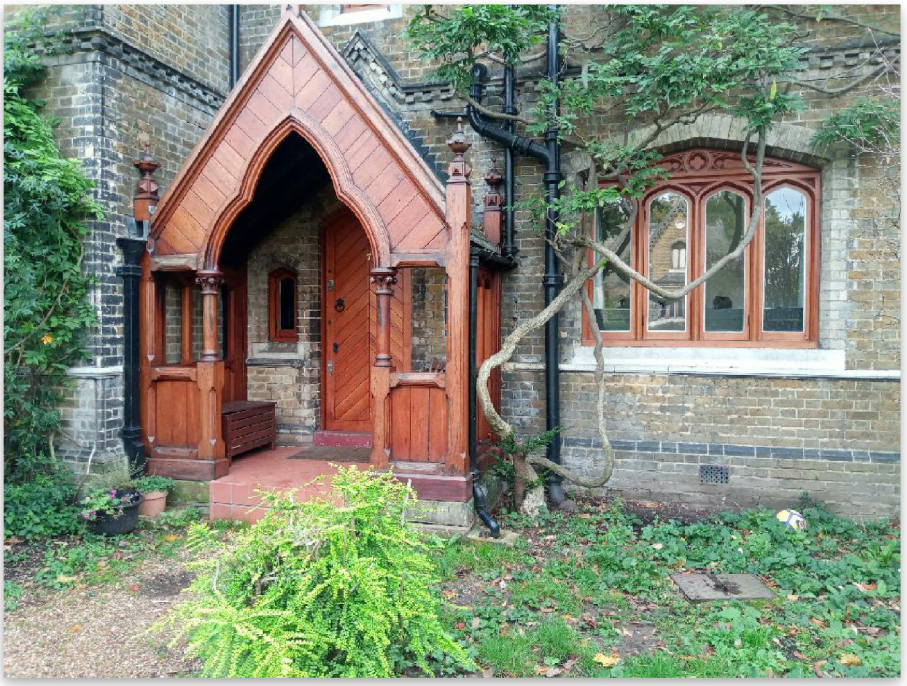
[redacted]

Site Investigation Report

[redacted]



Job Information	
Client	Crawford & Co
Client ref	[redacted]
Visit date	28/10/2022
Report date	07/11/2022

Job Summary

- CCTV survey undertaken. Read more.
- Drainage repairs required. Read more.
- Trial Hole depth not reached. Read more.

[redacted]

Job Information

Overview

Brief	Auger were commissioned by Crawford & Co to undertake a site investigation and CCTV inspection of the underground drainage within the area of concern (AOC) at the property.

Findings

Trial Hole Findings	We were unable to reach the required depth in TH2 because we encountered impenetrable gravelly clay which our engineer could not auger through. The footing exposed during TH2 was seen to be a brick step on top of sloped concrete.
Visual Inspection	We carried out a water mains listening test whilst on site which revealed that there was no evidence of a leak on the incoming water supply serving the property. The structure/ brick chamber of both manholes (MH1 and MH2) were seen to be damaged, and as such require replacing. Refer to the images below which shows the damage to the chamber/ benching.
Drain Survey	Within the area of concern there were multiple drains, some of which solely belonged to our customer, the neighbour and also some were shared. The drainage has been categorised into three groups (as seen below), we would advise the client refers back the **Shared Drainage** and the **Neighbours Drainage** to the LWA and neighbour respectively. **Neighbours Drainage** **Line 1- MH1 upstream to WG1** Our CCTV survey did not reveal any defects which could be allowing an escape of water. **Line 2- MH1 upstream to SVP** Our CCTV survey revealed a joint displacement. The cast iron section of this run was seen to be furred. **Line 3- MH1 upstream to WG2** Our CCTV survey revealed a hole within the pipework. The cast iron section of this run like line 2 was furred in sections. **Line 12- MH1 upstream to outside AOC** Our CCTV survey did not reveal any defects which could be allowing an escape of water. However similar to the above lines this cast iron run was furred. **Shared Drainage** **Line 4- MH1 downstream to MH2** Our CCTV survey revealed root ingress and a hole in the chamber just prior the trap outlet. **Line 8- MH2 downstream to main run** Our CCTV survey revealed a hole, root ingress and joint displacements **Customers Drainage** **Line 5- MH2 upstream to WC** Our CCTV survey revealed a joint displacement **Line 6- MH2 upstream to WG3** Our CCTV survey revealed cracking and joint displacements **Line 7- MH2 upstream to Rodding eye** Our CCTV survey did not reveal any defects which could be allowing an escape of water, although our survey did reveal the cast iron pipe is furred. **Line 9- MH3 upstream to Unknown** Our CCTV survey revealed fracturing and mass debris. Due to the debris within the run and also the bend in the pipe we were unable to continue the survey as such this was abandoned. The end destination of the upstream pipe is currently unknown and the only way to actually confirm this is via an excavation. **Line 10- MH3 downstream to outside AOC** Our CCTV survey revealed root ingress, fracturing and joint displacements. **Line 11- MH4 downstream to Line 7** Our CCTV survey did not reveal any defects which could be allowing an escape of water. The above mentioned defects to the below ground drainage system have been caused by ground movement.

Recommendations	
Refer Back to Client	Auger would advise the neighbouring property to address the above issues mentioned for lines 2 and 3. In terms of the shared drains and also the defective manholes, these defects need to be referred to the LWA. These defects could be leading to an escape of water into the surrounding ground. If the Loss Adjuster/Engineer is of the opinion that these defects are an influence in the cause of subsidence to the building structures, we recommend you inform the LWA of the problem and request that they (the LWA) inspect and repair their asset. We cannot undertake any further inspection or repair of LWA assets without the express approval of the LWA. **If the LWA decline ownership for the shared drains and the manholes, then Auger are capable of completing the remedial works. We would note this would be very excessive and a scope for said works can be drafted on request, if this occurs the below scope may be altered and a whole new proposed will be drafted.** In terms of how to repair the customer drainage, below is the scope of works needed. We would note that the works **must be completed after the LWA have addressed their issues.** **Line 5** Install a 100mm patch liner directly upstream of the manhole **Line 6** Excavate and replace WG3 and 2m of 100mm pipework at a depth less than 1.3m through slabs Auger have not allowed or will not be held responsible for any alteration or modification to the above ground drainage following the removal of the existing gully and reinstatement of a new gully. The customer must ensure that the above ground drainage correctly expels into the gully pot and avoids overcrowding the gully with numerous downpipes which could lead to the gully overflowing. **Line 9** Excavate and replace 1m of 100mm directly upstream of MH3 at a depth no greater than 2m through concrete steps. Auger prior the works will remove the steps however post works this requires specialist reinstatement. During the above excavation we will conduct a further CCTV survey and identify the end location of the drain, we would note this run may be redundant- however the only way to prove this is by conducting this excavation. Trench shoring will needed due to the depth of the excavation(s), in addition to enable the dig a 1.5 tonne excavator will be needed. A 4 yard skip will be needed to dispose of the spoil, the skip will have to be positioned far away from the site near the garages. As such a dumper will be needed to transfer the spoil from A to B **Line 10** Install 5m of 100mm liner downstream of MH3. Due to the depth of the manhole deep entry equipment will be needed During the clean-up/reinstatement process we will endeavour to leave the area we are working in clean and tidy and as close to how we found it as possible. There will always be an element of general debris/mud/waste that will build up in the area which cannot be prevented. There may however be elements of this process that are outside our remit i.e., Repainting or cleaning. If this is the case, then we will need to speak to the customer's insures to help in this regard. We will now refer back to the client in order to progress the claim.
Repair Caveats	*Once repairs have been undertaken the customer should ensure the drainage system is periodically inspected in the future for any deterioration and kept free flowing / free of blockages. Any damage noted during future inspections should be repaired immediately in accordance with current Building Regulations.* *With any repair process, complications and unforeseen circumstances can arise. These scenarios will be reported whilst on-site and could potentially cause an increase in repair costs and inconvenience.* *The proposed repairs will require radio detection in order to confirm the location of the defects. Although this is usually very accurate, a number of factors such as depth of pipework and presence of other services below ground can have an effect on the signal. This can result in a change of the location of the proposed excavation as well as the assumed depth and this may impact the scope of works. Costs may be subject to change due to the potential of excavating to a different depth and/or through different surfaces.* *Where any excavation reinstatement of the surface is required, the reinstatement will always attempt to match the previous surface patterns and colouring, however we cannot guarantee an exact match.*

If any of the above lining recommendations fail then excavation and replacement of the pipework would be required. This would severely increase the cost of repairs and would provide greater inconvenience to the residents. The relining of a severe joint displacement is normally unadvised due to the potential for complications in the future.

Recommendations have been made to reline or patch reline sections of the drainage system at the property. This process combines a number of chemicals in a resin, which then harden in a fibreglass matting to create a new section of drain within the original. The reaction creates ***a strong smell which can linger for up to 72 hours*** *once works are completed - this is not harmful. It is recommended that any areas where smells are experienced are kept well ventilated until the odour subsides.*

The above recommendations allow for the replacement of gullies & connected underground drainage only. The insured should be made aware that the aesthetic appearance of this gully may be different from what is currently in place.

Photographs

Trial Hole 1

Fig 1.1: Trial Hole 1 Location

Fig 1.2: Trial Hole 1 Footing

Trial Hole 2

Fig 2.1: Trial Hole 2 Location

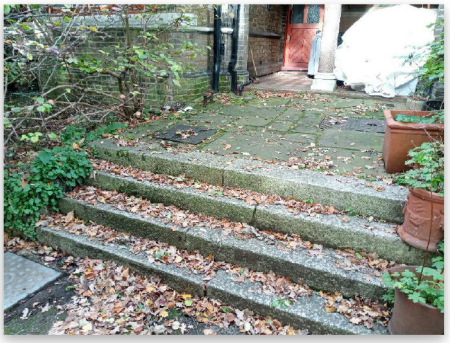
Fig 2.2: Trial Hole 2 Footing

Site Photos

Fig 3.1: Defective manhole

Fig 3.2: Defective manhole channel/ benching

Fig 3.3: Location of manholes (on the raised patio area).



CCTV Survey – Inspection Listings *(WRc Guidelines Applied)*

L12

Direction	Upstream	**From**	mh1
Pipe Size (mm)	100	**Depth (m)**	1.10m
Pipe Material	VC	**To**	u/s to neighbours property

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Material Change (CI)
0.5m	SWL
4.7m	Junction (rwp neighbour)
4.7m	Survey Abandoned (at neighbours property)

L1

Direction	Upstream	**From**	mh1
Pipe Size (mm)	100	**Depth (m)**	1.10m
Pipe Material	VC	**To**	swg

0.5m	Start of Survey Length
0.5m	Water Level 0%
0.5m	VC to CI
1.4m	Finish of Survey Length

L10

Direction	Downstream	**From**	mh3
Pipe Size (mm)	100	**Depth (m)**	1.50m
Pipe Material	VC	**To**	d/s

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.2m	Fracture - Circumferential
0.2m	Roots - Fine
0.9m	Fracture - Circumferential
1.6m	Fracture - Circumferential
1.6m	Roots - Fine
4.7m	Joint Displacement- Minor
11.1m	Debris 70%

L11

Direction	Downstream	**From**	mh4
Pipe Size (mm)	100	**Depth (m)**	0.50m
Pipe Material	VC	**To**	l7

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Material Change (CI)
2.3m	Junction
10.3m	Junction
14.4m	Finish of Survey Length

L2

Direction	Upstream	**From**	mh1
Pipe Size (mm)	100	**Depth (m)**	1.10m
Pipe Material	VC	**To**	svp

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.3m	Joint Displacement - Medium
0.3m	Material Change (CI)
1.2m	Surface Wear Medium (SWM)
1.2m	Finish of Survey Length

L3

Direction	Upstream	**From**	mh1
Pipe Size (mm)	100	**Depth (m)**	1.10m
Pipe Material	VC	**To**	swg

0.2m	Start of Survey Length
0.2m	Hole
0.2m	Material Change (CI)
0.2m	SWL
2.1m	Finish of Survey Length

L4

Direction	Downstream	**From**	mh1
Pipe Size (mm)	100	**Depth (m)**	1.10m
Pipe Material	VC	**To**	mh2

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Roots - Mass 20% (at 09 to 12)
0.6m	Material Change (CI)
0.6m	SWM
1.6m	Material Change (VC)
2.1m	MH2
2.1m	Finish of Survey Length
2.5m	Hole (hole before interceptor)

l5

Direction	Upstream	**From**	mh2
Pipe Size (mm)	100	**Depth (m)**	1.30m
Pipe Material	VC	**To**	wc

0.1m	Start of Survey Length
0.1m	Water Level 0%
0.1m	Material Change (CI)
0.1m	Joint Displacement - Large (to slipper)
0.5m	SWM
1.5m	Junction (vent)
6.6m	Material Change (VC)
7.1m	Finish of Survey Length

l6

Direction	Upstream	**From**	mh2
Pipe Size (mm)	100	**Depth (m)**	1.30m
Pipe Material	VC	**To**	wg

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.2m	Fracture - Circumferential
0.7m	Material Change (CI)
0.8m	Joint Displacement - Medium
2.3m	Fracture - Circumferential
2.3m	Finish of Survey Length

l7

Direction	Upstream	**From**	mh2
Pipe Size (mm)	100	**Depth (m)**	1.30m
Pipe Material	VC	**To**	rod access

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Material Change (CI)
1.5m	SWM
3.8m	Junction
6.7m	Junction
6.7m	Finish of Survey Length (at rod access)

l8

Direction	Downstream	**From**	mh2
Pipe Size (mm)	150	**Depth (m)**	1.30m
Pipe Material	VC	**To**	main line

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Hole
0.6m	Material Change (CI)

0.6m	SWM
4.4m	Joint Displacement - Large
4.4m	Material Change (VC)
4.4m	Roots - Fine (Joint)
4.7m	Finish of Survey Length

I9

Direction	Upstream	**From**	mh3
Pipe Size (mm)	100	**Depth (m)**	1.50m
Pipe Material	VC	**To**	u/s

0.0m	Start of Survey Length
0.0m	Water Level 0%
0.0m	Debris 50%
0.8m	Fracture - Multiple
0.8m	Debris 70%
0.8m	Survey Abandoned (unable to push)

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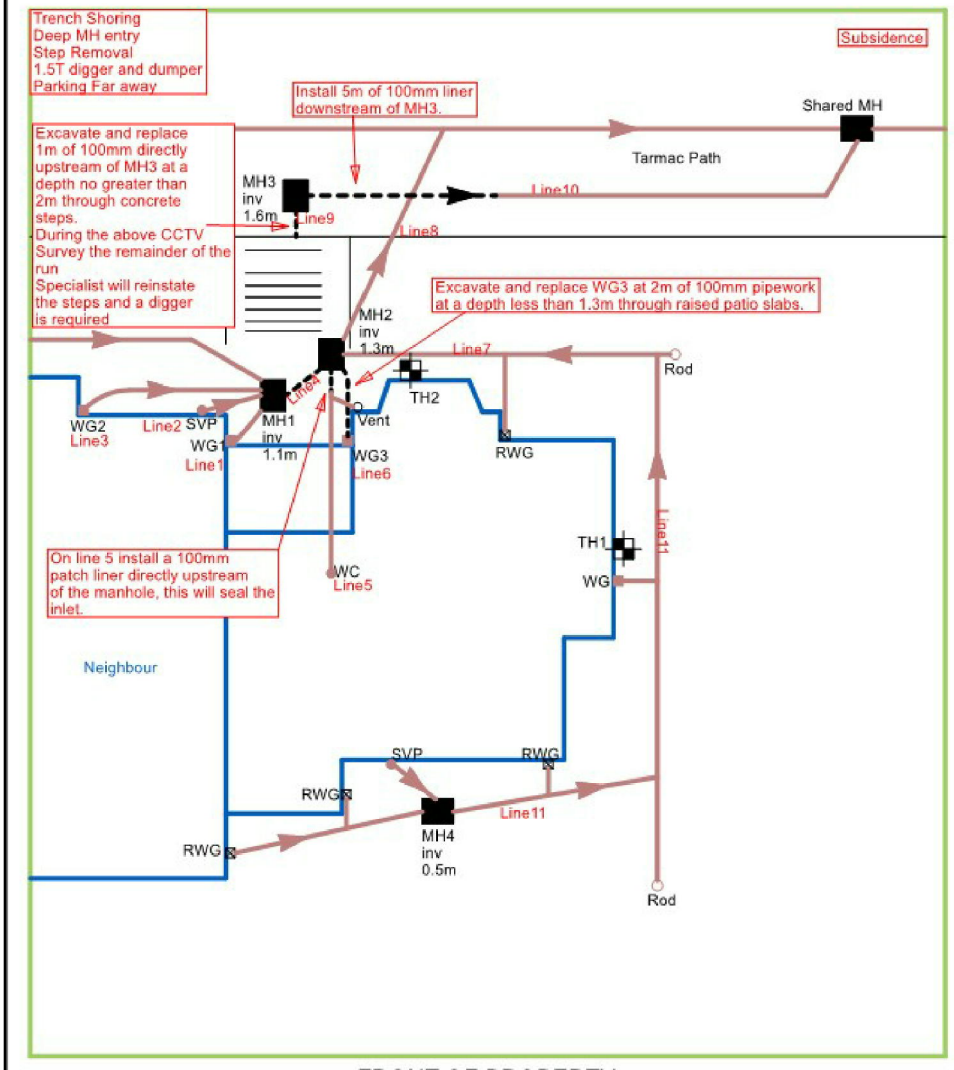
Proposed Layout

Date: 07/11/2022



This drawing should be used for diagrammatic purposes only. Auger are not responsible or liable for any 3rd party works undertaken using the details outlined in this drawing. Confirmation of the drainage configuration can only be confirmed by excavation or detailed technical survey.

LEGEND

- = Manhole (MH)
- = Inspection Chamber (IC)
- = Inspection Point (IP)
- = Blockage / Collapse
- = Soil Vent Pipe (SVP) / WC
- = Combined Waste Gully (CWG) / Foul Waste Gully (FWG)
- = Rainwater Gully (RWG)
- = Rainwater Pipe (RWP)
- = Lines not to be repaired
- = Lines to be repaired
- = Assumed water mains feed
- = Walls
- = Fences
- = Building Outline
- = Trial hole
- = Borehole
- = Direction of flow
- = Gate / Door
- = Shrubs / Bush
- = Hedge
- = Tree
- = Steps

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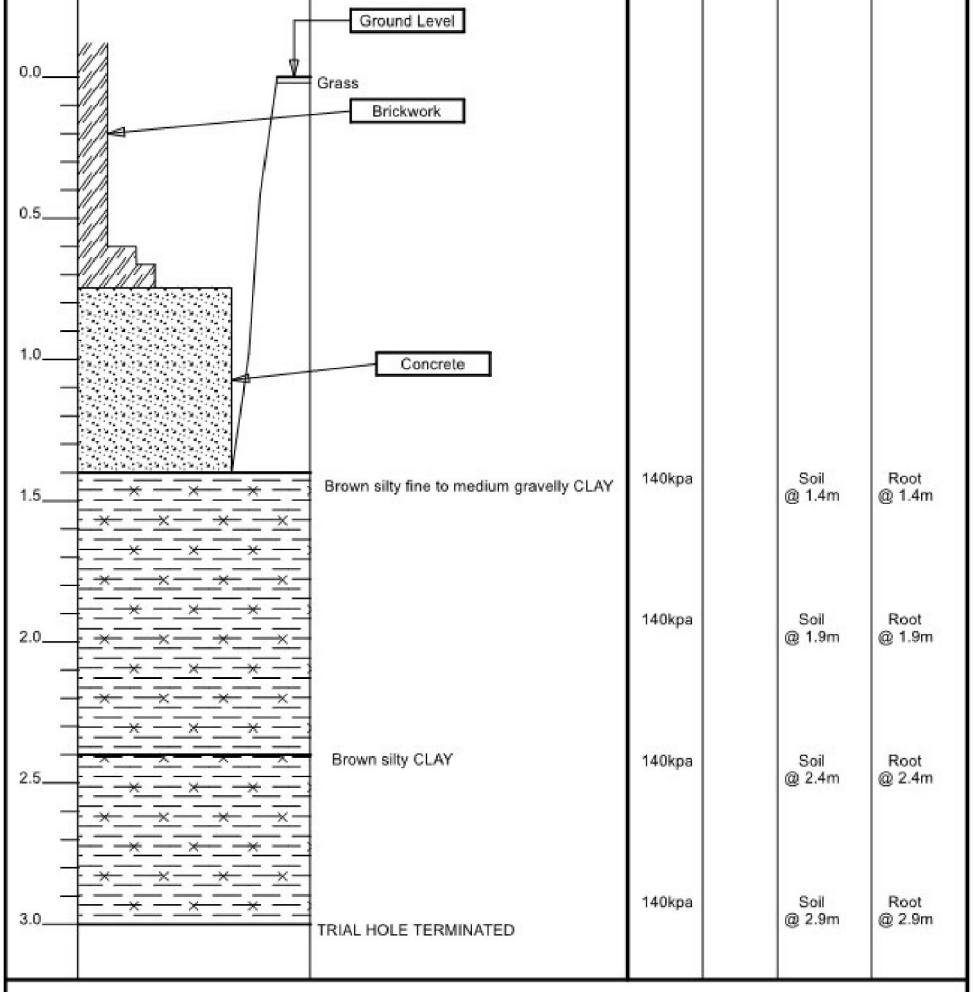
Trial Hole Log No.1

Location: Right hand side adjacent to wg1

[redacted]



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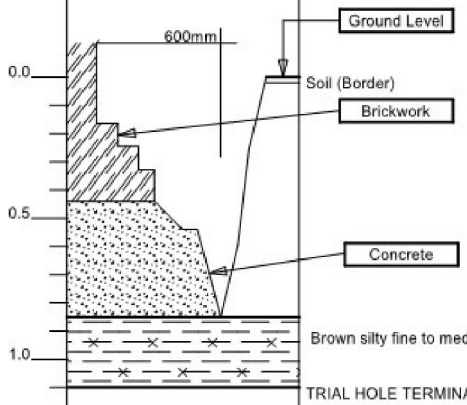
Trial Hole Log No.2

Location: Rear of bay

[redacted]

Depth (m)	Symbolic Log	Strata Description	Insitu Tests SV(19)	Insitu Tests	Soil Sample	Root Sample
0.0		Ground Level				
		600mm				
		Soil (Border)				
		Brickwork				
0.5		Concrete				
1.0		Brown silty fine to medium gravelly CLAY	140kpa		Soil @ 0.85m	Root @ 0.85m
		TRIAL HOLE TERMINATED				
1.5						
2.0						
2.5						
3.0						

Richardson's Botanical Identifications

Root identification
Vegetation surveys
Tree/Building investigations
Plant taxonomy

Dr Ian B K Richardson
BSc, MSc, PhD, MRSB, FLS
James Richardson
BSc (Hons. Biology)

Auger Solutions
Auger House
Cross Lane
WALLASEY
Wirral CH45 8RH

[redacted]

29/10/2022

Dear Sirs

Root ID

The samples you sent in relation to the above on 14/10/2022 have been examined. Their structures were referable as follows:

TH1, 1.40m		
3 no.	Examined root: could be LAURUS (Bay), CAMELLIA (evergreen shrubs or small trees, usually with white, pink or red flowers), or possibly RHODODENDRON (large woody shrubs with bright-coloured flowers). Slightly tentative.	Alive, recently*.
1 no.	A piece of BARK only, insufficient material for identification.	
3 no.	Unfortunately all with insufficient cells for identification.	
TH1, 1.90m		
2 no.	Examined root: also in many ways like LAURUS (Bay), CAMELLIA and RHODODENDRON.	Alive, recently*.
7 no.	Unfortunately all with insufficient cells for identification.	
TH1, 2.40m		
5 no.	Examined root: again, could be LAURUS (Bay), CAMELLIA or RHODODENDRON.	Alive, recently*.
2 no.	Examined root: as above, referable in many ways to - too immature to identify.	
TH1, 2.90m		
1 no.	Examined root: as above, referable in many ways to LAURUS (Bay), CAMELLIA and also RHODODENDRON. A very THIN sample.	Alive, recently*.
2 no.	Examined root: in many ways like QUERCUS (Oak).	Dead*.
4 no.	Unfortunately all with insufficient cells for identification.	

/ continued overleaf

TH2, 0.85m		
5 no.	Examined root: QUERCUS (Oak).	Alive, recently*.
3 no.	Examined root: the family Rosaceae, subfamily POMOIDEAE (as listed above).	Alive, recently*.
1 no.	Microscopic examination showed insufficient cells for recognition.	

Click here for more information: LAURUS POMOIDEAE QUERCUS

I trust this is of help. Please call us if you have any queries; our Invoice is enclosed.

Yours faithfully

[redacted]

Dr Ian B K Richardson

* Based mainly on the Iodine test for starch. Starch is present in some cells of a living woody root, but is more or less rapidly broken down by soil micro-organisms on death of the root, sometimes before decay is evident. This result need not reflect the state of the parent tree.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Geotechnical Testing Analysis Report**	auger environmental + claims mgmt + subsidence + drainage +
[redacted]	***The testing results contained within this report have been performed by GSTL a UKAS accredited laborotory on behalf of Auger.**	[redacted]

Summary Of Claim Details

Policy Holder	Unknown
Risk Address	Unknown
SI Date	14/10/2022
Issue Date	14/10/2022
Report Date	03/11/2022
Auger Reference	[redacted]
Insurance Company	Midas Underwriting
LA Claim Reference	[redacted]
LA Co. Reference	Crawford & Co

Checked and approved	03/11/2022	Wayne Honey	[redacted]

UKAS TESTING
2788

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)
DESCRIPTIONS

auger
environmental + claims mgmt + subsidence + drainage +

GSTL Contract Number	[redacted]	
Risk Address	**Unknown**	
Auger Reference	[redacted]	

TH Trial Hole	Sample Type	Depth (m)	Sample Description
TH1	D	1.40	Brown silty fine to medium gravelly CLAY
TH1	D	1.90	Brown silty fine to medium gravelly CLAY
TH1	D	2.40	Brown silty CLAY
TH1	D	2.90	Brown silty CLAY
TH2	D	0.85	Brown silty fine to medium gravelly CLAY

Test Operator
Jason Smith

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)

auger
environmental + claims mgmt + subsidence + drainage +

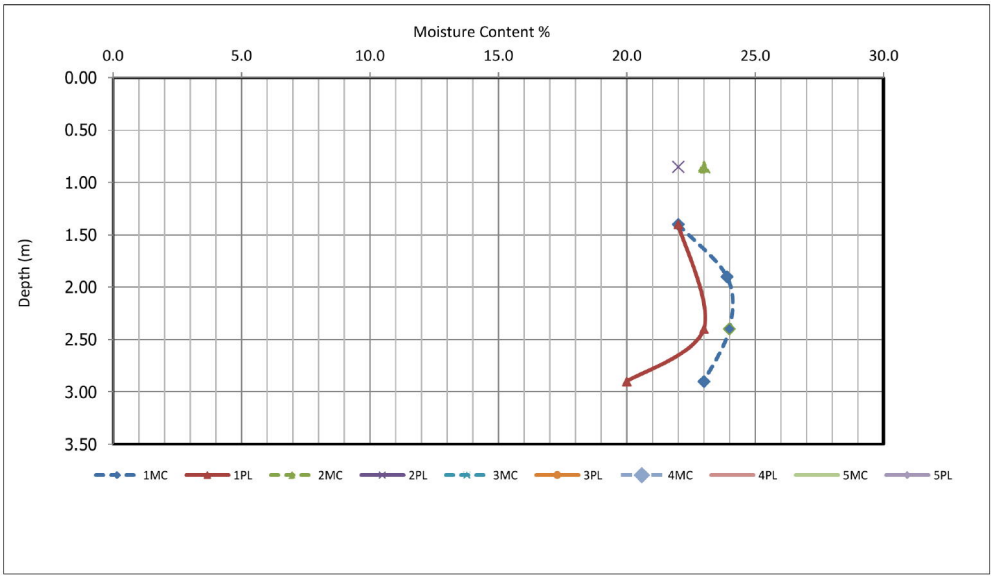
GSTL Contract Number	[redacted]	
Risk Address	**Unknown**	
Auger Reference	[redacted]	
Remarks	NP - (Non-Plastic), # - (Liquid Limit and Plastic Limit Wet Sieved)	

TH Trial Hole	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	NHBC Chapter 4.2	Remarks
TH1	D	1.40	22	68	22	46	94	HIGH VCP	CH High Plasticity
TH1	D	1.90	24						
TH1	D	2.40	24	63	23	40	100	MEDIUM VCP	CH High Plasticity
TH1	D	2.90	23	78	20	58	100	HIGH VCP	CV Very High Plasticity
TH2	D	0.85	23	67	22	45	94	HIGH VCP	CH High Plasticity

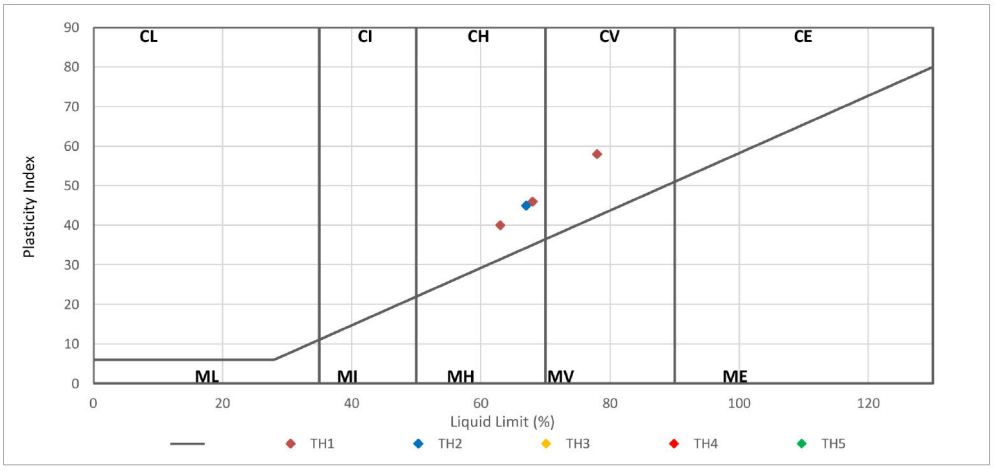
Modified Plasticity Index (PI) <10	: Non Classified
Modified PI = 10 to <20	: Low volume change potential (LOW VCP)
Modified PI = 20 to <40	: Medium volume change potential (Med VCP)
Modified PI = 40 or greater	: High volume change potential (HIGH VCP)

The Atterberg Limits May also be used to classify the volume change potential of fine soils using the National House building system, as given in the NHBC's Standards Chapter 4.2 (2003) "Building Near Trees"

Test Operator
Jason Smith



PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Modified Plasticity Index (PI) <10	: Non Classified
Modified PI = 10 to <20	: Low volume change potential (LOW VCP)
Modified PI = 20 to <40	: Medium volume change potential (Med VCP)
Modified PI = 40 or greater	: High volume change potential (HIGH VCP)

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Test Operator
Jason Smith