SECOND ADDENDUM REPORT

Crawford Reference: SU1300377

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prepared for

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SUBSIDENCE CLAIM

DATE 21 May 2015

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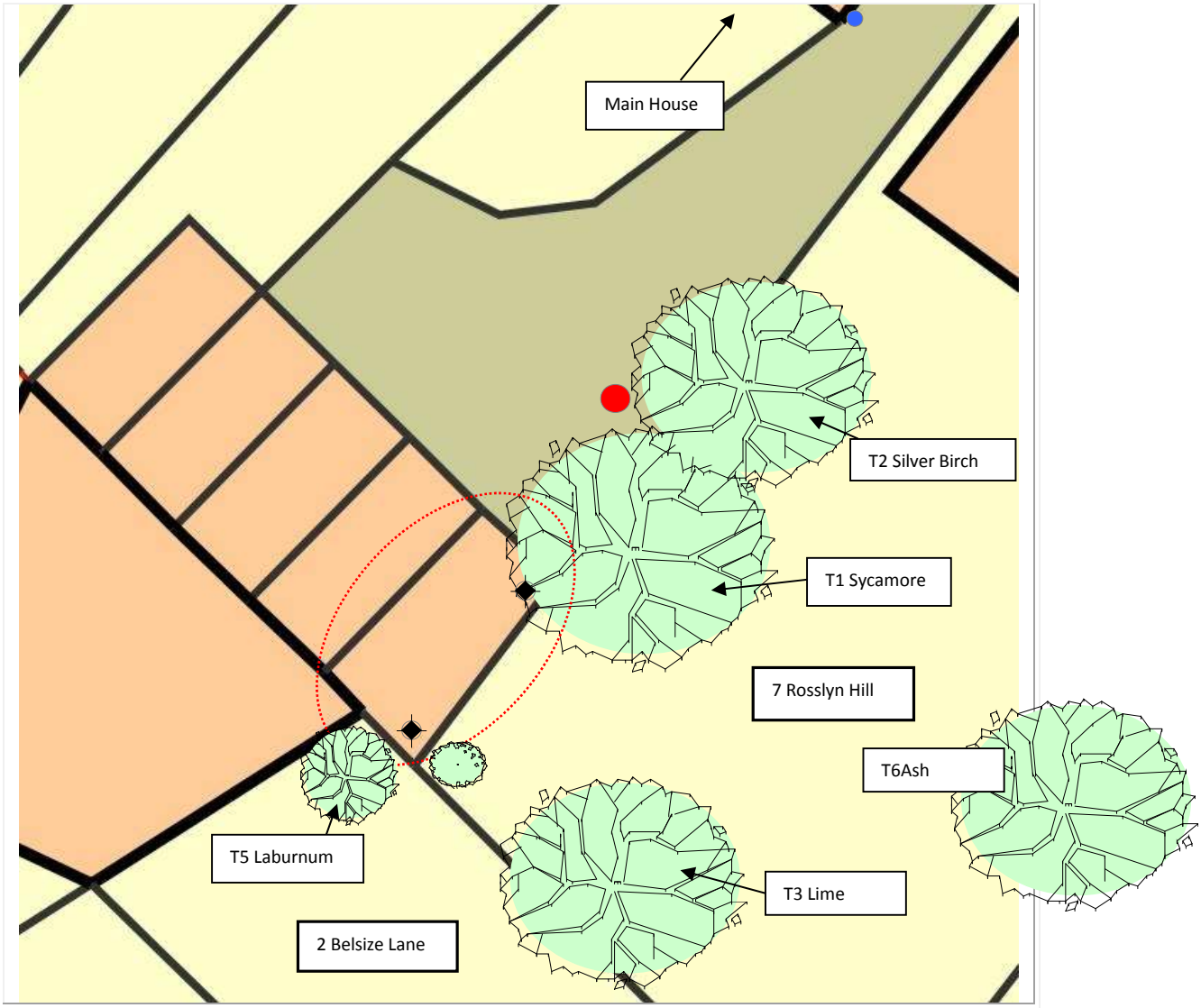
Site Plan	This plan is Not to Scale

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.



Key:

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

INTRODUCTION

We have been instructed by insurers to investigate a claim for subsidence at the above property. The area of damage, timescale and circumstances are outlined in our initial Technical Report. This report should be read in conjunction with that report and our first Addendum Technical Report.

INVESTIGATIONS

The following investigations were undertaken to identify the cause of movement.

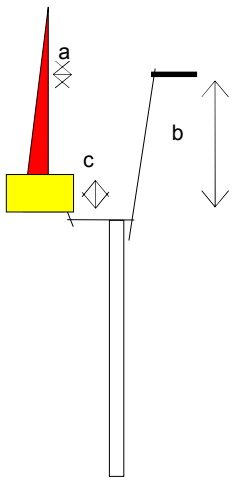
TRIAL HOLES

Two further trial holes were excavated to expose the foundations - see site plan for location and the diagram below for details:-

Trial pit 2 carried out internally to the front left of the garage was excavated to expose the foundations. This revealed a concrete strip footing founded at a depth of 0.90 m below ground level which bears onto medium compact mid to dark brown, sandy, silty clay with occasional gravel, brick, concrete pieces and clinker fragments (made ground) Roots up to 5mm in diameter were observed to the underside of the foundation.

Trial pit 3 carried out internally to the rear left of the garage was excavated to expose the foundations. This revealed a concrete strip footing founded at a depth of 0.75 m below ground level which bears onto medium compact mid brown, sandy, very silty clay with occasional gravel, brick, concrete pieces and clinker fragments (made ground) Roots up to 2mm in diameter were observed to the underside of the foundation.

Root activity of live appearance was noted to the underside of the foundations.



Foundation Details

No.	Borehole Depth	Footing (a)	Underside (b)	Thickness (c)
TH2	3.00 m.	200 mm.	900 mm.	500 mm.
TH3	3.00 m.	300 mm.	750 mm.	350 mm.

AUGERED BOREHOLES

A 50mm diameter hand auger was sunk - see site plan for location(s).

Borehole 2 revealed that the subsoil changed to a stiff, mid brown, grey veined silty CLAY with partings of orange & brown silt and fine sand and occasional clayston nodules at 1.10m below ground level becoming stiff with occasional crystals at 2.2m below ground level, with roots to a depth of 2.2 m below ground level. The borehole remained dry and open upon completion.

Borehole 3 revealed that the subsoil changed to a firm mid brown, grey veined, silty CLAY with partings of orange and brown silt and fine sand and occasional claystone nodules at 0.95m below ground level becoming stiff at 1.2m below ground level, with roots to a depth of 2.0 m below ground level. The borehole remained dry and open upon completion.

SOIL SAMPLES

Soil samples were retrieved from the bore, wrapped in cling film before being bagged and deposited with a testing laboratory the same day. The laboratory has instructions to test the samples to determine if there is evidence of root induced desiccation.

The following laboratory tests were carried out on soil samples retrieved from the boreholes:-

Moisture Content

Values ranged from 30% to 34% over the depth of Borehole 2.
Values ranged from 25% to 34% over the depth of Borehole 3.

Atterberg Limits

Results indicate that the clay subsoil with all the boreholes can be classified as high to very high plasticity clay in accordance with the Casagrande chart.

ROOTS

Roots in Borehole 1 were identified as Fraxinus (which include Ash trees). Starch was present which indicates that the roots were alive at the time of retrieval.

Roots in Borehole 2 were identified as Acer and Fraxinus (which include Sycamore and Ash trees). Starch was present which indicates that the roots were alive at the time of retrieval.

Roots in Borehole 3 were identified as Tilia (which include Lime trees) Starch was present which indicates that the roots were alive at the time of retrieval.

DRAINS

The drainage is remote from the area of current damage and trial pit/ borehole investigations did not reveal any suggestion that leakage from drainage is adversely affecting the property. As such, an escape of water can be ruled out as the cause of the claim.

MONITORING AND ARBORICULTURAL REPORT

Cyclical movement has been recorded up to April 2015 on the garage, with the property moving upward and downward through wet and dry periods. This type of movement can be created by clay shrinkage subsidence.

Reviewing the pattern of cracking to the left hand flank wall, the recent closure in cracks here is likely to be due to the location of the monitoring studs. It is likely the elevation has dropped and the crack being measured has subsequently closed up. Although pattern of seasonal movement in this area of the garage is not uniform, no other cause can be attributed to this type of movement other than root induced clay shrinkage.

Crack monitoring has been carried out over a period from Feb-13 to April-15. The results indicate opening of cracks to the rear area of damage over the Summer period (maximum 4.65 mm) and closure over the Winter period (maximum 5.57 mm). This is characteristic of the seasonal pattern of foundation movement where vegetation is involved.

MWA have formed a revised arboricultural report following the results of the site investigation dated 21/4/15 and the latest monitoring data. The report cites the Sycamore tree, T1, Birch tree T2 Lime tree T3 and Ash tree T6 as the effective and substantive cause of the movement. Minor vegetation a Laburnum T5 was removed in September 2013. Ongoing movement has been recorded, which supports our view the remaining vegetation continues to influence the property and removal is required.

DISCUSSION

The results of the site investigations confirm that the prime and effective cause of subsidence is root-induced clay shrinkage. The Sycamore, Birch, Lime and Ash trees are seen as the trigger of the claim. This is supported by the following investigation results:-

- Ash, Lime and Sycamore roots were found to a depth between 2.0m and 2.2m under the foundations of the moving structures.
- The crack monitoring between February 2013 and April 2015 showed cyclical movement due subsidence of the site.
- The moisture content profile indicates a reduction in moisture content between a depth of 1.5m and 3.0m in borehole 1, and between 2.0m and 3.0 m in borehole 2 and between 2.0m and 3.0m which is indicative of desiccation caused by root induced moisture extraction.
- Atterberg limit testing indicates that the soil has a very high plasticity and hence will shrink and swell with changes in moisture content.
- Suction tests indicate slight to moderate desiccation between a depth of 1.5 m and 3.0 m coincident with the depth of root activity.
- Roots were found to a depth between 2.0m and 2.2 m and were identified as the species Fraxinus which are Ash, Acer which are Sycamores and Tilia which are Limes. Starch was present which indicates that the roots were alive at the time of retrieval.

RECOMMENDATION

An application shall be submitted to fell the trees Property stability is expected following the completion of this work. The tree work can proceed without risk of heave damage being created.

The cause of the movement needs to be dealt with first. From the results of the site investigation, we are satisfied that vegetation can be removed. Whilst no roots were recovered from the Birch tree T2 given its size, species profile and position relative to the observed damage it is our opinion that this will be influencing the soils volume and removal is recommended.

Repairs are estimated to be if the tree is removed total £2,500. Underpinning localised to the affected areas of the damaged property will be needed if tree felling is blocked. The cost of this work is estimated to exceed £15,000.

Yours faithfully,

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21 May 2015