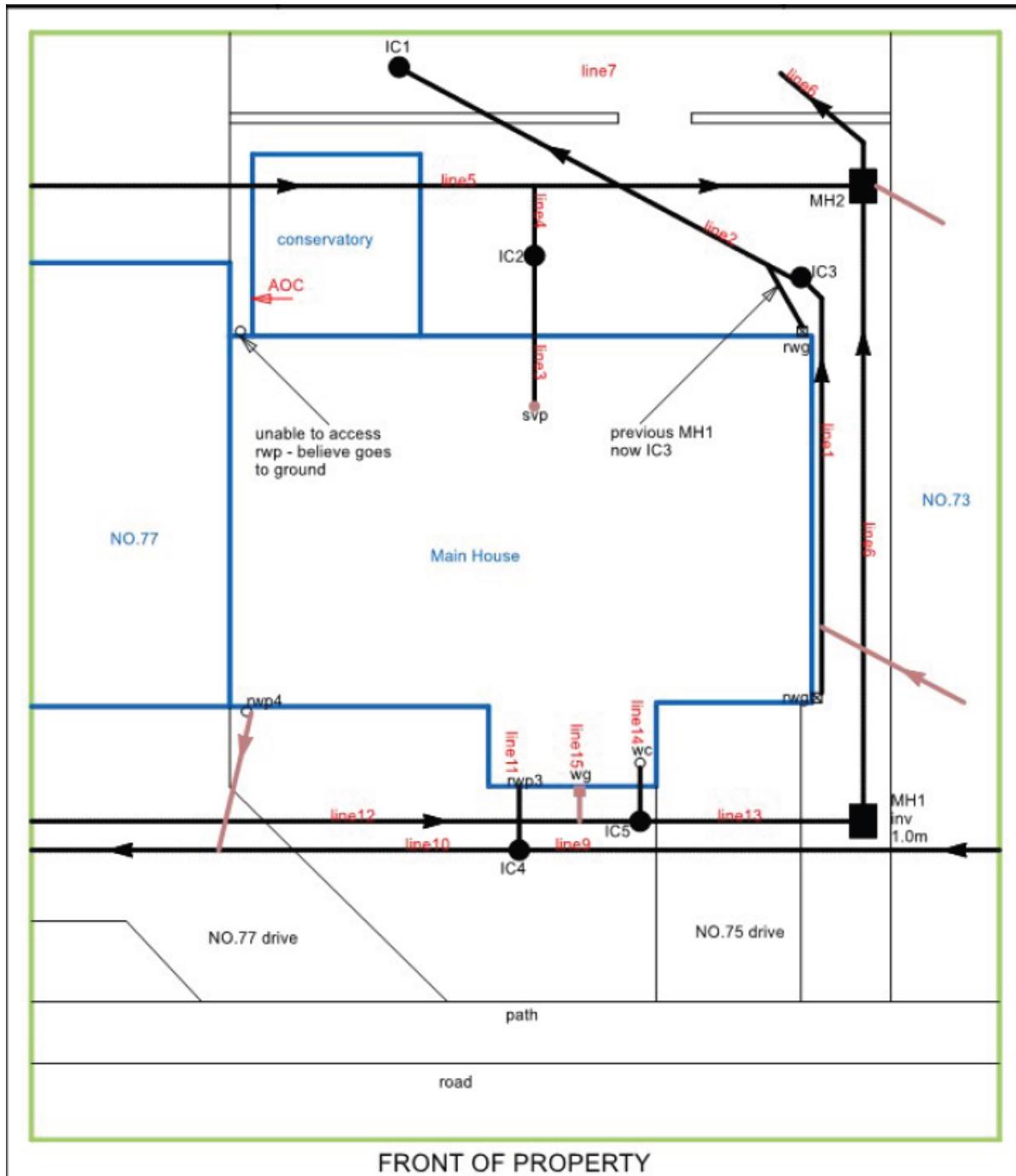
SITE INVESTIGATIONS

Site investigations were arranged to confirm the cause of the damage and were carried out by Auger Ltd and CET Property Assurance Ltd.

They were completed on the following dates:

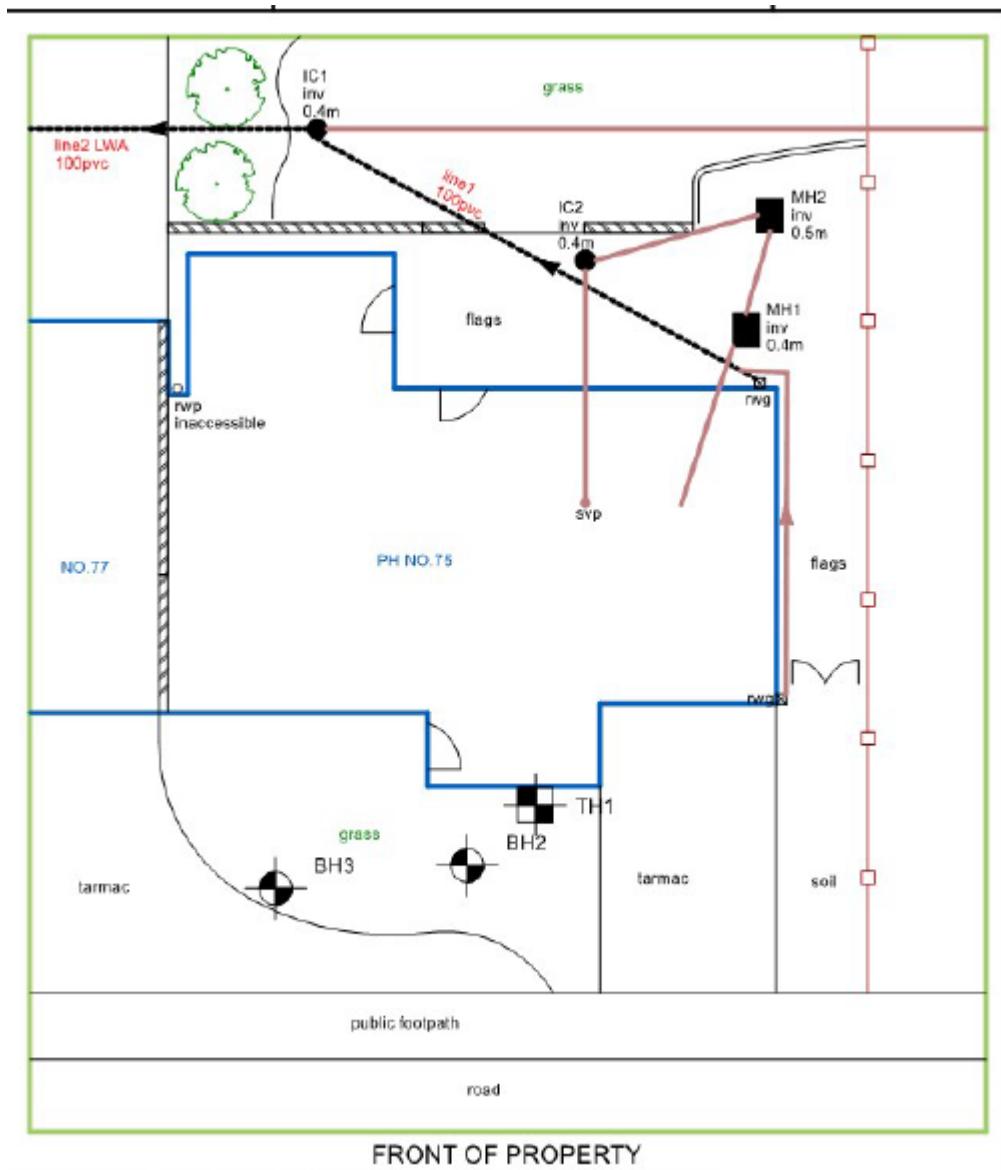
- January 2020- Auger Ltd- CCTV of drainage system.
- May 2020- Auger Ltd- CCTV of drainage system.
- July 2020- Auger Ltd- Trial pits.
- December 2020- Auger Ltd- Remote borehole
- March 2023- CET Property Assurance Ltd- Trial pits.

A comprehensive CCTV survey of the drains was undertaken but no defects were found which would lead to an escape of water into the soil.



Extract from Auger drainage report

Two trial pits were excavated to determine the nature and depth of the foundations. These were also extended by boreholes in order to examine the nature and condition of the supporting soil and to determine what might be influencing the soil to cause the subsidence.

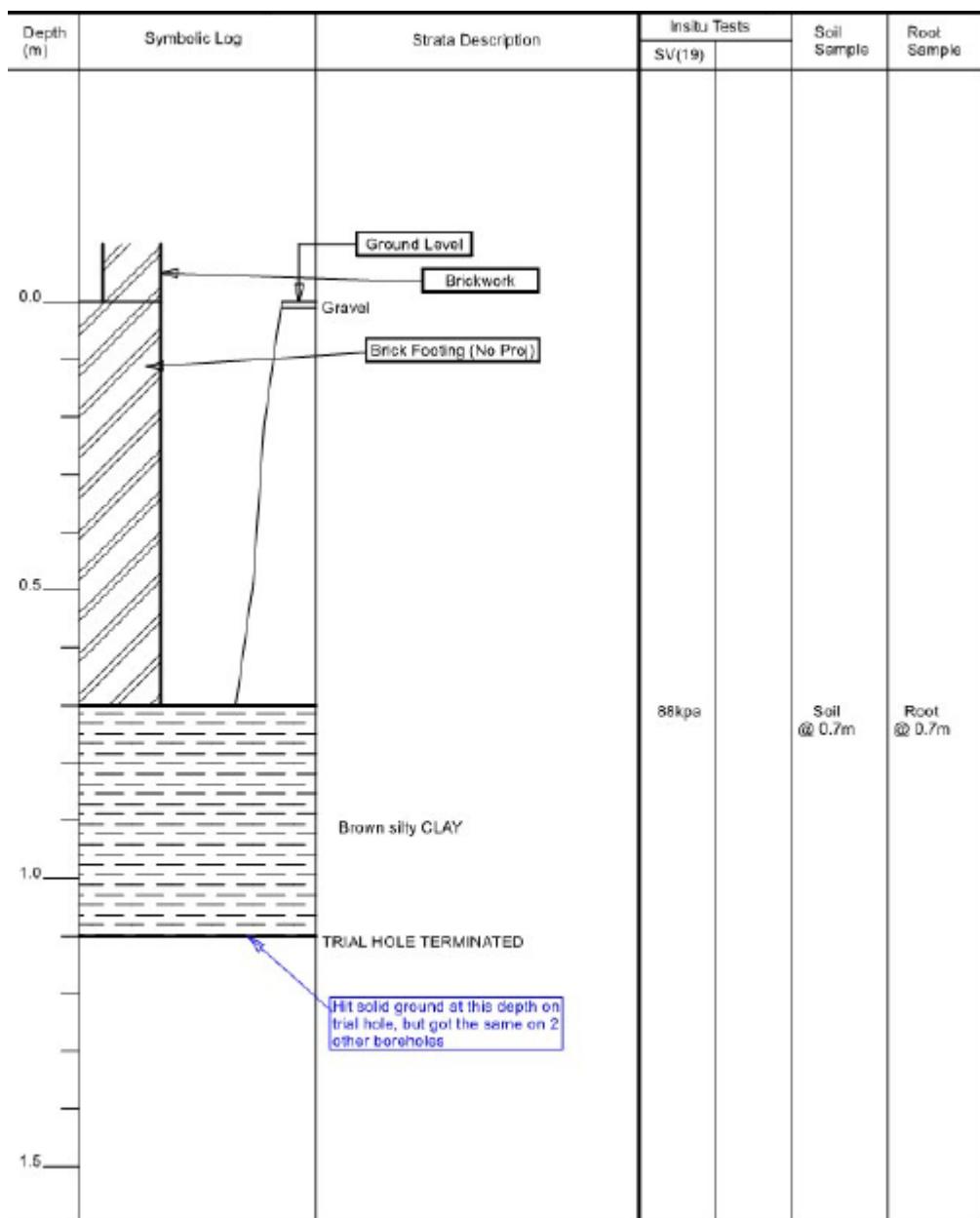


Extract from Auger July 2020 report showing location of trial hole and remote boreholes to front of property.

Trial pit 1 was excavated at the front of the outrigger and revealed a concrete foundation bearing at a depth of 700mm below external ground level on to brown silty clay. The trial hole and remote boreholes were terminated at a depth of 1.1m due to encountering solid ground and was unable to penetrate further.

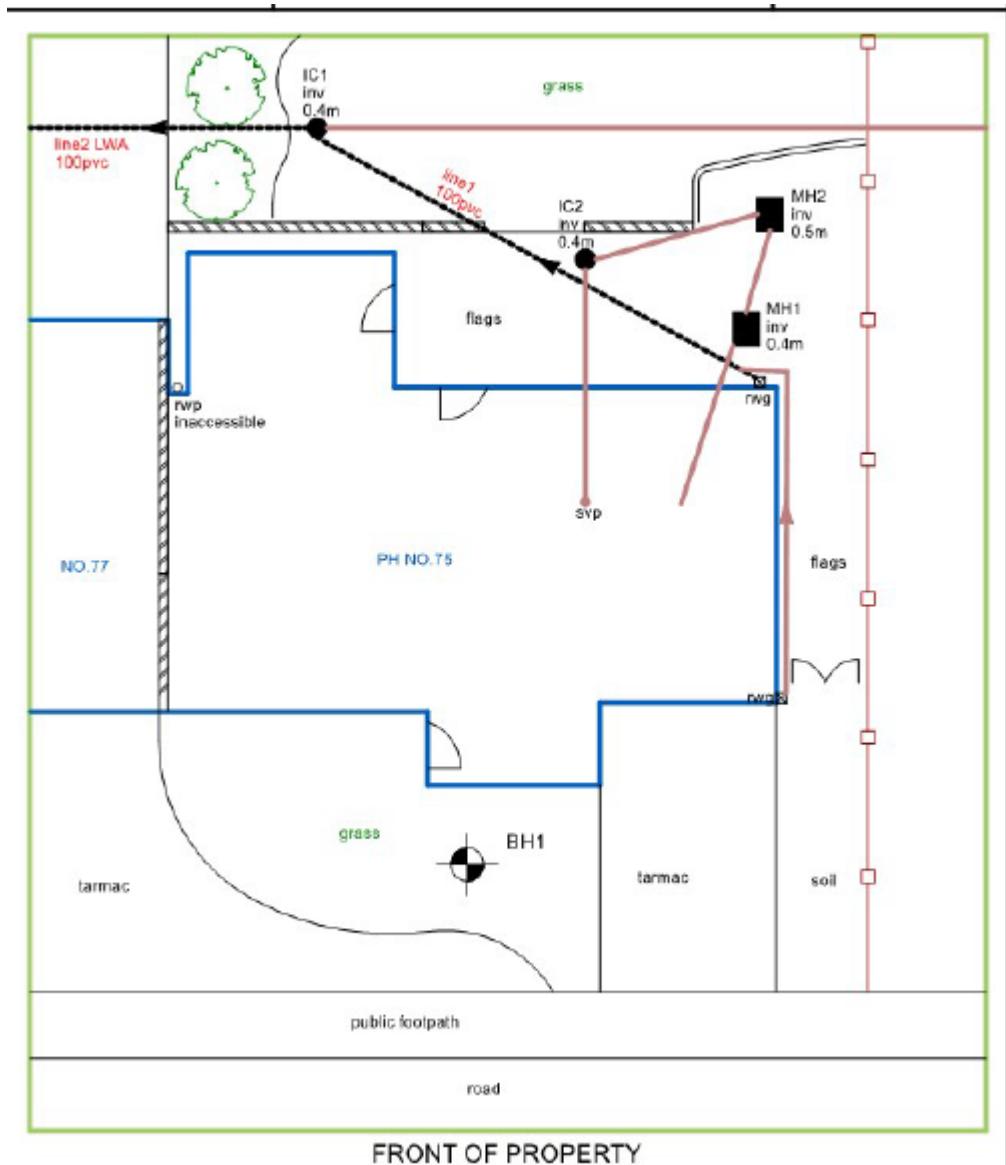
Roots were observed in the trial pit.

TH Trial Hole	Sample Type	Depth (m)	Sample Description
TH1	D	0.50	Brown sandy fine to medium gravelly silty CLAY
TH1	D	1.00	Brown sandy silty CLAY
TH1	D	1.50	Brown sandy fine to coarse gravelly silty CLAY
TH1	D	2.00	Brown fine to medium gravelly silty CLAY
TH1	D	2.50	Brown fine to medium gravelly silty CLAY
TH1	D	3.00	Brown fine to medium gravelly silty CLAY
TH1	D	3.50	Brown fine to medium gravelly silty CLAY
TH1	D	4.00	Brown fine to medium gravelly silty CLAY
TH1	D	4.50	Brown fine gravelly silty CLAY
TH1	D	5.00	Brown fine gravelly silty CLAY



Extracts from Auger July 2020 report showing trial pit 1 details and soil descriptions

A further remote borehole was augered to the front of the property in December 2020 with the location shown on plan:



Extract from Auger December 2020 report showing location of remote borehole.

The borehole passed through the following materials which was terminated 5.0m below ground level:

TH Trial Hole	Sample Type	Depth (m)	Sample Description
TH1	D	0.50	Brown sandy fine to medium gravelly silty CLAY
TH1	D	1.00	Brown sandy silty CLAY
TH1	D	1.50	Brown sandy fine to coarse gravelly silty CLAY
TH1	D	2.00	Brown fine to medium gravelly silty CLAY
TH1	D	2.50	Brown fine to medium gravelly silty CLAY
TH1	D	3.00	Brown fine to medium gravelly silty CLAY
TH1	D	3.50	Brown fine to medium gravelly silty CLAY
TH1	D	4.00	Brown fine to medium gravelly silty CLAY
TH1	D	4.50	Brown fine gravelly silty CLAY
TH1	D	5.00	Brown fine gravelly silty CLAY

Extract from Auger December 2020 report

Depth (m)	Symbolic Log	Strata Description	In situ Tests		Soil Sample	Root Sample
			SV(19)			
0.0	Remote Borehole	Ground Level				
0.0		Grass				
0.5		Moist Brown sandy fine to medium gravelly silty CLAY (made ground)			Soil @ 0.5m	Root @ 0.3m
1.0		Moist Brown sandy silty CLAY			Soil @ 1m	Root @ 0.8m
1.5		Moist Brown sandy fine to coarse gravelly silty CLAY			Soil @ 1.5m	Root @ 1.1m
2.0					Soil @ 2m	Root @ 2.1m
2.5					Soil @ 2.5m	
3.0		Moist Brown fine to medium gravelly silty CLAY			Soil @ 3m	
3.5					Soil @ 3.5m	Root @ 3.4m
4.0					Soil @ 4.0m	
4.5		Moist Brown fine gravelly silty CLAY			Soil @ 4.5m	
5.0		TRIAL HOLE TERMINATED	130kpa		Soil @ 5m	

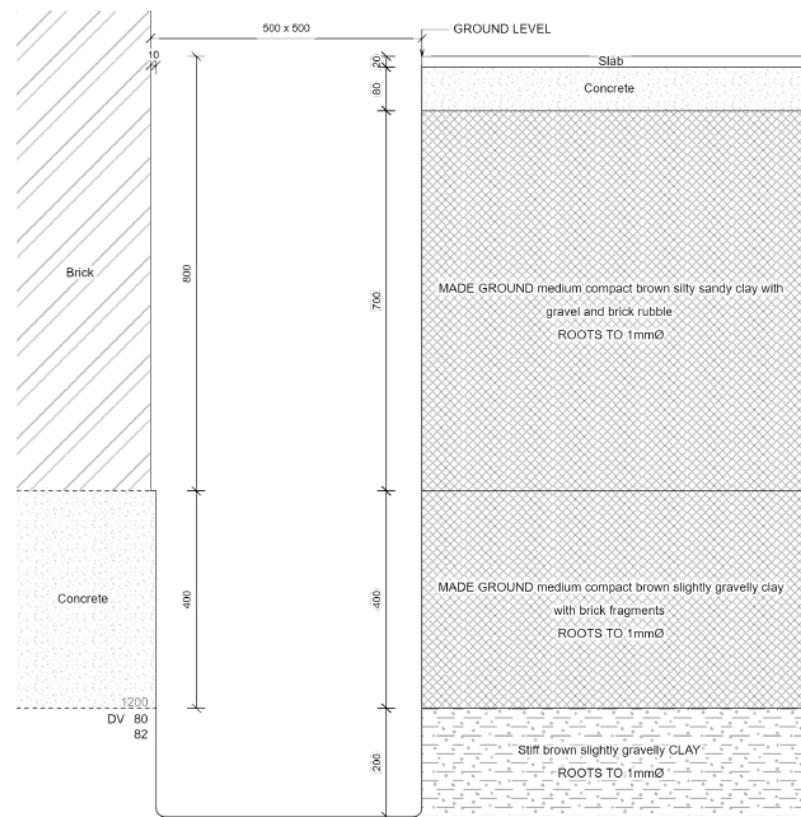
Extract from Auger December 2020 report

Roots were also observed in this borehole.

Trial pit 2 was excavated at the rear of the property located at the abutment of the main house & the conservatory to the right hand side and revealed the following:

Main House: A concrete foundation bearing at a depth of 1200mm below external ground level on to stiff brown slightly gravelly clay.

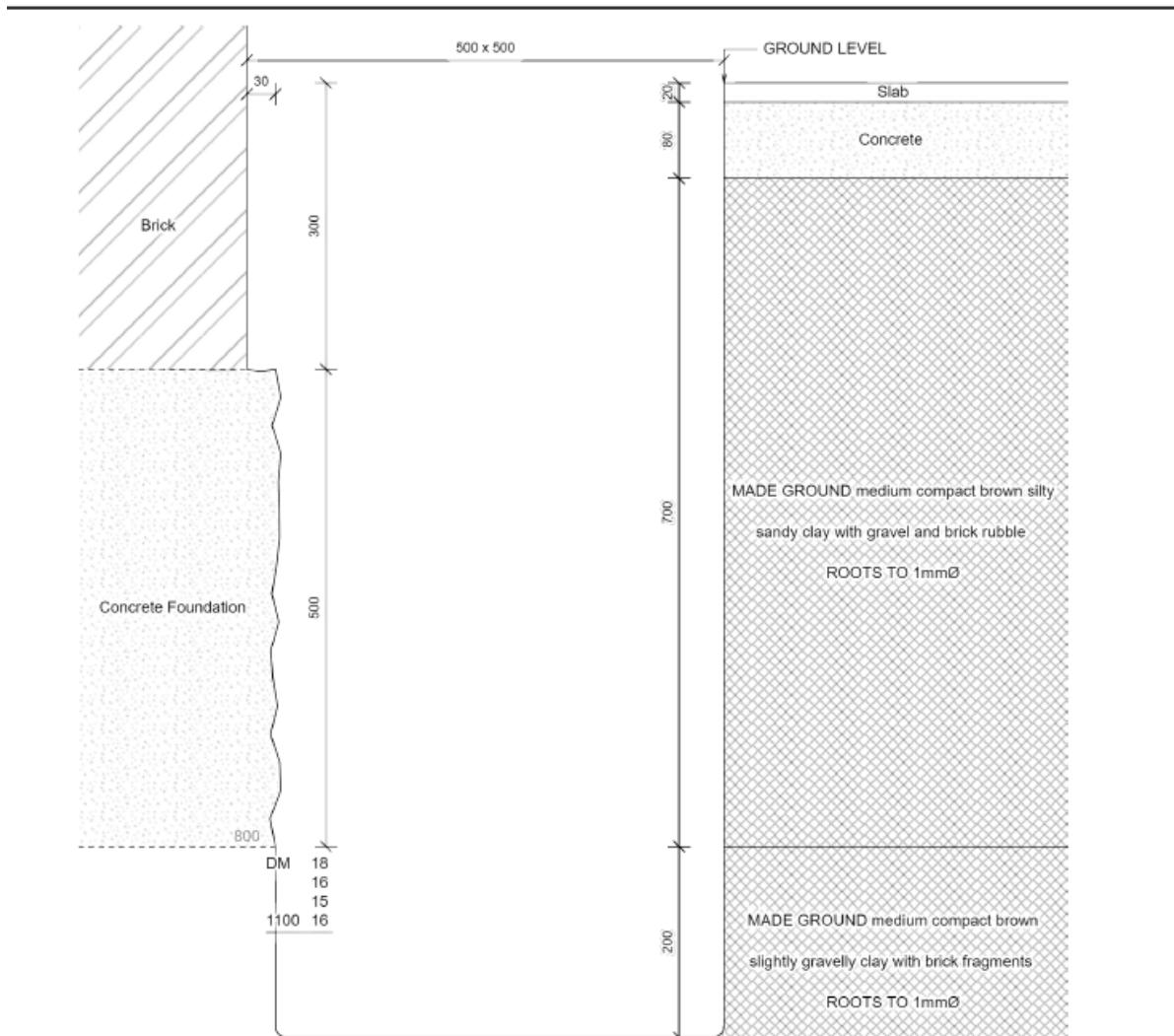
Roots were observed in the trial pit.



Extract from CET's report showing trial pit 2 details- Main House

Conservatory: A concrete foundation bearing at a depth of 800mm below external ground level on to made ground: medium compact brown slightly gravelly clay with brick fragments.

Roots were observed in the trial pit.



For Strata below 1000mm see Trial Pit log

Extract from CET's report showing trial pit 2 details- Conservatory

A borehole was augered from the bottom of the trial pit passing through stiff brown slightly gravelly clay and reaching a depth of 1.50m and was terminated in this material.

No further roots were observed to this borehole.

Borehole		1		Sheet:	1 of 1	Site:	75 LADYGATE LANE			
Boring Method:	Hand Auger			Job No:	560417					
Diameter (mm):	75	Weather:		Date:	24/03/2023					
Depth (m)	Soil Description						Samples and Tests			
0.00	See Trial Pit						Thickness	Legend	Depth	
1.40	Stiff brown slightly gravelly CLAY						0.10			
1.50	End of BH									

Extract from CET's report showing borehole details

Soil samples were retrieved from the trial pits/boreholes for laboratory testing and analysis.

The tests revealed that the clay soil are of high plasticity and with a medium volume change potential (based on modified plasticity index) when subject to changes in moisture content caused by the drying action of tree roots.

In trial pit/borehole 1 (front elevation) the moisture content tests indicate that the clay is desiccated down to 3500mm, as confirmed by moisture content values being less than 0.4 x liquid limit. The soil suction test values are high and indicate severe desiccation in the soil.

In trial pit/borehole 2 (rear elevation) the moisture content tests indicate that the clay is desiccated at the underside of foundation level. The soil suction test values are high and indicate severe desiccation in the soil.

Root samples were retrieved from trial pits 1 and 2 and examined in the laboratory in order to determine their origin. The results were reported as follows:

Root ID

The samples you sent in relation to the above have been examined. Their structures were referable as follows:

TH1, 0.7m		
9 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
2 no.	Both pieces of BARK only - insufficient material for recognition.	
3 no.	Unfortunately all with insufficient cells for identification.	

Click here for more information: [QUERCUS](#)

Extract from Auger July 2020 report showing root identification

Root ID

The samples you sent in relation to the above have been examined. Their structures were referable as follows:

BH1, 0.3-0.4m		
9 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
BH1, 0.8m		
7 no.	Examined root: QUERCUS (Oak).	Dead*.
BH1, 1.1m		
2 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
BH1, 2.3m		
1 no.	Examined root: QUERCUS (Oak) or the related CASTANEA (Sweet Chestnut). This was a very IMMATURE sample.	Dead*.
1 no.	Microscopic examination showed insufficient cells for recognition.	
BH1, 3.4m		
1 no.	Examined root: essentially too immature for identification (less than 0.03mm in diameter). Definitely NOT a conifer; NOR is it particularly referable to any of the above described types.	Dead* (note this 'dead' result can be unreliable with such thin samples).

Click here for more information: [CASTANEA](#) [QUERCUS](#)

Extract from Auger December 2020 report showing root identification

Root ID

The samples you sent in relation to the above have been examined. Their structures were referable as follows:

BH1, 0.3-0.4m		
9 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
BH1, 0.8m		
7 no.	Examined root: QUERCUS (Oak).	Dead*.
BH1, 1.1m		
2 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
BH1, 2.3m		
1 no.	Examined root: QUERCUS (Oak) or the related CASTANEA (Sweet Chestnut). This was a very IMMATURE sample.	Dead*.
1 no.	Microscopic examination showed insufficient cells for recognition.	
BH1, 3.4m		
1 no.	Examined root: essentially too immature for identification (less than 0.03mm in diameter). Definitely NOT a conifer; NOR is it particularly referable to any of the above described types.	Dead* (note this 'dead' result can be unreliable with such thin samples).

Click here for more information: [CASTANEA](#) [QUERCUS](#)

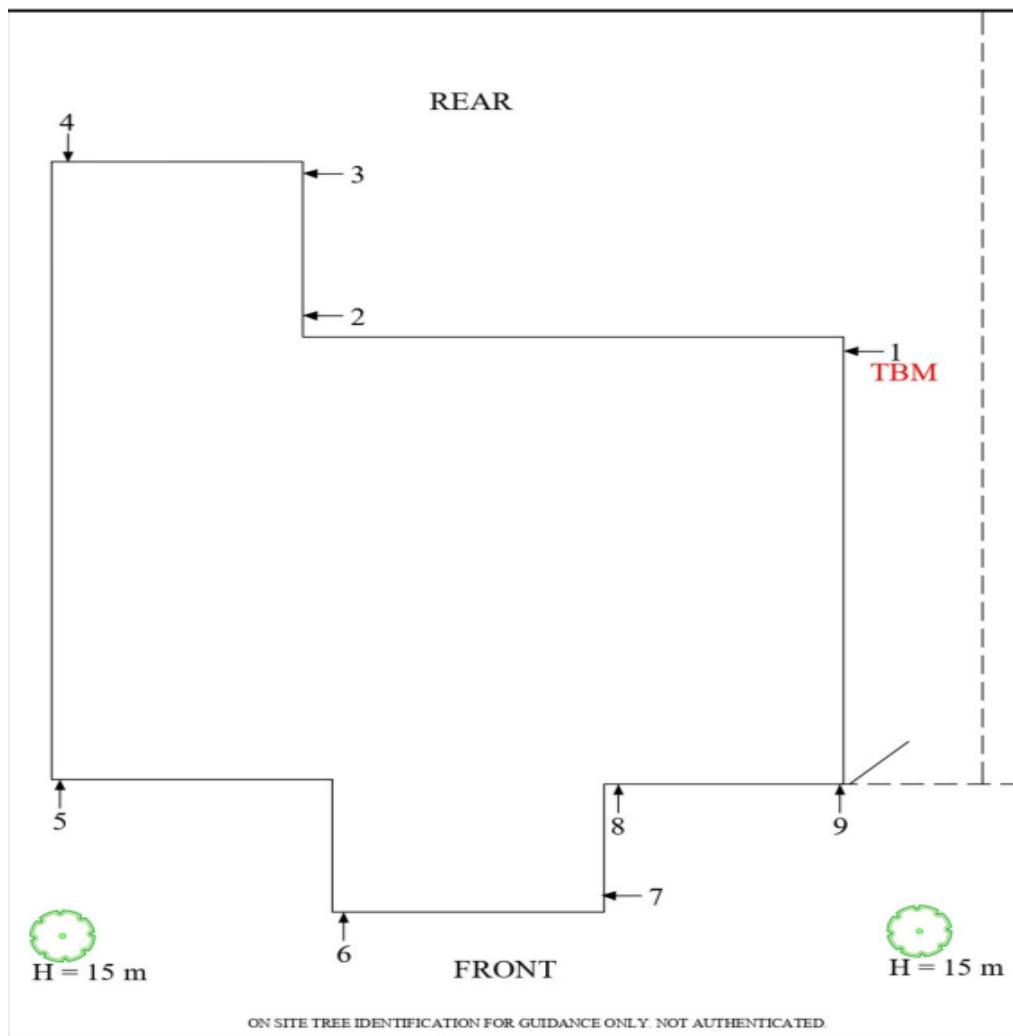
Extract from CET March 2023 report showing root identification

The results of the site investigation indicate that the main house and conservatory have relatively deep foundations built on a shrinkable clay soil and that roots from an Oak trees, which were alive at the time of testing, have encroached beneath the foundations.

MONITORING

In order to determine if the property is being affected by cyclical movement, as is the case when damage is caused by clay shrinkage subsidence, level monitoring stations were installed at the property by My Home Needs in November 2020.

Based on an assessment of damage in the property it was concluded that the rear right corner of the main house has not been affected by subsidence and is hence a stable point. A stable datum (TBM) was therefore installed to the rear right corner of the house and the monitoring readings have been plotted relative to this station.



Extract from My Home Needs report showing location of monitoring stations

Monitoring readings have been obtained on an eight weekly basis from November 2020 to August 2024 and the results plotted over time.

Stations 5, 6, 7, 8 and 9 are located on the front elevation where maximum damage has occurred.

Stations 1, 2, 3 and 4 are located on the rear wall of the rear elevation wall and conservatory where further damage has occurred. Stations 2, 3 and 4 are located around the conservatory which is the main area of concern to the rear.

The level monitoring shows a cyclical pattern of downward movement during the drier summer months when the trees are in leaf, and subsequent upward movement during the wetter winter months when the trees have dropped leaf and are dormant. This pattern of movement is consistent with clay shrinkage subsidence.

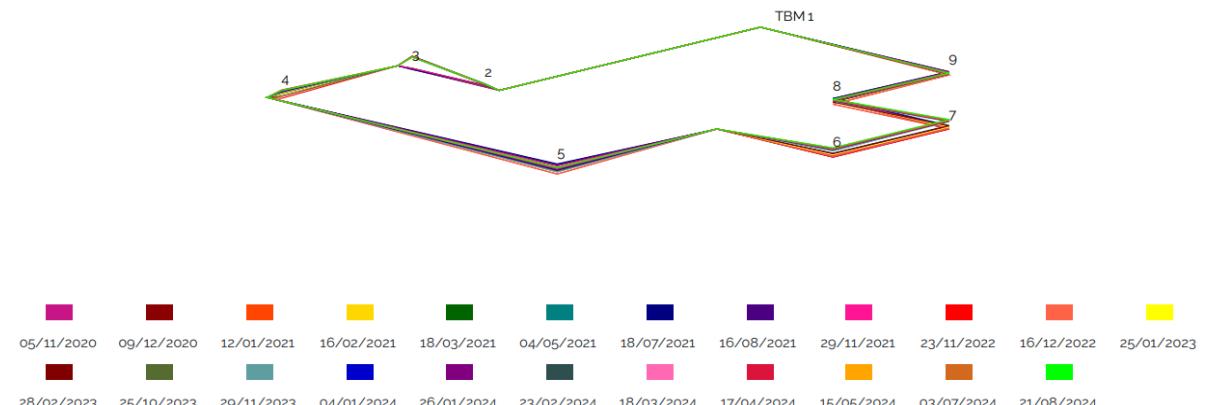
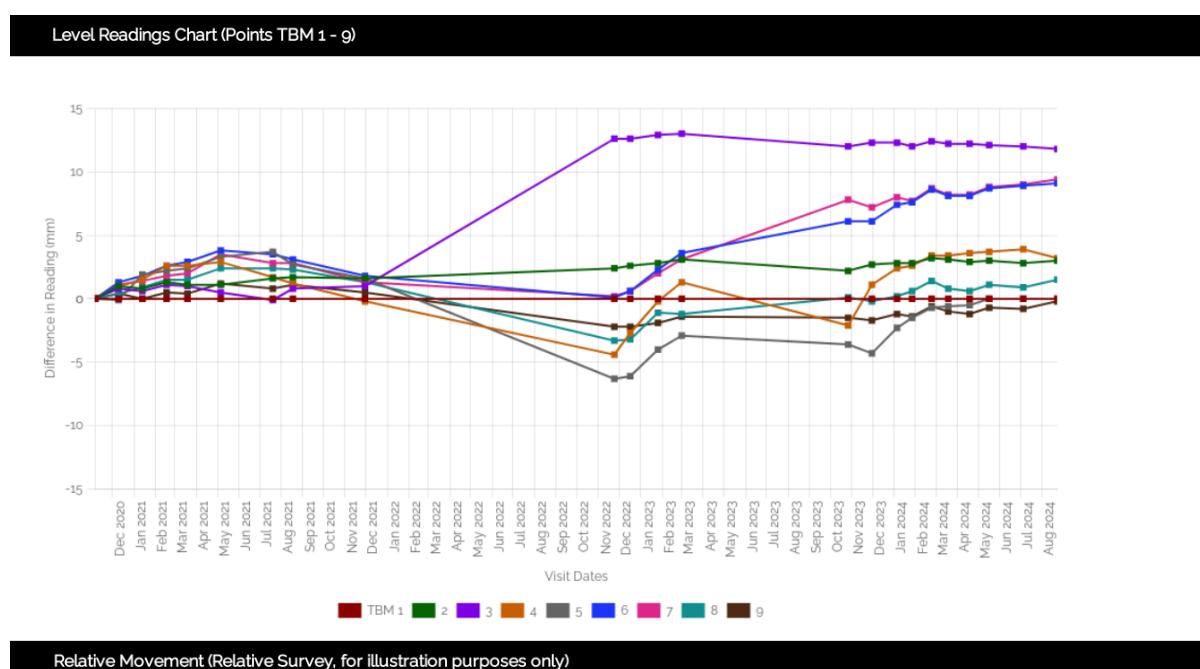
The maximum movement is noted to the front left hand corner of the property and indicates a downward movement of 10mm between July 2021 and November 2022

The maximum movement noted to the rear left hand corner of the conservatory and indicates a significant rotational downward movement of 7.3mm between May 2021 and November 2022.

Full recovery was not achieved until March 2023.

Seasonal movement has been recorded until August 2024 consistent with the wetter summer of 2023 and mild summer of 2024.

It's worth noting that Geopolymer treatment works were completed in September 2022 and again retreated in October 2023 due to its failure. Although this has provided a degree of stabilisation borne out in the monitoring readings following the retreatment works its effectiveness has not yet been fully verified.



CAUSE OF DAMAGE

Based on the information detailed above, we are of the opinion that damage has occurred due to clay shrinkage subsidence. This has been caused by moisture extraction by roots altering the moisture content of the clay subsoil, resulting in volume changes, which in turn have affected the foundations.

This view is based on the fact that the foundations of the property in the area of damage bear onto shrinkable clay subsoil. The soil is susceptible to movement as a result of changes in volume of the clay with variations in moisture content and analysis of the site investigation results indicates that the soil has been affected by shrinkage. Oak tree roots are present in the clay subsoil beneath the foundations to the main property and conservatory.

In this case, we are satisfied that the damage has therefore been caused by clay shrinkage subsidence following moisture extraction by the Oak trees.

We have also considered whether there could be any other influencing factors such as leaking drains, but from the CCTV survey, no damage was identified which could be leading to an escape of water. We are therefore satisfied that there is no factor, other than the Oak tree, that is causing the damage.

We have attempted to mitigate the loss by carrying out Geopolymer treatment works. The damage still persists and it's well documented that this engineering solution is not effective in high plasticity soils.

RECOMMENDATIONS

We consider the damage will not progress if appropriate measures are taken to remove the cause. In this instance it is likely that vegetation for which the adjoining private Third Parties is responsible is contributing toward the cause of damage.

An arboricultural inspection has been carried out by Property Risk Inspections Ltd who have identified the Oak trees as the most likely source of the tree roots and have made recommendations to fell the tree in order to mitigate the current damage.

Tree No:	Species	Works Required
T1	Oak	Fell and treat stump (deciduous).
T2	Oak	Fell and treat stump (deciduous).

Extract from PRI's report with recommendations to fell the Oak Trees

HEAVE ASSESSMENT

I have assessed whether significant heave/ground recovery will occur should the vegetation as referred to above be removed.

The site investigation has been undertaken during the summer months with desiccation suggested by the suction and moisture content readings. The amount of desiccation is minor and, in my opinion, represents purely seasonal desiccation rather than a persistent soil moisture deficit. I have carried out a heave assessment in accordance with BRE Digest 412, and calculate the heave

potential of the site to be nominal. I believe this to equate to ground recovery of the subsidence that has taken place this summer, rather than being true heave, and consequently I am not of the opinion that long term heave will result should the tree be removed.

There is no evidence of significant tilt towards the trees having occurred to the house, or distortion within the property, as would be expected if a significant persistent soil moisture deficit had been set up, and where the tree was planted after the house was built.

I am not of the opinion that heave of the clay subsoil is a threat to adjacent properties.

In summary, based on the site investigation results, the timing of the investigation and the nature and extent of damage within the property, I have concluded that significant heave and/or ground recovery will not occur should the vegetation management described above be undertaken.

REPAIRS

We have decided on the final type of repair required and have produced an outline of the requirements. This involves undertaking superstructure repairs and redecoration. This decision has been taken based on our knowledge and experience of dealing with similar claims. In addition the results of the Site Investigation, laboratory testing and monitoring have been taken into account.

If the Oak trees are removed then we consider that works including structural crack repair and redecoration at an approximate cost of £10,000.00 will be appropriate in order to repair the damage in this case.

If the Oak trees are not removed then it may be necessary to consider underpinning of the foundations of the property in the area of damage, in addition to structural crack repair and redecoration needed to repair the damage. The total cost of this option is estimated at £100,000.00.

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