

Site Investigation and Drainage Report



Site	Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY Ref: L/019/58338/S
Client	Ecclesiastical Insurance Group c/o GHG
Date	23.10.19
Our Ref	11053



SITE INVESTIGATION AND DRAINAGE REPORT CONTENT

- 1.0 SITE PLAN
- 2.0 TRIAL PIT/BOREHOLE LOGS
- 3.0 GEOTECHNICAL SOIL TESTING RESULTS
- 4.0 CCTV DRAINAGE SURVEY AND RECOMMENDATIONS
- 5.0 REPORT NOTES

Chelmer Global Ltd

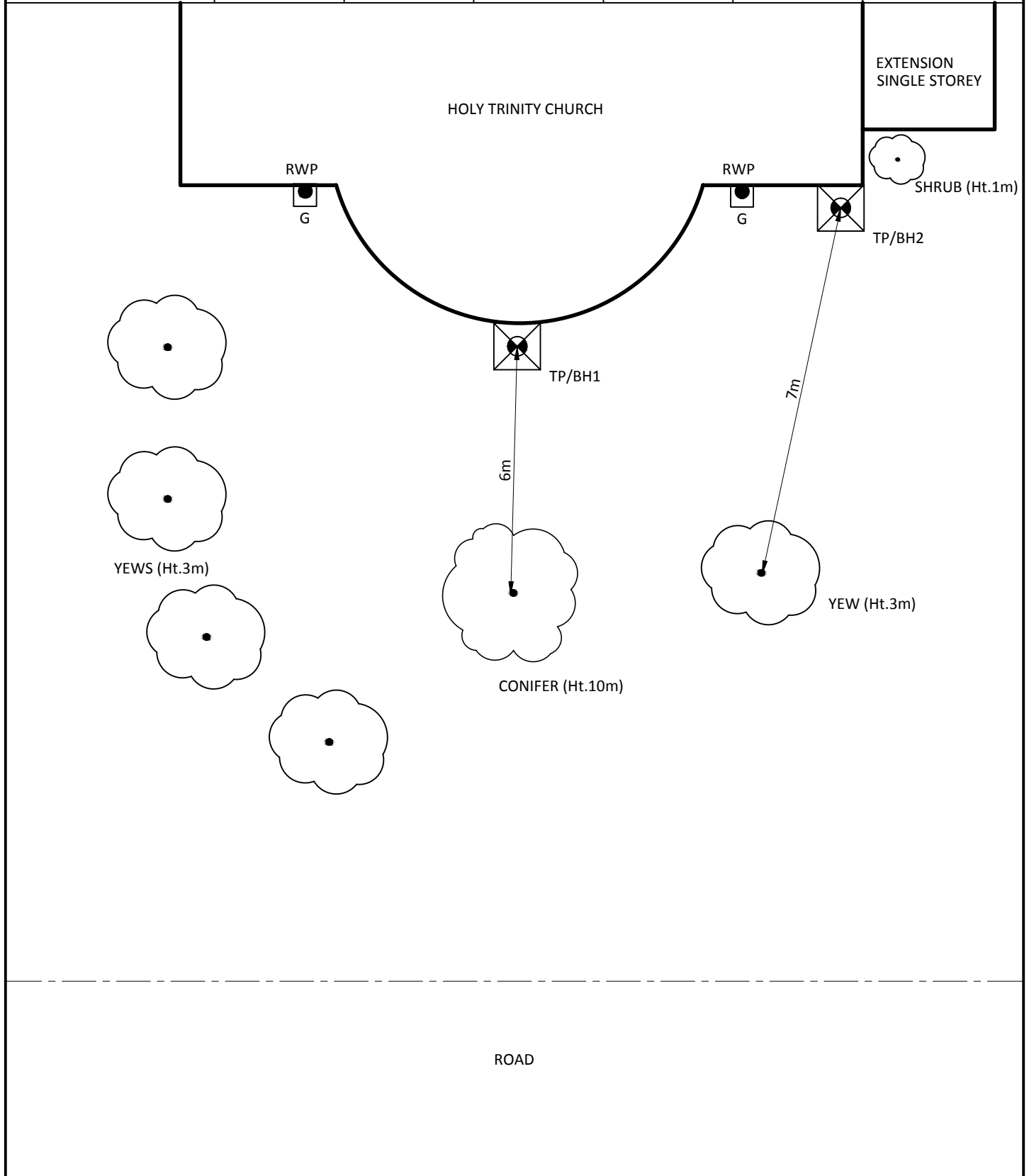
Unit 7 Hall Road Industrial Estate, Hall Road, Southminster, Essex CM0 7DA

Essex: 01245 400930 | info@siteinvestigations.co.uk | www.siteinvestigations.co.uk



Site: Holy Trinity Church, Church Road, Potten End, Berkhamsted HP4 2QY		Client: Ecclesiastical Insurance Group c/o GHG		Identification: SP	
Contract Number: 11053	Date: 23.10.19	Logged By: PE	Checked by: ME	Drawn by: DE	Sheet 1 of 1
Easting: ND	Northing: ND	Ground Level: ND	Plan: ND	Weather: Overcast	Scale: NTS


Sketch Site Plan

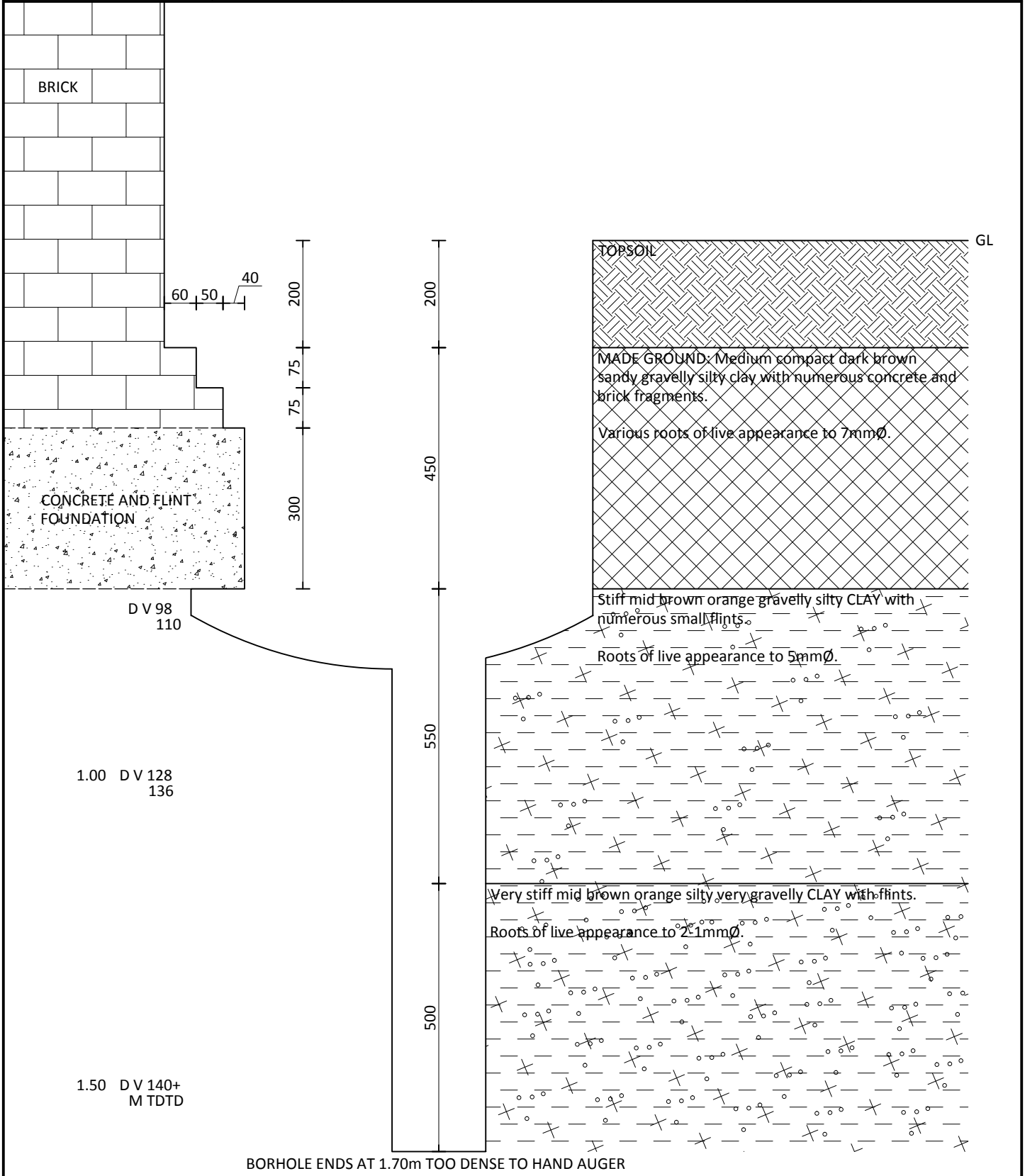


Remarks: On site tree identification for guidance only. Not authenticated.
All dimension in metres.


Key:

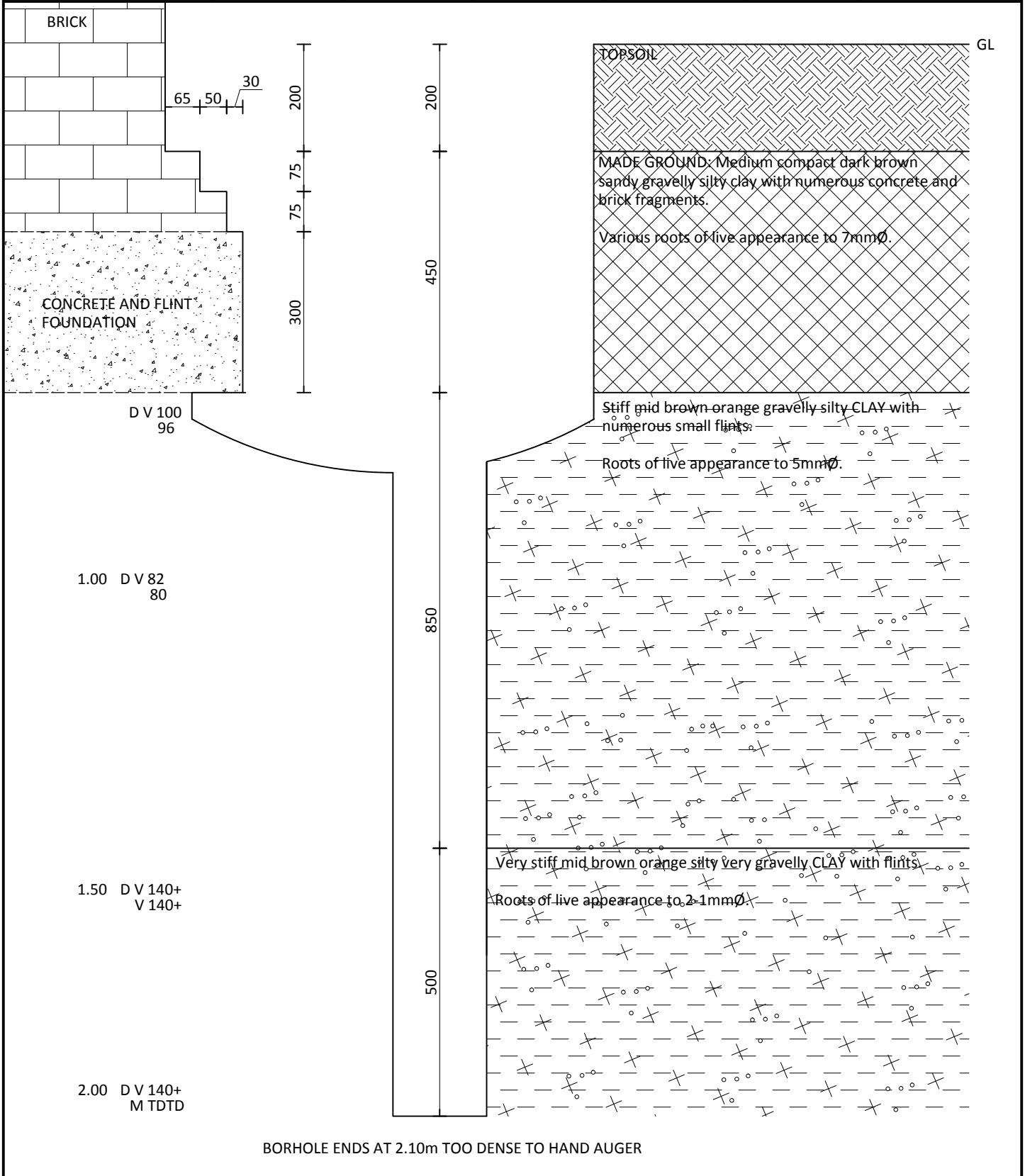
ND	NTS		TP/BH		RWP	
No Data	Not to Scale	Trial Pit and Borehole		Tree/Shrub	Rainwater Pipe	Gully

	Site: Holy Trinity Church, Church Road, Potten End, Berkhamsted HP4 2QY		Client: Ecclesiastical Insurance Group c/o GHG		Identification TP/BH1
	Contract Number: 11053	Date: 23.10.19	Logged By: PE	Checked by: ME	
	Easting: ND		Northing: ND	Ground Level: ND	Excavation Method: Hand Tools



Remarks: No water encountered. Borehole 'dry' and 'open' on completion. All dimensions in millimetres.	Key: ND No Data NTS Not to Scale GL Ground Level D Small Disturbed Sample M Mackintosh Probe V Pilcon Vane (kPa) TDTD Too Dense to Drive
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	Site: Holy Trinity Church, Church Road, Potten End, Berkhamsted HP4 2QY		Client: Ecclesiastical Insurance Group c/o GHG		Identification TP/BH2
	Contract Number: 11053	Date: 23.10.19	Logged By: PE	Checked by: ME	
	Easting: ND		Northing: ND	Ground Level: ND	Excavation Method: Hand Tools



Remarks: No water encountered. Borehole 'dry' and 'open' on completion. All dimensions in millimetres.	Key: ND No Data NTS Not to Scale GL Ground Level D Small Disturbed Sample M Mackintosh Probe V Pilcon Vane (kPa) TDTD Too Dense to Drive
--	--

Laboratory Report



Site

Holy Trinity Church Church Road Potten End
Berkhamsted HP4 2QY

Client

Ecclesiastical Insurance Group C/o GHG

Date

18-Nov-19

Our Ref

CSI11053

CGL Ref

11053

Chelmer Global Ltd

Unit 7 Hall Road Industrial Estate, Hall Road, Southminster, Essex CM0 7DA

Essex: 01245 400930 | info@siteinvestigations.co.uk | www.siteinvestigations.co.uk



Content Summary

This report contains all test results as indicated on the test instruction/summary.

CGL Reference : 11053

Client Reference : CSI11053

For the attention of : Ecclesiastical Insurance Group C/o GHG

This report comprises of the following :

- 1 Cover Page
- 1 Inside Cover/Contents Page
- 2 Pages of Results
- 1 Moisture/Shear Strength Chart
- 1 Plasticity Chart
- 1 Limitations of Report Page

Notes :

General

Please refer to report summary notes for details pertaining to methods undertaken and their subsequent accreditations

Samples were supplied by **Chelmer Global Ltd**

All tests performed in-house unless otherwise stated

Deviant Samples

Samples were received in suitable containers Yes

A date and time of sampling was provided Yes

Arrived damaged and/or denatured No

Laboratory Testing Results

BS 1377 : 1990



Job Number : 11053
 Client : Ecclesiastical Insurance Group C/o GHG
 Client Reference : CSI11053
 Site Name : Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY

Date Received : 30/10/2019
 Date Testing Started : 03/11/2019
 Date Testing Completed : 18/11/2019
 Laboratory Used : Chelmer Geotechnical, CM3 8AB

Sample Ref			Sample Type	*Moisture Content (%) [1]	*Soil Fraction > 0.425mm (%) [2]	*Liquid Limit (%) [3]	*Plastic Limit (%) [4]	*Plasticity Index (%) [5]	*Liquidity Index (%) [5]	*Modified Plasticity Index (%) [6]	*Soil Class [7]	Filter Paper Contact Time (h) [8]	*Soil Sample Suction (kPa)	Insitu Shear Vane Strength (kPa) [9]	Organic Content (%) [10]	*pH Value [11]	*Sulphate Content (g/l)		
BH/TP/W/S	Depth (m)	UID															SO ₃ [12]	SO ₄ [13]	Class [14]
TPBH1	0.65		D	15	11	43	24	19	-0.45	17	CI			94					
TPBH1	1.0		D	19	7	43	21	22	-0.09	20	CI			132					
TPBH1	1.5		D	16	13	38	20	18	-0.21	16	CI			140					

Notes :- *UKAS Accredited Tests

[1] BS 1377 : Part 2 : 1990, Test No 3.2
 [2] Estimated if <5%, otherwise measured
 [3] BS 1377 : Part 2 : 1990, Test No 4.4
 [4] BS 1377 : Part 2 : 1990, Test No 5.3
 [5] BS 1377 : Part 2 : 1990, Test No 5.4
 [6] BRE Digest 240 : 1993

[7] BS 5930 : 1981 : Figure 31 - Plasticity Chart for the classification of fine soils
 [8] In-house method S9a adapted from BRE IP 4/93
 [9] Values of shear strength were determined in situ by Chelmer Global using a Pilcon hand vane or Geonor vane (GV).
 [10] BS 1377 : Part 3 : 1990, Test No 4
 [11] BS 1377 : Part 2 : 1990, Test No 9

[12] BS 1377 : Part 3 : 1990, Test No 5.6
 [13] SO₄ = 1.2 x SO₃
 [14] BRE Special Digest One (Concrete in Aggressive Ground) 2005

Note that if the SO₄ content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise

Key
D - Disturbed sample
B - Bulk sample
U - U100 (undisturbed sample)
W - Water sample
ENP - Essentially Non-Plastic
US - Underside Foundation

Comments :-

Technician :- MW
 Checked & Authorised By:- Martin Edwards- Chelmer Global Company Director
 Date Checked :- 03/12/2019

Laboratory Testing Results

BS 1377 : 1990



Job Number : 11053
 Client : Ecclesiastical Insurance Group C/o GHG
 Client Reference : CSI11053
 Site Name : Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY

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BH/TP/W/S	Depth (m)	UID															SO ₃ [12]	SO ₄ [13]	Class [14]
TPBH2	0.65		D	21	6	39	19	20	0.10	19	CI			98					
TPBH2	1.0		D	20	10	42	21	21	-0.04	19	CI			81					
TPBH2	1.5		D	25	8	52	24	28	0.04	25	CH			140					
TPBH2	2.0		D	33	10	51	23	28	0.35	25	CH			140					

Notes :- *UKAS Accredited Tests

[1] BS 1377 : Part 2 : 1990, Test No 3.2
 [2] Estimated if <5%, otherwise measured
 [3] BS 1377 : Part 2 : 1990, Test No 4.4
 [4] BS 1377 : Part 2 : 1990, Test No 5.3
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[12] BS 1377 : Part 3 : 1990, Test No 5.6
 [13] SO₄ = 1.2 x SO₃
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Note that if the SO₄ content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise

Key
D - Disturbed sample
B - Bulk sample
U - U100 (undisturbed sample)
W - Water sample
ENP - Essentially Non-Plastic
US - Underside Foundation

Comments :-

Technician :- MW
 Checked & Authorised By:-  Martin Edwards- **Chelmer Global Company Director**
 Date Checked :- 03/12/2019

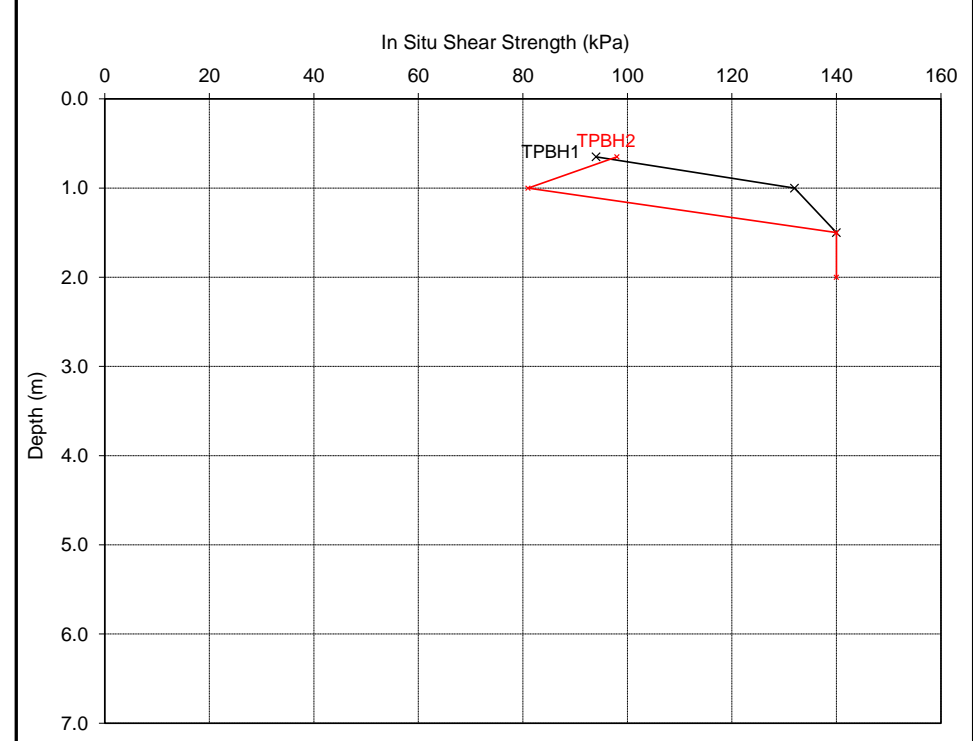
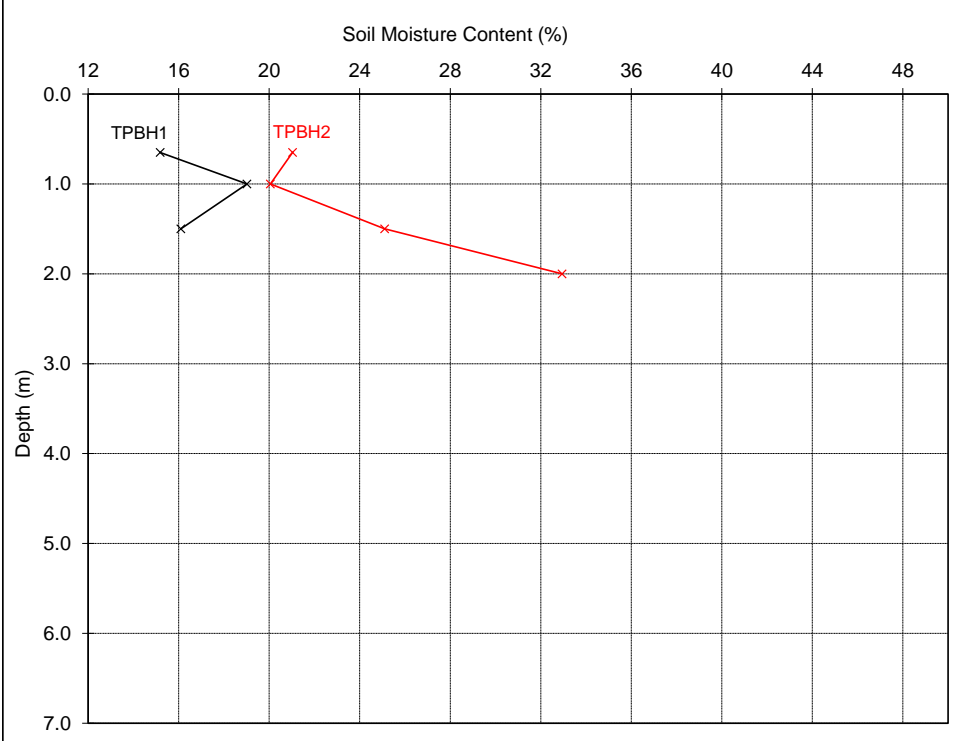
Laboratory Testing Results

Moisture Content/Shear Strength Profile



Job Number : 11053
 Client : Ecclesiastical Insurance Group C/o GHG
 Client Reference : CS111053
 Site Name : Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY

Date Received : 30/10/2019
 Date Testing Started : 03/11/2019
 Date Testing Completed : 18/11/2019
 Laboratory : Chelmer Geotechnical Laboratories, CM3 8AB




Notes :-

1. If the Soil Fraction > 0.425mm exceeds 5% the Equivalent Moisture Content of the remainder (calculated in accordance with BS 1377: Part 2 : 1990, cl.3.2.4 note 1) is also plotted and the alternative profile additionally shown as an appropriately coloured broken line.
2. If plotted, 0.4 LL and PL+2 (after Driscoll, 1983) should only be applied to London Clay (and similarly over consolidated clays) at shallow depths.

Unless otherwise stated, values of Shear Strength were determined in situ by Chelmer Global Ltd using a Picon Hand Vane the calibration of which is limited to a maximum reading of 140 kPa. (Not UKAS accredited)

Comments :-

Checked & Authorised By:-  Martin Edwards- Chelmer Global Company Director

Date: 03/12/2019

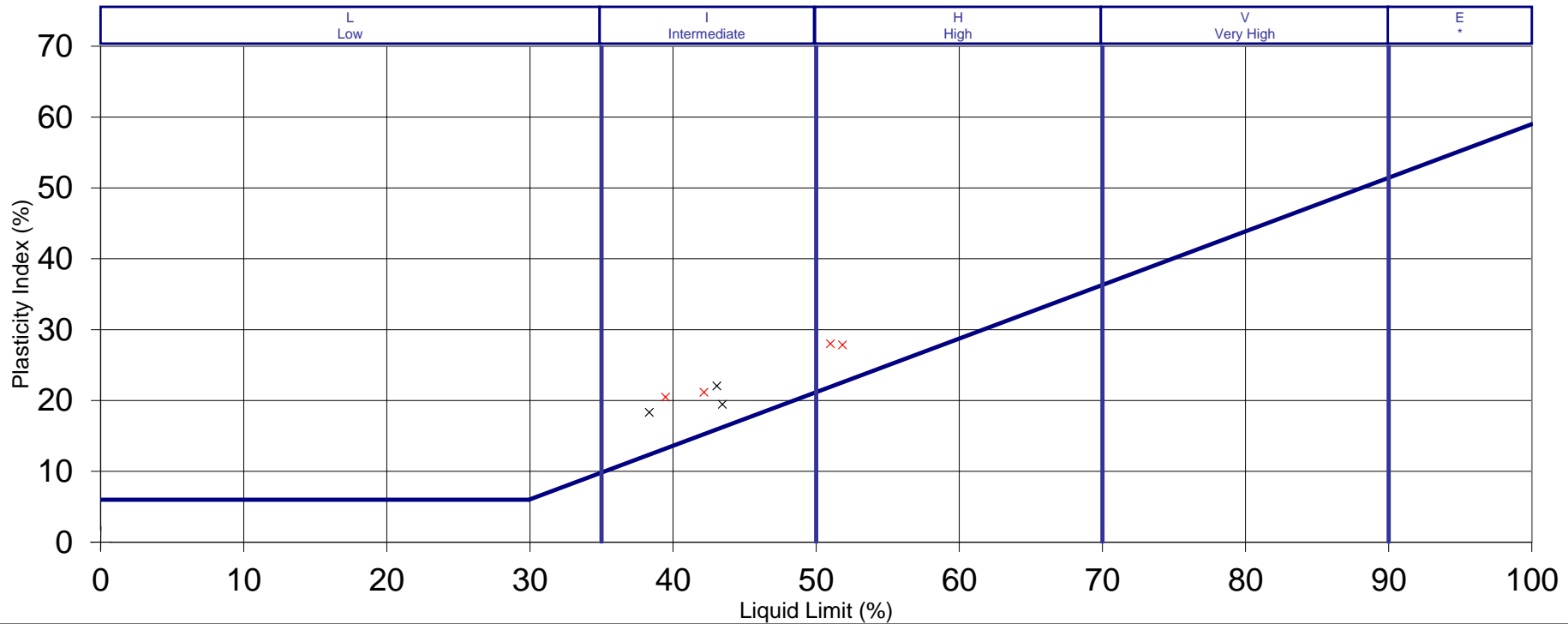
Laboratory Testing Results

Plasticity Chart for the classification of fine soils and the finer part of coarse soils
In Compliance with BS5930 : 1999



Job Number : 11053
Client : Ecclesiastical Insurance Group C/o GHG
Client Reference : CSI11053
Site Name : Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY

Date Received : 30/10/2019
Date Testing Started : 03/11/2019
Date Testing Completed : 18/11/2019
Laboratory : Chelmer Geotechnical Laboratories, CM3 8AB



Notes :-

SILT (M-SOIL), M, plots below A-Line
CLAY, C, plots above A-Line)M and C may be combined as FINE SOIL, F.

Key :- TPBH1
TPBH2

Comments :-

Checked & Authorised By:-  Martin Edwards- Chelmer Global Company Director

Date: 03/12/2019



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This report shall not be reproduced, except in full, without the written approval of Chelmer Global Ltd.

Where our involvement consists exclusively of testing samples, the results and comments (if provided) relate only to the samples tested.

Any samples that are deemed to be subject to deviation will be recorded as such within the test summary.



Project

Project Name: HolyTrinity Church, Church Road, HP4 2QY
Project Description: WinCan Import in Miraculix WRc4 Standard
Project Date: 27/10/2019





Table of Contents

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019

Project Information	P-1
Project Pictures	P-5
Section: 1; RWP 1 > DOWNSTREAM (RWP 1X)	1
Disclaimer	9

**Project Information**

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019

Client

Company: CHELMER GLOBAL

Site

Company: GHG
Street: Holy Trinity Church
Town or City: Church Road, Potton End
County: Herts
Post Code: HP4 2QY

Contractor

Company: Chelmer Global Ltd
Contact: Matthew Proctor
Street: Unit 15, East Hanningfield Industrial Estate
Town or City: East Hanningfield
County: Essex
Post Code: CM3 8AB
Email: info@chelmerglobal.co.uk

Project Information

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019

Project Notes

Your Ref: Holy Trinity Church, Church Road, Potten End, HP4 2QY.

Date: 23/10/19

RE: Holy Trinity Church, Church Road, Potten End, HP4 2QY.

1. DESCRIPTION OF PROPERTY

The above property is a church.

2. DRAINAGE SYSTEM SURVEY

The cctv survey was carried out on all accessible drainage as instructed by client.

3. SHARED

The drains were for the sole use of the building.

4. CIRCUMSTANCES

The cctv survey was required to establish the condition of the drainage system.

5. CAUSE AND EXTENT OF DAMAGE

- 1) RWDP1-Downstream: This drain is constructed from 110mm Poly Vinyl Chloride Pipe which changes material to 100mm Vitrified Clay Pipe at 1.67m. The Vitrified clay section has many defects including circumferential cracks, root infiltration, joint displacements and a hole in the drain. These defects would all ensure that the drain would leak under pressure. We would advise that the drain is prepared and relined to ensure that the drain does not deteriorate further and is left in a watertight condition.

Due to the nature of working underground it is not possible to state conclusively that

Project Information

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019

there will be no further damage discovered once the repair works commence. If this occurs, we will make all efforts to mitigate the costs and seek the authority through the proper channels before carrying out any additional repairs.

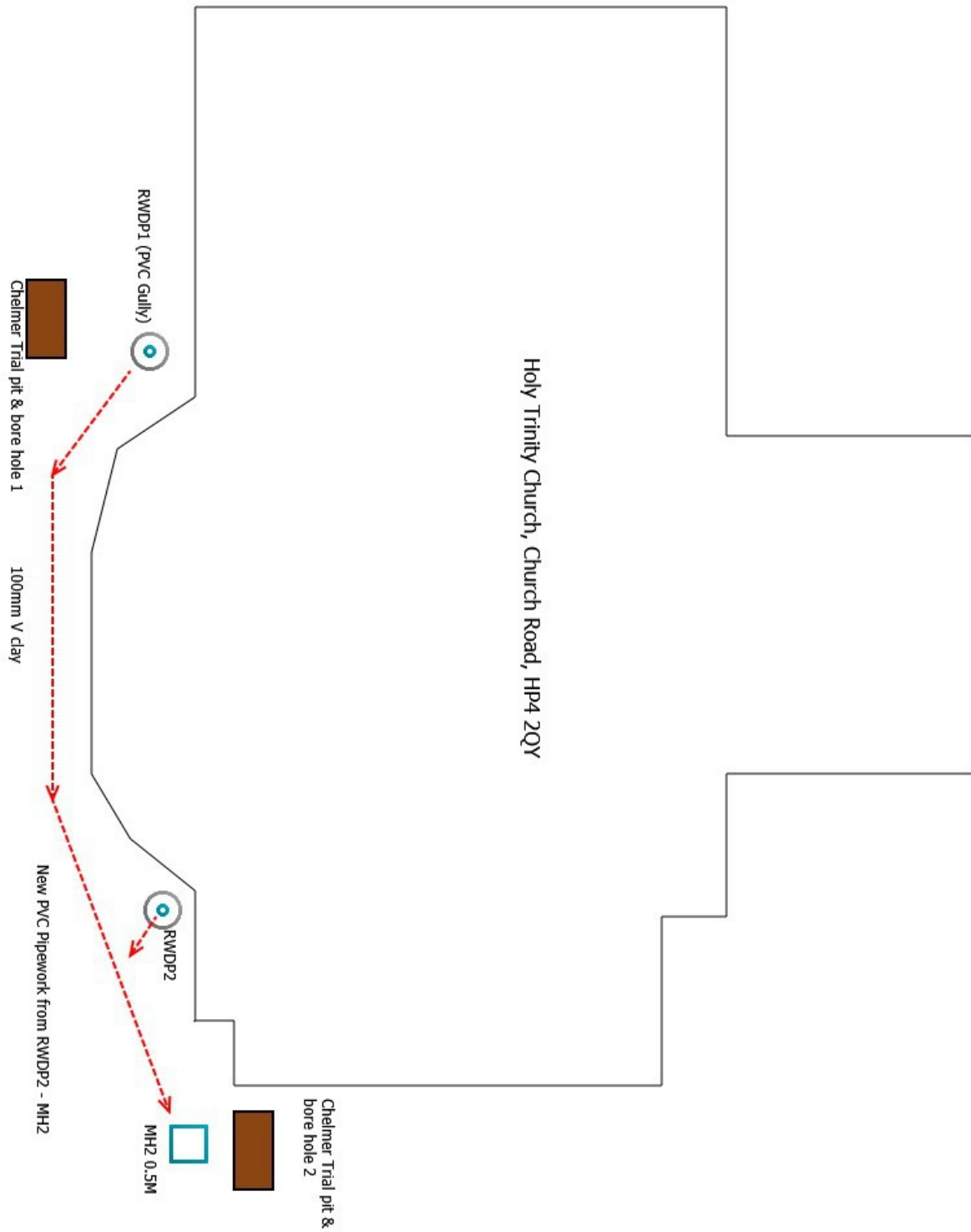
Polyester drain lining is guaranteed for 10 years. Silicate Patch lining is guaranteed for 15 years. You will receive a written guarantee and video footage of any repairs carried out for your records.

If you would like to continue with the repairs, please ensure access to water and electricity are provided on site to complete the repair.

Project Information

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019

Project Drawing



Project Pictures

Project Name	Project Number	Project Date
HolyTrinity Church, Church Road, HP4 2QY		27/10/2019



2019-10-25 20.22.03



2019-10-25 20.22.54



2019-10-25 20.24.06



2019-10-25 20.25.04



2019-10-25 20.25.51



2019-10-25 20.27.23

Section Inspection - 23/10/2019 - RWP 1X

Section 1	Inspection 1	Date 23/10/19	Time 8:55	Client's Job Ref 01	Weather No Rain Or Snow	Pre Cleaned Yes	PLR RWP 1X
Operator AARON		Vehicle Not Specified		Camera Not Specified	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Potten End	Inspection Direction:	Downstream	Upstream Node:	RWP 1
Road:	Holy Trinity Church Church Road	Inspected Length:	10.60 m	Upstream Pipe Depth:	0.000 m
Location:	Other (state in comments)	Total Length:	10.60 m	Downstream Node:	DOWNSTREAM
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.000 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:		Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

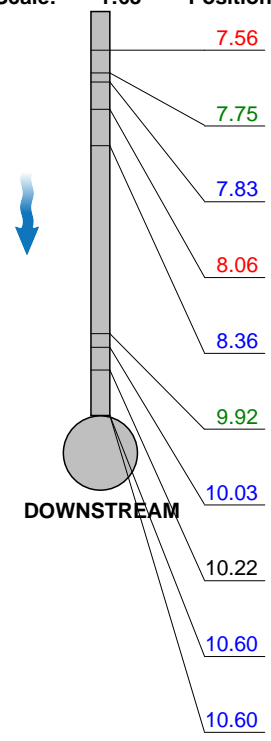
Comments: CCTV DOWNSTREAM EXSISTING CLAY PIPEWORK TO NEW PVC PIPEWORK



Scale:	1:63	Position [m]	Code	Observation	MPEG	Photo	Grade																																																																																																									
<div style="display: flex; align-items: flex-start;"> <div style="width: 20%; text-align: right; padding-right: 10px;"> <p>Depth: 0.00 m</p> <p>RWP 1</p> </div> <table border="1" style="width: 80%; border-collapse: collapse;"> <tr> <td style="text-align: right;">0.00</td> <td style="text-align: center;">GY</td> <td>Start node type, gully, reference number: 1</td> <td style="text-align: right;">00:00:03</td> <td style="text-align: right;">20191023-085610-sn-ap0000.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">0.00</td> <td style="text-align: center;">WL</td> <td>Water level, 0% % of the vertical dimension</td> <td style="text-align: right;">00:00:04</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">0.53</td> <td style="text-align: center;">LL</td> <td>Line deviates left: 30</td> <td style="text-align: right;">00:00:38</td> <td style="text-align: right;">20191023-085610-sn-ap0001.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">1.22</td> <td style="text-align: center;">JDM</td> <td>Joint displaced, medium</td> <td style="text-align: right;">00:00:53</td> <td style="text-align: right;">20191023-085610-sn-ap0002.jpg</td> <td style="text-align: center;">1</td> <td></td> </tr> <tr> <td style="text-align: right;">1.67</td> <td style="text-align: center;">MCVC</td> <td>Material changes to vitrified clay: CHANGE V.CLAY</td> <td style="text-align: right;">00:01:05</td> <td style="text-align: right;">20191023-085610-sn-ap0003.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">1.75</td> <td style="text-align: center;">WL</td> <td>Water level, 10% % of the vertical dimension</td> <td style="text-align: right;">00:01:14</td> <td style="text-align: right;">20191023-085610-sn-ap0004.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">1.82</td> <td style="text-align: center;">RFJ</td> <td>Roots, fine at joint</td> <td style="text-align: right;">00:01:21</td> <td style="text-align: right;">20191023-085610-sn-ap0005.jpg</td> <td style="text-align: center;">2</td> <td></td> </tr> <tr> <td style="text-align: right;">2.47</td> <td style="text-align: center;">LL</td> <td>Line deviates left: 30</td> <td style="text-align: right;">00:01:39</td> <td style="text-align: right;">20191023-085610-sn-ap0006.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">3.38</td> <td style="text-align: center;">CC</td> <td>Crack, circumferential, from 12 to 12 o'clock</td> <td style="text-align: right;">00:02:04</td> <td style="text-align: right;">20191023-085610-sn-ap0007.jpg</td> <td style="text-align: center;">2</td> <td></td> </tr> <tr> <td style="text-align: right;">3.38</td> <td style="text-align: center;">RF</td> <td>Roots, fine</td> <td style="text-align: right;">00:02:21</td> <td style="text-align: right;">20191023-085610-sn-ap0008.jpg</td> <td style="text-align: center;">2</td> <td></td> </tr> <tr> <td style="text-align: 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right;">20191023-085610-sn-ap0012.jpg</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">6.92</td> <td style="text-align: center;">CC</td> <td>Crack, circumferential, from 07 to 05 o'clock</td> <td style="text-align: right;">00:03:55</td> <td style="text-align: right;">20191023-085610-sn-ap0013.jpg</td> <td style="text-align: center;">2</td> <td></td> </tr> </table> </div>								0.00	GY	Start node type, gully, reference number: 1	00:00:03	20191023-085610-sn-ap0000.jpg			0.00	WL	Water level, 0% % of the vertical dimension	00:00:04				0.53	LL	Line deviates left: 30	00:00:38	20191023-085610-sn-ap0001.jpg			1.22	JDM	Joint displaced, medium	00:00:53	20191023-085610-sn-ap0002.jpg	1		1.67	MCVC	Material changes to vitrified clay: CHANGE V.CLAY	00:01:05	20191023-085610-sn-ap0003.jpg			1.75	WL	Water level, 10% % of the vertical dimension	00:01:14	20191023-085610-sn-ap0004.jpg			1.82	RFJ	Roots, fine at joint	00:01:21	20191023-085610-sn-ap0005.jpg	2		2.47	LL	Line deviates left: 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1.82	RFJ	Roots, fine at joint	00:01:21	20191023-085610-sn-ap0005.jpg	2																																																																																																											
2.47	LL	Line deviates left: 30	00:01:39	20191023-085610-sn-ap0006.jpg																																																																																																												
3.38	CC	Crack, circumferential, from 12 to 12 o'clock	00:02:04	20191023-085610-sn-ap0007.jpg	2																																																																																																											
3.38	RF	Roots, fine	00:02:21	20191023-085610-sn-ap0008.jpg	2																																																																																																											
4.22	LL	Line deviates left: 30	00:02:37	20191023-085610-sn-ap0009.jpg																																																																																																												
4.94	RTJ	Roots, tap at joint	00:03:00	20191023-085610-sn-ap0010.jpg	4																																																																																																											
5.55	RFJ	Roots, fine at joint	00:03:25	20191023-085610-sn-ap0011.jpg	2																																																																																																											
6.35	LL	Line deviates left: 30	00:03:39	20191023-085610-sn-ap0012.jpg																																																																																																												
6.92	CC	Crack, circumferential, from 07 to 05 o'clock	00:03:55	20191023-085610-sn-ap0013.jpg	2																																																																																																											

Section Inspection - 23/10/2019 - RWP 1X

Section 1	Inspection 1	Date 23/10/19	Time 8:55	Client's Job Ref 01	Weather No Rain Or Snow	Pre Cleaned Yes	PLR RWP 1X
Operator AARON		Vehicle Not Specified		Camera Not Specified	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Scale:	1:63	Position [m]	Code	Observation	MPEG	Photo	Grade
 <p style="text-align: center;">DOWNSTREAM</p> <p>Depth: 0.00 m</p>		7.56	H	Hole in drain or sewer, at 12 o'clock	00:04:29	20191023-085610-sn-ap0014.jpg	4
		7.75	DES	Settled deposits, fine, 10% % cross-sectional area loss	00:04:50	20191023-085610-sn-ap0015.jpg	3
		7.83	MCPVC	Material changes to polyvinyl chloride	00:05:17	20191023-085610-sn-ap0016.jpg	
		8.06	JDM	Joint displaced, medium	00:05:35	20191023-085610-sn-ap0017.jpg	1
		8.36	MCVC	Material changes to vitrified clay	00:05:58	20191023-085610-sn-ap0018.jpg	
		9.92	LR	Line deviates right: 15	00:06:30	20191023-085610-sn-ap0019.jpg	
		10.03	MCPVC	Material changes to polyvinyl chloride	00:07:17	20191023-085610-sn-ap0021.jpg	
		10.22	WL	Water level, 15% % of the vertical dimension	00:06:42	20191023-085610-sn-ap0020.jpg	
		10.60	CN	Connection other than junction, at 06 o'clock, diameter: 100 mm: RWP 2	00:07:31	20191023-085610-sn-ap0022.jpg	
		10.60	OCF	Finish node type, other special chamber, reference number: DOWNSTREAM: NEW PVC	00:07:49	20191023-085610-sn-ap0023.jpg	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
5	80.0	9.6	102.0	4.0	5	5.0	0.9	10.0	4.0

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



20191023-085610-snap0000.jpg, 00:00:03, 0.00 m
Start node type, gully, reference number: 1



20191023-085610-snap0001.jpg, 00:00:38, 0.53 m
Line deviates left, 30



20191023-085610-snap0002.jpg, 00:00:53, 1.22 m
Joint displaced, medium



20191023-085610-snap0003.jpg, 00:01:05, 1.67 m
Material changes to vitrified clay, CHANGE V.CLAY

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



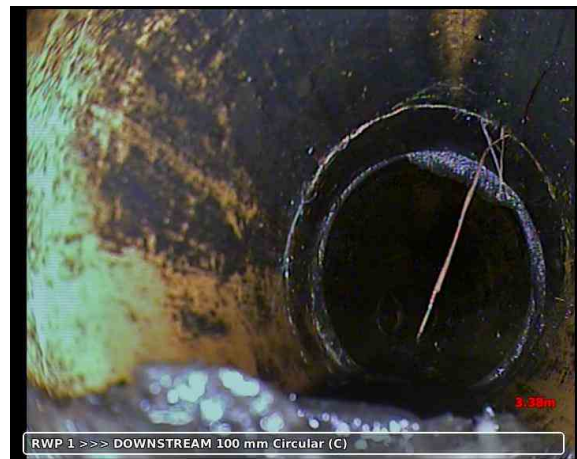
20191023-085610-snap0004.jpg, 00:01:14, 1.75 m
Water level, 10% % of the vertical dimension



20191023-085610-snap0005.jpg, 00:01:21, 1.82 m
Roots, fine at joint



20191023-085610-snap0006.jpg, 00:01:39, 2.47 m
Line deviates left, 30



20191023-085610-snap0007.jpg, 00:02:04, 3.38 m
Crack, circumferential, from 12 to 12 o'clock

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



20191023-085610-snap0008.jpg, 00:02:21, 3.38 m
Roots, fine



20191023-085610-snap0009.jpg, 00:02:37, 4.22 m
Line deviates left, 30



20191023-085610-snap0010.jpg, 00:03:00, 4.94 m
Roots, tap at joint



20191023-085610-snap0011.jpg, 00:03:25, 5.55 m
Roots, fine at joint

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



20191023-085610-snap0012.jpg, 00:03:39, 6.35 m
Line deviates left, 30



20191023-085610-snap0013.jpg, 00:03:55, 6.92 m
Crack, circumferential, from 07 to 05 o'clock



20191023-085610-snap0014.jpg, 00:04:29, 7.56 m
Hole in drain or sewer, at 12 o'clock



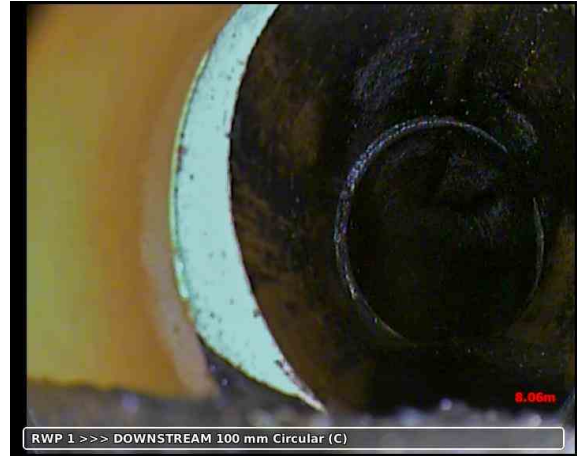
20191023-085610-snap0015.jpg, 00:04:50, 7.75 m
Settled deposits, fine, 10% % cross-sectional area loss

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



20191023-085610-snap0016.jpg, 00:05:17, 7.83 m
Material changes to polyvinyl chloride



20191023-085610-snap0017.jpg, 00:05:35, 8.06 m
Joint displaced, medium



20191023-085610-snap0018.jpg, 00:05:58, 8.36 m
Material changes to vitrified clay



20191023-085610-snap0019.jpg, 00:06:30, 9.92 m
Line deviates right, 15

Section Pictures - 23/10/2019 - RWP 1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	RWP 1X	01	



20191023-085610-snap0021.jpg, 00:07:17, 10.03 m
Material changes to polyvinyl chloride



20191023-085610-snap0020.jpg, 00:06:42, 10.22 m
Water level, 15% % of the vertical dimension



20191023-085610-snap0022.jpg, 00:07:31, 10.60 m
Connection other than junction, at 06 o'clock, diameter: 100 mm, RWP 2



20191023-085610-snap0023.jpg, 00:07:49, 10.60 m
Finish node type, other special chamber, reference number: DOWNSTREAM, NEW PVC

Disclaimer

- 1)The cctv survey is based on a visual inspection of the drainage system which is accordingly limited in scope.
- 2)The cctv survey will report on defects that will affect the drainage system providing that they were reasonably detectable at the time of the cctv survey. The report and the results it contains are the view of the engineer appointed to carry out the cctv survey and are considered relevant on the day of the survey.
- 3) All defects noted within the cctv survey will be correct at the time and date of the survey. We cannot offer any guarantees regarding the future condition of the drainage system including existing defects or future defects. Drain and sewer performance can alter over time so we cannot be held responsible for any differences from the recorded condition after the report was generated.
- 4)CCTV subsidence investigations do not account for water tightness of drains and are purely a visual inspection of the drainage system. CCTV camera engineers are not qualified to report on the causes of subsidence and can only suggest remedial actions for the drains not the affected building.
- 5)Subsidence is a structural building failure which can occur for many reasons. Although failures within the drainage system can contribute to subsidence, we would advise that all other possibilities are investigated also. We would advise that drains within 10 metres of areas of subsidence are pressure tested to ensure the drains do not leak and remedial works should be actioned if these are found to lose pressure beyond acceptable levels.
- 6)This survey has been produced in accordance with WRC standards.

DRAINAGE RECOMMENDATIONS/REPAIRS - QUOTATION

Site: Holy Trinity Church Church Road Potten End Berkhamsted HP4 2QY

Client: Ecclesiastical Insurance Group C/o GHG – L/2019/58338/S

Date: 03/12/19

DESCRIPTION OF PROPERTY

The above property is a church.

DRAINAGE SYSTEM SURVEY

The CCTV survey was carried out on all accessible drainage as instructed by client.

SHARED

The drains were for the sole use of the building.

CIRCUMSTANCES

The CCTV survey was required to establish the condition of the drainage system.

CAUSE AND EXTENT OF DAMAGE

1) RWDP1-Downstream: This drain is constructed from 110mm Poly Vinyl Chloride Pipe which changes material to 100mm Vitrified Clay Pipe at 1.67m. The Vitrified clay section has many defects including circumferential cracks, root infiltration, joint displacements and a hole in the drain. These defects would all ensure that the drain would leak under pressure. We would advise that the drain is prepared and relined to ensure that the drain does not deteriorate further and is left in a watertight condition.

Item cost: £1,095.00

All prices are exclusive of VAT

Due to the nature of working underground it is not possible to state conclusively that there will be no further damage discovered once the repair works commence. If this occurs, we will make all efforts to mitigate the costs and seek the authority through the proper channels before carrying out any additional repairs.

Polyester drain lining is guaranteed for 10 years. Silicate Patch lining is guaranteed for 15 years. You will receive a written guarantee and video footage of any repairs carried out for your records.

If you would like to continue with the repairs, please ensure access to water and electricity are provided on site to complete the repair.



REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (kN/m) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

SUBSIDENCE ENGINEER'S REPORT

Client Name	Ecclesiastical Insurance Group
Reference	378768
Name of Insured	Vicar/CHNS/PCC Potten End, Holy Trinity
Policy Number	04/XPG/0259708
Risk Address	Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



GHG Reference	L/2019/58338/S/JNA
Date of Report	08 November 2019

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1. Introduction

We have been asked by Interested Underwriters per Ecclesiastical Insurance Group to inspect the subject property, Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY which is the property of Vicar/CHNS/PCC Potten End, Holy Trinity, and comment upon cracking in the front chancel of the property.

Our site visit took place on 23 October 2019 and weather conditions were dry and cool.

This Report has been prepared on the instruction of Interested Underwriters per Ecclesiastical Insurance Group for their sole use in connection with a notification of a Claim under their Insurance Policy. Our comments are based on limited observations of the nature and suspected cause of the damage notified but we have not widened our brief to consider other structural matters.

Our Report does not consider questions of timber or damp, service installations or the general condition of the property. We have not inspected woodwork or other parts of the structure, which are covered, unexposed or inaccessible. We are therefore unable to report that any such part of the property is free from defect.

Comments on the causation of damage are based only on the limited investigations, which have been carried out at this stage and would be subject to review in the light of further information being made available at a later date.

This Report should not be used in the same way as a Pre-Purchase Report. It is limited to the damage, which forms the subject of a Claim made by the Policyholder against Interested Underwriters per Ecclesiastical Insurance Group.

2. The Property

Please note that all left-hand and right-hand directions within this Report are as though you are facing the front elevation of the property from the road.

A photograph of the front elevation of the property is shown on the cover of this Report.

The risk address on this occasion is a detached church building which appears to have been built in 1868.

The external walls are solid brick under a pitched, tile covered roof.

The windows are of leaded light single glazed construction and the property is well maintained.

The property has been extended with a large porch to the rear left and a vestry to the front right. The ages of these extensions are not known.

3. The Site

The property stands on the outskirts of Potten End near Berkhamsted.

The immediate site is flat and the area comes under the control of Dacorum Borough Council.

We are not aware of any unusual features of the immediate site.

3.1 Vegetation

On this occasion we do not believe that vegetation is contributing to the damage which is the subject of this claim.

However, we are aware of the presence of a clay subsoil. As such any vegetation around the property should be maintained at a size which will reduce the likelihood of it causing damage to the property by moisture extraction.

3.2 Geology

From our investigations on site we have confirmed that the subsoil in the area is clay overlying flint gravel.

Soils with a clay content will generally have a propensity to shrink and swell with changes in moisture content. That is to say that as the clay is dried its volume will reduce and this can allow downward movement, or subsidence, of the foundations of properties.

The amount of shrinkage and swelling which takes place can vary quite dramatically between different types of soil and can only be quantified by soil testing techniques.

4. History

The property was constructed in 1858 for the parish and it has been owned by them since then.

Damage was first noted by the Policyholder in August 2019.

On this occasion we have not been able to inspect the 2015 quinquennial survey report as your Policyholders were unable to locate this prior to our visit. We have requested a copy as soon as possible.

5. Damage

5.1 Description of Damage

The damage to this property which forms the subject of this claim relates to the chancel area at the front of the building.

We would suggest that the extent of damage falls within Category 2 (slight) according to BRE Digest 251 Assessment of Damage to Low Rise Buildings (August 1990).

<u>Category</u>	<u>Definition</u>	<u>Crack Width</u>
0	Negligible	Less than 0.1mm
1	Very slight	Up to 1mm
2	Slight	Up to 5mm
3	Moderate	5mm to 15mm
4	Severe	15mm to 25mm
5	Very Severe	Greater than 25mm

Externally



This photograph shows cracking in the sill to the right hand chancel window.

Front Elevation

The front elevation of the building is of facing brickwork with a projecting curved chancel in the centre of the original building. The elevation contains several windows.

On this elevation we noted a crack running vertically up from the head of the central window vertically through the brick arch and then through mortar joints above. The crack was a maximum of 1.5mm in width.

There is a substantial crack in the front end of the sill to the left hand chancel window being approximately 3mm in width, which does not appear to be subsidence related. It is also of some considerable age.

Right Hand Flank Elevation

The right hand flank elevation of the building is of facing brickwork attached to which is the vestry extension and boiler house.

On this elevation we noted no evidence of subsidence damage.

Left Hand Flank Elevation

The left hand flank elevation of the building is of facing brickwork incorporating several windows and the front entrance porch and doors.

On this elevation we noted no evidence of subsidence damage.

Rear Elevation

The rear elevation of the building is of facing brickwork incorporating several windows.

On this elevation we noted no evidence of subsidence damage.

Internally



This photograph shows cracking below the bottom left hand side of the right hand chancel window.

Ground Floor Level

In the entrance porch, which is situated to the rear left of the property, we noted that the wall finish was of facing brickwork and the ceiling finish was of exposed timber rafters and boarding.

In this area we noted no signs of damage which would be consistent with current subsidence movement.

In the main body of the church, we noted that the wall finish was of painted timber boarding to dado rail level and emulsion painted plaster above. The ceiling finish was of exposed timber roof structure and timber roof boarding.

In this area we noted cracking within the curved chancel. There were three vertical cracks running up from the head of the central window, one of which extended into the reveal of the opening. These cracks were hairline to 0.5mm in width. There was also a vertical crack running down from each bottom left corner of this window again with a maximum width of 1.5mm.

There was a single hairline crack running from ceiling down to windowsill level between the centre and left hand window and a single hairline crack running above the head of the left hand window.

There were also hairline cracks running down from both bottom corners of the left hand window opening.

There were two significant cracks running up vertically from the head of the right hand window to ceiling level being a maximum of 2mm and 3mm in width respectively.

There was also a vertical hairline crack running down for approximately 1m in line with the left hand side of that window opening and a further hairline crack running down to about head height between this window and the central window.

There were two vertical cracks running down from the bottom left hand side of the right hand window, one being hairline and the other 1.5mm in width.

There was also a hairline crack running vertically down from the centre of the window opening and also below the right hand side of the same window.

In the vestry, which is situated to the right hand side of the property we noted that the wall finish was of emulsion on plaster and the ceiling finish was of emulsion on plaster.

In this room we noted no signs of damage which would be consistent with current subsidence movement.

In the lobby and WC, which was situated to the rear of the right hand side extension, we noted that the wall finish was of emulsion on plaster and the ceiling finish was of emulsion on plaster.

In this room we noted no signs of damage which would be consistent with current subsidence movement.

6. Investigations

Two trial pits and borehole were excavated at the property which revealed the depth of foundation and subsoil beneath.

A CCTV survey of the drains was also undertaken where accessible.

6.1 Drains

A CCTV survey of the drainage was undertaken from the rainwater gully to the front left of the projecting chancel and revealed that the drains were of clay with numerous minor defects and some root ingress.

6.2 Trial Holes

Trial hole number one was excavated at the front left hand side of the projecting chancel area and revealed that the foundations in this location were conventional concrete strip with an overall founding depth of approximately 650mm below ground level. The soil immediately beneath the foundations was seen to be a brown sandy clay which was moist at the time of our inspection.

Roots of up to 2mm were located in the soil beneath the foundations in trial hole 01.

Trial hole number two was excavated at the front corner of the north transept and revealed that the foundations in this location were conventional concrete strip with an overall founding depth of approximately 650mm below ground level. The soil immediately beneath the foundations was seen to be a brown sandy clay which was moist at the time of our inspection.

Roots of up to 1mm were located in the soil beneath the foundations in trial hole 02.

6.3 Boreholes

Borehole 01 was sunk through the base of trial hole 01 and to an overall depth of 1500mm below ground level.

The soil located in the borehole was a medium firm brown sandy clay which appeared to show no particular signs of wetting or drying at the time of our testing.

The borehole was stopped at 1500mm below ground level due to increasing gravel/flint content which prevented augering to a greater depth.

A total of three soil samples have been retrieved from this borehole and sent to the laboratory for analysis.

A number of root samples were located in the soil samples taken from this borehole and have been sent to the laboratory for analysis.

6.4 Soil Testing

A total of seven samples of the sub soil have been taken and sent to the laboratory for analysis. This comprises three from borehole 01 and four from borehole 02. On receipt of this data we will advise further.

The purpose of the testing on this occasion is to try to determine some of the physical characteristics of the soil which will include, amongst other tests, the clay content and plasticity index of the soil, and if appropriate the extent of any desiccation. This test gives an indication of the likely degree by which the soil will shrink and swell with changes in moisture content, and the extent of any deficiencies.

6.5 Roots Analysis

Sample of the root which were found below ground level in trial pit/borehole 01 and 02 were retrieved and submitted to a specialist laboratory in order to determine what species of tree they originate from.

6.6 Ground Water

None observed.

7. Discussion

The damage on this occasion affects the curved projecting chancel area at the front of the property and comprises of a number of predominantly vertical cracks internally. There was a cracked windowsill and one crack above the window externally and the pattern of cracking did not suggest subsidence or indeed any cause. Nevertheless, we believe that minor subsidence is a possibility.

A storm water drain runs around the perimeter of the curved section of the property a short distance from it and defects were found in the drain which could give rise to an escape of water albeit not a substantial escape of water.

The ground conditions were somewhat less dry than we had anticipated although some significant rain had fallen in the days preceding our visit and the clay being sandy and gravelly, would be rather more porous than dense clay. There was certainly no excess moisture.

Two of the internal cracks have opened up which suggests some movement of the external wall, but the rest are all hairline, some quite close together and suggest they result from the method of construction which without disruptive investigation could not be established. These hairline cracks do not appear to be of any structural significance albeit that one has opened up both above and below the window.

The cause of the cracking is not immediately apparent although subsidence cannot be ruled out neither can subsidence as a result of softening of the subsoil due to water escaping from the adjacent drain.

We must remember that we have experienced particularly dry periods over the last 18 months and recent rainfall could have had a softening effect on the clay subsoil which would inevitably have been desiccated by the climatic conditions and the roots from the nearby conifer and yew trees. Their water demand will not have been high but combined with the dry weather, could have given rise to some substantial shrinkage.

On balance, we think it is unlikely that the damage is the result of subsidence however, we believe awaiting the laboratory test results of the soil samples taken will enable us to be more categorical in this respect and to offer a more positive analysis of the cause of the damage.

8. Recommendations

On this occasion, we recommend awaiting the laboratory test results of the soil samples taken to enable us to more positively determine the cause of the damage and how best to proceed.

John Andrews

For THE GRAHAM HIGH GROUP LIMITED

Email to: GHGresponse@highgroup.co.uk

Encs: Site Sketch
 Trial Pit Sketches
 Photograph Pages

Copy to: Vicar/CHNS/PCC Potten End, Holy Trinity

OUR REF: L/2019/58338/S/JNA/sp/BC

REF: 378768

POLICYHOLDER: Vicar/CHNS/PCC Potten End, Holy Trinity

ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 01:

This photograph shows the front elevation of the church.



PHOTOGRAPH 02:

This photograph attempts to show the right hand flank elevation of the church.



PHOTOGRAPH 03:

This photograph attempts to show the left hand flank elevation of the church.

Barclays House, 20-24 Upper Market Street, Eastleigh, Hampshire, SO50 9FD

The Graham High Group Limited, Registered In England, Company Registration No: 3007129
Registered office, c/o Wilkins Kennedy LLP, Lulworth Close, Chandlers Ford, Hants SO53 3TL

OUR REF: L/2019/58338/S/JNA/sp/BC

REF: 378768

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ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 04:

This photograph shows the rear elevation of the church.



PHOTOGRAPH 05:

This photograph shows cracking above the central chancel window.



PHOTOGRAPH 06:

This photograph shows cracking in the sill to the right hand chancel window.

OUR REF: L/2019/58338/S/JNA/sp/BC

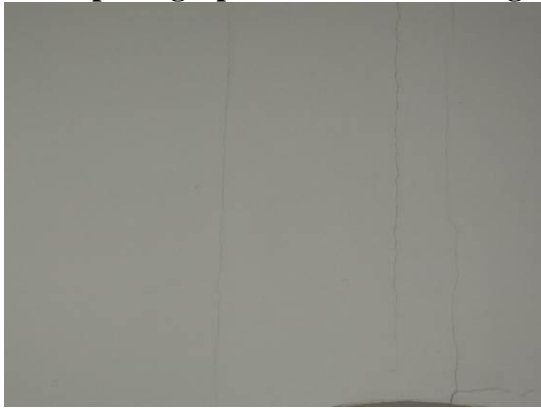
REF: 378768

POLICYHOLDER: Vicar/CHNS/PCC Potten End, Holy Trinity

ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 07:

This photograph shows the cracking above the central chancel window.



PHOTOGRAPH 08:

This photograph shows a continuation of one of the cracks in the previous photograph into the reveal of the central chancel window.



PHOTOGRAPH 09:

This photograph shows the cracking above the left hand chancel window and its continuation into the reveal.

OUR REF: L/2019/58338/S/JNA/sp/BC

REF: 378768

POLICYHOLDER: Vicar/CHNS/PCC Potten End, Holy Trinity

ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 10:

This photograph shows cracks above the right hand chancel window and its continuation into the reveal.



PHOTOGRAPH 11:

This photograph shows cracking below the bottom left hand side of the right hand chancel window.



PHOTOGRAPH 12:

This photograph shows cracking running down from the bottom right hand corner of the central chancel window.

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POLICYHOLDER: Vicar/CHNS/PCC Potten End, Holy Trinity

ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 13:

This photograph shows the location of trial hole 01 to the front left hand side of the curved chancel at the front of the building.



PHOTOGRAPH 14:

This photograph is a close up looking down trial hole 01.



PHOTOGRAPH 15:

This photograph shows the location of trial hole 02 at the front right corner of the north transept.

OUR REF: L/2019/58338/S/JNA/sp/BC

REF: 378768

POLICYHOLDER: Vicar/CHNS/PCC Potten End, Holy Trinity

ADDRESS: Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire,
HP4 2QY



These photographs were taken during the site visit on 23 October 2019



PHOTOGRAPH 16:

This photograph is a close up looking down trial hole 02.

ANALYSIS OF SITE INVESTIGATION DATA

Client Name	Ecclesiastical Insurance Group
Reference	378768
Name of Insured	Vicar/CHNS/PCC Potten End, Holy Trinity
Policy Number	04/XPG/0259708
Risk Address	Holy Trinity Church, Church Road, Potten End, Berkhamsted, Hertfordshire, HP4 2QY



GHG Reference	L/2019/58338/S/JNA
Date of Report	05 March 2020

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1. Introduction

As reported previously we have been asked to investigate damage at the above property and our recent Report recorded our initial findings and views in connection with this matter. This Supplementary Report is issued following the receipt of further investigation data.

50mm diameter disturbed soil samples were retrieved from the boreholes that was sunk to the front of this property on 23rd October 2019.

The samples were deposited with a testing laboratory with instructions to determine the index properties of the soils

The purpose of these tests is to establish whether the soils exhibit any signs of root or drought induced desiccation, and if so, whether the potential exists for significant progressive movement.

2. Soil Properties

The retrieved soil samples have been tested by an independent testing laboratory and this has revealed that they have what are known as intermediate plasticity index properties.¹

As an example, in the sample taken from Borehole number 01 at 1m below ground level the liquid limit is shown to be 43%, the plastic limit is 21% and the plasticity index (which is the difference between the two) is 22%.

Intermediate plasticity clays generally show they have moderate shrinkage potential in relation to the moisture content. That is, they shrink when moisture content is reduced and swell when the moisture content is increased but to a relatively low level.

¹Table 1, Chapter 4.2, Para 2.3 of N.H.B.C. Standards, 1986.

3. Moisture Content

Using criteria put forward by Driscoll² it is suggested that clay soils are desiccated if the moisture content is less than 40% of the liquid limit. In addition, he suggested for certain clays only that a further indicator of desiccation exists if the moisture content is less than 2% above the plastic limit.

The latter method is rarely used, however, as it applies to certain clays only and also the method of determining the plastic limit is less reliable than the method of determining the liquid limit.

In this case the lowest moisture content in Borehole 01 is seen to be 15% in the sample taken from a depth of 650mm below ground level.

This is clearly less than 40% of the liquid limit (43% x 40%) being 17.2% which does suggest that the soil in this area is desiccated

In this case the lowest moisture content in Borehole 02 is seen to be 20% in the sample taken from a depth of 1.50m below ground level.

This is clearly not less than 40% of the liquid limit (42% x 40%) being 16.8% which suggests that the soil in this area is not desiccated

² Driscoll (1983) "The Influence of Vegetation on the Swelling & Shrinking of Clay Soils in Britain". Geotechnique. Vol. 33.

4. Root Identification

Although roots were found below foundation level to a depth of 1.5m in borehole 01 and a similar depth in borehole 02, our site investigation contractor failed to test these although it is clear that the roots could only originate from trees within the churchyard. These were predominantly yews but there was one unidentified conifer which was the largest tree and closest to the affected part of the property and it is likely that this tree has had some influence on the subsoil.

5. CCTV Drainage Survey/Mains Water Supply

A CCYV survey of the drain which runs from right to left around the chancel was carried out from the inspection chamber to the front right of the church. This revealed that the first part up to a connection to a rainwater pipe to the right of the chancel was of uPVC and was clearly part of the earlier drain repairs. From then on the drain was in clay ware and contained numerous relatively minor defects but these could have given rise to escape of water at times of heavy rainfall. The drain was infiltrated by roots at most joints.

6. Discussion

The damage on this occasion affects solely the chancel and is relatively minor and although not typical of subsidence cracking, could be the result of subsidence affecting the front section of the chancel.

The subsoil beneath the foundations was an orange/brown gravelly silty clay. There was no evidence of softening or weakening of the clay by water escaping from the drains.

The nature of the clay, whilst shrinkable, was such that the level of shrinkage would be relatively small and there was some evidence of moisture depletion down to 1m at the front of the chancel but no evidence in trial pit/borehole 02 at the front right hand corner of the church.

We are drawn to the conclusion that the damage on this occasion is the result of minor subsidence caused by shrinkage of the clay subsoil due to the effects of the conifer planted to the front of the church.

Recent drought summers would undoubtedly have played a part.

7. Recommendations

On this occasion, we would suggest that the most appropriate course of action would be for the conifer tree to be removed and for the soil to be allowed to rehydrate. We would suggest that once stability returns, all that will be required will be above ground structural repairs to the cracking.

Whilst there was no evidence to suggest that water escaping from the drain around the front of the chancel has contributed to the cause of the damage, we would recommend that the drain be lined or replaced as the root ingress can only increase and the damage to the drains similarly increase providing a threat of further subsidence from softening and weakening of the subsoil in the future.

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Enc. Chelmer Site Investigation Report