

# **TECHNICAL REPORT ON A SUBSIDENCE CLAIM**

**Crawford Reference: SU1803352**

**[REDACTED]  
61 Park Avenue  
Ruislip  
Middlesex  
HA4 7UL**



Prepared for

**Ageas - SAGA  
Ageas House  
The Square  
Gloucester Business Park  
Brockworth  
Gloucester  
GL3 4AD**

**Claim Reference 6353274N**

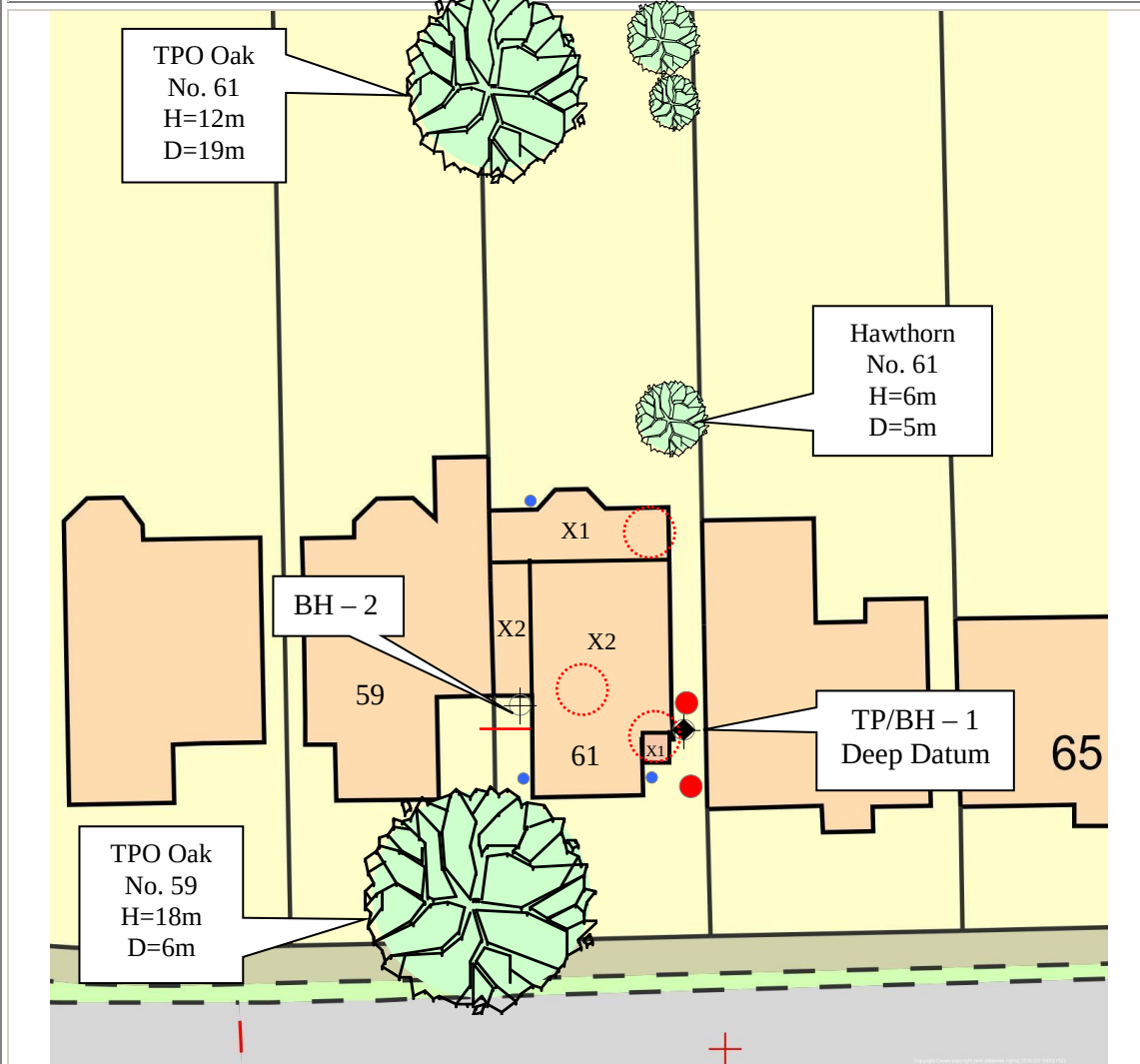
## **SUBSIDENCE CLAIM**

13 September 2018

  
**Crawford**<sup>®</sup>  
Subsidence Division  
Cartwright House  
Tottle Road  
Riverside Business Park  
Nottingham, NG2 1RT  
Tel: 0115 943 8240  
Fax: 0121 200 0309

**Site Plan –Overview****This plan is Not to Scale**

This plan is diagrammatic only and has been prepared to illustrate the general position of the property and its relationship to nearby trees etc. The boundaries are not accurate, and do not infer or confer any rights of ownership or right of way. Position of utilities is only indicative and contractors must satisfy themselves regarding actual location before commencing works.



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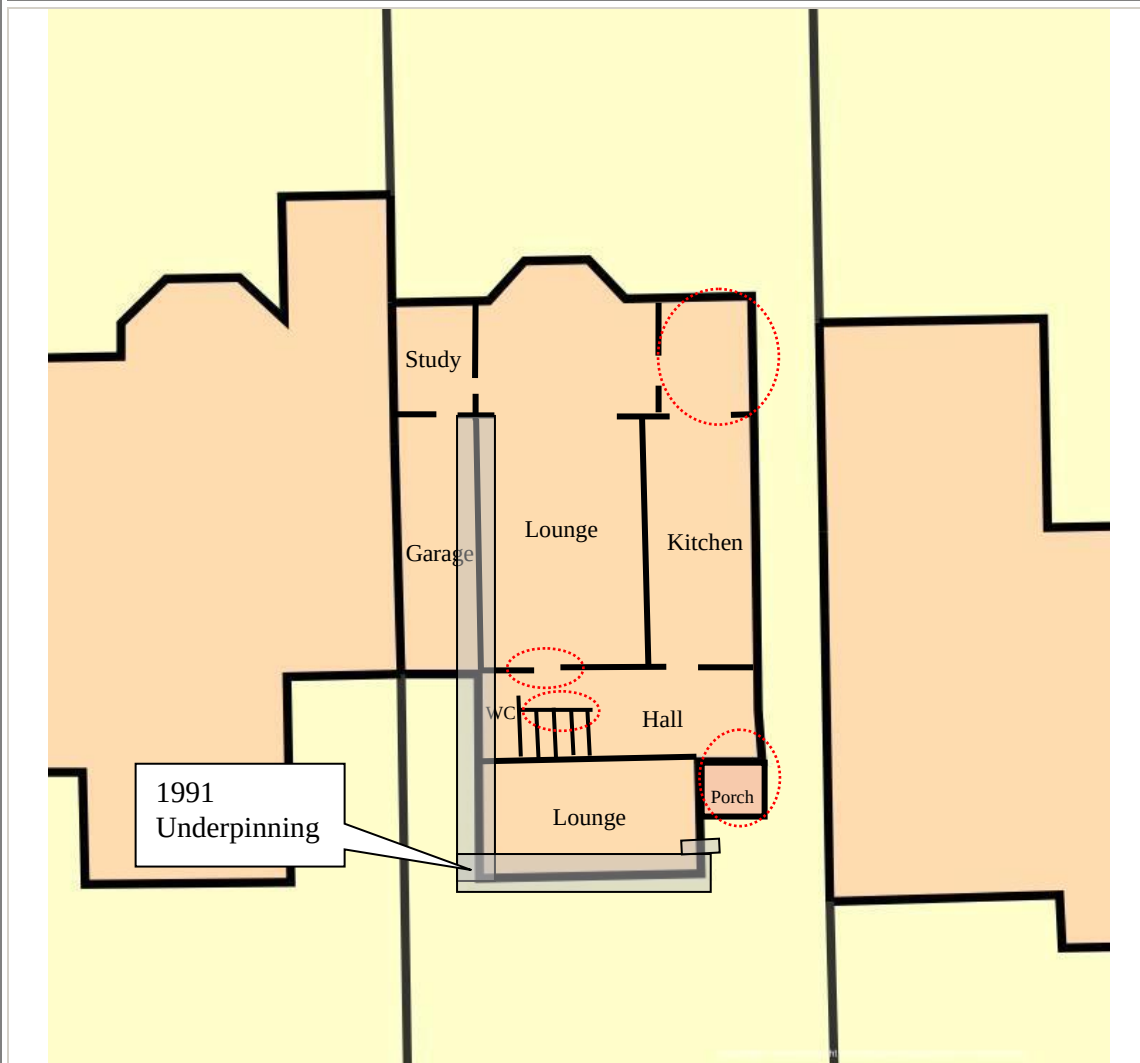
**Key:**

|                                                                                     |                     |                                                                                     |                    |                                                                                      |                   |
|-------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------|-------------------|
|  | Tree: Deciduous     |  | Tree: Conifer      |  | Shrub             |
|  | Hedge               |  | Area of Damage     |  | Bore Hole         |
|  | Trial Hole          |  | Trial & Bore Hole  |  | Level Monitoring  |
|  | Rain Water Manhole  |  | Rain Water Gully   |  | Rain Water Pipe   |
|  | Waste Water Manhole |  | Waste Water Gully  |  | Toilet Pipe       |
|  | Rain Water Drain    |  | Waste Water Drain  |  | Electricity Cable |
|  | Water Supply Pipe   |  | Gas Supply Pipe    |  | Incoming Gas Pipe |
|  | Incoming Water      |  | Incoming Electrics |                                                                                      |                   |

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## INTRODUCTION

We have been asked by Ageas - SAGA to comment on movement that has taken place to the above property. We are required to briefly describe the damage, establish a likely cause and list any remedial measures that may be needed.

Our report should not be used in the same way as a pre-purchase survey. It has been prepared specifically in connection with the present insurance claim and should not be relied on as a statement of structural adequacy. It does not deal with the general condition of the building, decorations, timber rot or infestation etc.

The report is made on behalf of Crawford & Company and by receiving the report and acting on it, the client - or any third party relying on it - accepts that no individual is personally liable in contract, tort or breach of Statutory duty. Where works address repairs **that are not covered** by the insurance policy we recommend that you seek professional advice on the repair methodology and whether the works will involve the Construction (Design & Management) Regulations 2015. Compliance with these Regulations is compulsory; failure to do so may result in prosecution. We have not taken account of the regulations and you must take appropriate advice.

We have not commented on any part of the building that is covered or inaccessible.

## TECHNICAL CIRCUMSTANCES

The insured noticed the damage in July 2018 and instructed Mark Riley MStructE of Riley Consulting Structural Engineers to inspect and comment upon the damage. He concluded that the damage is the result of subsidence and to contact insurers in respect of a claim.

The property has been subject to a previous subsidence claim in c.1990 which comprised of traditional mass concrete underpinning of the front and left elevation of the front projection the area was underpinned to a max depth of 2.9m at the front corner underpin bases transitioning down to 2.3m.

## PROPERTY

Two storey detached house of traditional construction with part rendered brick walls surmounted by a pitched tiled roof. The single storey rear extension was constructed in 1988. An additional storey was added above the garage in 1986.

## HISTORY & TIMESCALE

We await insurer's advice on how they wish us to proceed with the claim.

|                                       |             |
|---------------------------------------|-------------|
| Date of Construction .....            | Circa 1920  |
| Purchased .....                       | 1983        |
| Policy Inception Date .....           | 03/02/2016  |
| Damage First Noticed .....            | June 2018   |
| Claim Notified to Insurer.....        | 06/08/2018  |
| Date of our Inspection.....           | 30/08/2018  |
| Issue of Report .....                 | 13/09/2018  |
| Anticipated Completion of Claim ..... | Winter 2020 |

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## TOPOGRAPHY

The property occupies a reasonably level site with no unusual or adverse topographic features.

## GEOLOGY

Reference to the 1:625,000 scale British Geological Survey Map (solid edition) OS Tile number TQNW suggests the underlying geology to be Lambeth Group.

Woolwich and Readings Beds occur in three facies<sup>1</sup> comprising marine fossiliferous sand (East Kent), estuarine deposits known as Woolwich Beds (West Kent, East Surrey and Essex) and fluvial strata known as the Reading Beds (West and North). They are a sedimentary complex comprising a basal bed of glauconic sands, loams and pebbles with variable clays and sands above.

Page and Skipper<sup>2</sup> regard them as “highly diverse – there is probably no other group of sediments within the UK that displays such a range of textures and fabrics within such a small stratigraphical thickness”.

The sands are yellow, greenish brown, containing layers of mottled clay. They have an average depth of around 15mtrs. The Reading beds consist of mottled, plastic clays and light coloured sands with thin bands of flint pebbles.

From an engineering perspective they are probably more prone to loss of fines and erosion due to flowing water (leaking drains etc.) than clay shrinkage. However, if there is a high clay content they can suffer root induced clay shrinkage (seasonal shrinkage alone is probably quite rare) although the movement is usually fairly modest, depending on the provenance of the clay in the soil matrix.

Recently redefined as a member of the Lambeth Group.

The superficial deposits are thought to be Alluvium.

Alluvial soils are recent (in geological terms) deposits found in river valleys, estuaries and on the sea bed. They are post glacial in origin. Alluvium is present along riverbanks where it forms low lying areas often prone to flooding. It can be a silty clay of variable composition with occasional thin gravel bands<sup>3</sup>.

Alluvial soils can suffer from consolidation settlement which may be associated with lowering of the water table but have low index properties and are not usually troublesome where vegetation is present. They do not suffer the shrink/swell cycles in the same way as a clay soil but they can be eroded by flowing water.

They represent a relatively high risk in situations where there are damaged drains, leaking water services etc., and can also be troublesome in cases of fluctuating water tables.

Alluvial soils are “normally consolidated” deposits and show an increase in shear strength with depth. A stiffer ‘crust’, about 1 - 1.2mtrs thick, can develop at the surface. Light loads can be accommodated by shallow strip foundations taking support from this crust. Higher loads need to be supported by a raft or piled foundation<sup>4</sup>.

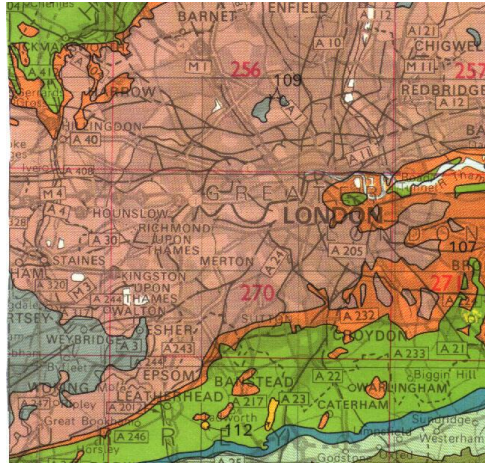
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<sup>1</sup> Sherlock R.L. (1962) “LONDON & THAMES VALLEY” H.M.S.O.

<sup>2</sup> Page D. & Skipper J (2000). “Ground Engineering Journal”

<sup>3</sup> Haines B.A. (1969) “BRITISH REGIONAL GEOLOGY - CENTRAL ENGLAND” H.M.S.O.

<sup>4</sup> Tomlinson M.J. (1991) “FOUNDATION DESIGN & CONSTRUCTION” Longman Scientific Publishing.



## Geology.

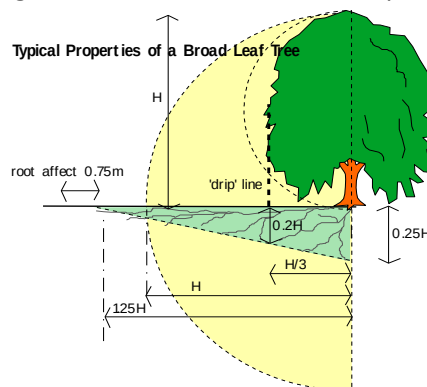
## VEGETATION

There are several trees and shrubs nearby, some with roots that may extend beneath the house foundations. The following are of particular interest:-

| Type     | Height | Distance | Ownership |
|----------|--------|----------|-----------|
| Oak      | 18 m   | 6 m      | No. 59    |
| Hawthorn | 6 m    | 5 m      | Owners    |
| Oak      | 12 m   | 19 m     | Owners    |

See sketch. Tree roots can be troublesome in cohesive (clay) soils because they can induce volumetric change. They are rarely troublesome in non-cohesive soils (sands and gravels etc.) other than when they enter drains, in which case blockages can ensue.

Oak trees (*Quercus*) are deciduous and native to Europe. They can reach heights in excess of 35m, but more typically grow to between 18 - 25m, depending on health, environment and soil conditions. They have a medium growth rate of around 250mm per year and strong root activity<sup>5</sup>.



Typical proportions of an Oak showing the potential root zone. They have by far the most aggressive of root systems, often spreading considerable distances (1.5 x height or more).

Maximum tree-to-damage distance recorded in the Kew survey was 30mtrs, with 50% of all cases occurring within 9.5mtrs<sup>6</sup>. Life expectancy > 100 years, although they are vulnerable to insect and

<sup>5</sup> Richardson & Gale (1994) "*Tree Recognition*" Richardson's Botanical Identifications

<sup>6</sup> Cutler & Richardson (1991) *"Tree Roots & Buildings"* Longman Scientific

fungal attack. Old and young trees are tolerant of quite heavy pruning and crown reduction, although re-growth can be an ongoing problem.

Oaks are, in my experience, worthy of considerable respect when dealing with subsidence claims. Their root system extends for surprising distances and can be associated with particularly high soil suctions.

Because of difficulties in controlling the oak, and its vigorous root system, I regard it as being far more significant (in terms of a subsidence league table) than either the willow or poplar tree.

Hawthorn (*Crataegus monogyna*) are deciduous and can reach heights up to 14m depending on health, environment and soil conditions. On shrinkable clays they rarely achieve a height greater than 10mtrs. They have a slow growth rate of around 200mm per year and medium root activity<sup>7</sup>, although they can be deep rooted.

In the Kew Garden Survey 50% of all cases of damage occurred when the tree was within 5mtrs of the property. The maximum-recorded distance was 11.5mtrs. Interestingly they accounted for 4.6% of the total sample, and 3.5% of the tree population. In cases where the Hawthorn was implicated there was a 99% coincidence of shrinkable clays.

They were involved in 1.6% of all cases involving damage to drains. Hawthorn's are tolerant of quite heavy pruning and crown thinning although suckering can be a problem. Unfortunately the roots are similar to those of the apple, pear and *Sorbus*, all belonging to the family *Pomoideae*. They have a life expectancy of less than 50 years.

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<sup>7</sup> Richardson & Gale (1994) "*Tree Recognition*" Richardson's Botanical Identifications

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## OBSERVATIONS

There are three areas of damage 1) Front Right Corner to Main House 2) Internal Wall between Rear Lounge and Hall 3) Single Storey Rear Extension.

The following is an abbreviated description. Photographs accompanying this report illustrate the nature and extent of the problem.

## INTERNAL



Lounge - Diagonal crack above door



Hall - Drop in lounge door frame

### Rear Lounge (8.45 x 4.08 x 2.36)

Diagonal crack on front wall above door - 4mm  
Historical distortion noted to door opening

### Hall (2.09 x 5.35 x 2.41)

Separation to top of rear lounge door - 5mm  
Separation above door - 3mm  
Diagonal crack above front door - 0.5mm  
Rucking of wallpaper above front door  
Front door has been planed  
Separation to stairs - 4mm  
Under stair door is now distorted and sticks

### Front Lounge (3.78 x 4.58 x 2.42)

Vertical crack to left of door to hall - 0.5mm

### Kitchen (7.69 x 2.30 x 2.38)

Ceiling junction separation at extension junction - 2mm  
Vertical crack to corner of extension - 2mm

### Porch (1.12 x 1.46 x 2.40)

Horizontal crack to right of front door - 4mm  
Vertical separation to front right corner - 10mm  
Vertical separation to front right corner - 10mm  
Vertical separation to rear right - 3mm  
Front UPVC door won't open

### Left Hand Office (5.27 x 2.17 x 2.47)

Vertical crack to rear right - 2mm - Not subsidence  
Ceiling junction separation to left wall - 1mm - Not subsidence

### Bathroom (2.59 x 1.89 x 2.47)

Vertical crack to front right corner - 2mm  
Undulation to tiles

### Rear Left Bedroom (4.15 x 2.97 x 2.47)

Vertical crack above door to landing - 1mm - Not subsidence  
Outline of vertical crack to right wall to middle - Not subsidence  
Crack in ceiling - 1mm - Not subsidence

### Rear Right Bedroom (2.74 x 2.67 x 2.47)

Outline of crack on rear wall to left of window - Not subsidence

### Front Bedroom (3.84 x 3.98 x 2.47)

Crack above door to landing - 1mm

**EXTERNAL**

Front Elevation - Horizontal crack to right of front door



Right Elevation - Vertical crack at extension junction

**Front Elevation**

Vertical hairline crack to middle of bay - Not subsidence

**Front of Porch**

Vertical separation between timber post and masonry - 10mm

**Right Elevation**

Vertical crack at extension junction - 2mm

Vertical crack at porch junction- 3mm

Stepped crack below porch window and slippage - 10mm

**Rear Elevation of Main House**

Vertical crack at extension junction at first floor level - 2mm - Not subsidence

**CATEGORY**

In structural terms the damage falls into Category 3 of Table 1, Building Research Establishment<sup>8</sup> Digest 251, which describes it as "moderate".

|            |               |                |
|------------|---------------|----------------|
| Category 0 | "negligible"  | < 0.1mm        |
| Category 1 | "very slight" | 0.1 - 1mm      |
| Category 2 | "slight"      | >1 but < 5mm   |
| Category 3 | "moderate"    | >5 but < 15mm  |
| Category 4 | "severe"      | >15 but < 25mm |
| Category 5 | "very severe" | >25 mm         |

**Extract from Table 1, B.R.E. Digest 251**

Classification of damage based on crack widths.

<sup>8</sup> Building Research Establishment, Garston, Watford. Tel: 01923.674040

## DISCUSSION

The pattern and nature of the cracks is indicative of an episode of subsidence. The cause of movement appears to be clay shrinkage.

The timing of the event, the presence of shrinkable clay beneath the foundations and the proximity of vegetation where there is damage indicates the shrinkage to be root induced. This is a commonly encountered problem and probably accounts for around 70% of subsidence claims notified to insurers.

Fortunately, the cause of the problem (dehydration) is reversible. Clay soils will re-hydrate in the winter months, causing the clays to swell and the cracks to close. Provided the cause of movement is dealt with (in this case, vegetation) there should not be a recurrence of movement.

## RECOMMENDATIONS

### Damage to the Front

Although the cause of the movement needs to be dealt with, we note the vegetation is subject to a Preservation Order. Unfortunately, current legislation requires certain investigations to be carried out to support an application for the tree works.

Typically, these investigations would involve trial pits to determine the depth and type of footings, boreholes to determine the nature of the subsoil/influence of any roots and monitoring to establish the rate and pattern of movement. The monitoring data provided must be sufficient to show a pattern of movement consistent with the influence of the vegetation and therefore it may be necessary to carry out the monitoring for up to a 12 month period.

It will also be necessary to obtain a specialist Arboricultural Report.

### Heave

Typically due to the large size and close distance of the oak tree there is a potential high heave risk in respect of the removal of the oak tree. However, we would consider that if any heave were to occur this should have happened following the underpinning of the property in 1991 as the underpinning would have cut off the roots and caused the clay soil underneath the property to heave. As this did not occur we consider that the risk of heave is low, but site investigations in the form of deep boreholes are required to confirm this view.

We will report further once these investigations have been completed.

### Damage to the Rear

The cause of the movement needs to be dealt with first. We have completed a Soil Risk Analysis (VISCAT Assessment) and we are satisfied that your Hawthorn can be removed.

We will obtain a quotation for the recommended tree works and undertake statutory checks for Preservation Orders or whether the tree are in a Conservation Area.

Provided the tree management works are completed expeditiously, consideration may then be given to carrying out the appropriate repairs to the property.

**Callan Harwood-Griffith BSc (Hons)**

**Subsidence Division**

**Direct Dial : 0739 287 154**

[subsidence@crawco.co.uk](mailto:subsidence@crawco.co.uk)

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## PHOTOGRAPHS



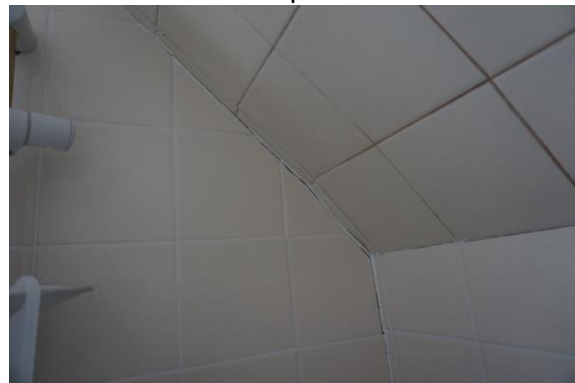
Hall - Separation to door frame



Hall - Drop in stairs



Kitchen - Ceiling junction separation



Bathroom - Vertical crack to corner



Right Elevation Porch - Stepped crack



View of Oak



View of Hawthorn



View of Oak to Rear

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