Project: Retaining Wall: Eaton House 179 Great North Road Eaton Socon

Postcode: PE19 8EG

Job Number: 23/1057

Client: Patricia and Barrie Litchfield

[redacted]

Date of Visit: 9/11/2023

Structural Report and Recommendations:

1.0 General Notes:

1. We would note that this Structural Engineers report is concerned solely with the above structure and that our liability in this respect is limited to yourself as our client.
2. Any third parties using this report do so at entirely their own risk.
3. References to left and right are given as viewing the property from the front road elevation.
4. We have not inspected unexposed or concealed parts of the structure at this time, and we are therefore unable to report that any such parts of the wall are free from defect.

2.0 Instructions:

1. Further to instructions from Mrs Litchfield we visited the above site on 9th November 2023 and report our observations and recommendations as follows.
2. Our instructions are to inspect and report on the external boundary (east side to the Great North Road) retaining wall on the front elevation, to assess its stability and make recommendations for any necessary remedial works.
3. Design of any works is not included in our remit at this stage but will be assessed after this report is agreed.

3.0 Site Location:

1. The site is located approximately 1.5 miles to the Southwest of the centre of St Neots.
2. The National Grid reference for the site is TL 16946 59123
3. Subsoils shown on the British Geological Survey (BGS) maps are:
   Superficial deposits: River Terrace Deposits, 2 - Sand and gravel. Sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period. Overlying
   Bedrock geology: Oxford Clay Formation - Mudstone. Sedimentary bedrock formed between 166.1 and 157.3 million years ago during the Jurassic period.

It is noted that the maps show the area of superficial (upper) deposits between the retaining wall and the house to be on a boundary between sand and gravel and Diamicton (boulder clay).

Superficial deposits to the West: Oadby Member - Diamicton. Sedimentary superficial deposit formed between 480 and 423 thousand years ago during the Quaternary period.

4.0 Observations:

1. The retaining wall section inspected at our visit is approximately 35 m in overall length with approximately 18 m. of this running adjacent to the path on the west side of The Great North Road.
2. The wall is constructed of 225 mm thick brick masonry with lime mortar bedding with 325 mm square integrated piers along its length. Piers are located at approximately 3.0 to 3.5 m. centres.
3. Retained earth height varies from 0.20 m at the gate to 0.90 m. maximum between piers referenced 3 and 6.
4. The condition of the brickwork varies with some areas of significant weathering, cracking, repairs and lateral movement noted along its length. The layout and data from initial survey measurements are shown on the attached sheets.
5. A number of mature and semi mature trees are located on the bank behind the wall and a large tree has been cut down to a stump approximately 6 years ago.
6. Two further large trees (horse chestnut and Yew, see attached plan) are located very close to the back of the wall. The yew, which is quite large, is noted to be leaning over the path towards the road.
7. The wall leans outwards over the path significantly in the area between piers 4 and 7 with vertical cracking to the outer face.
8. A number of areas of cement repointing would indicate that repairs have been carried out in the more recent path (perhaps 50 years) in particular the area between piers 7 and 10.
9. A metal gas supply pipe is located on the path, close to the area of maximum lateral movement and entering the wall at around mid height to feed a meter housing on the back of the wall.
10. There are no drainage or weep holes noted along the length of the wall.
11. Lateral movement of the wall is likely to be due to a number of factors: earth, surcharge and water pressure at the rear of the wall, physical pressure from tree roots from trees very close to the wall, and possible Clay shrinkage due to moisture extraction by roots. Further, seasonal thermal expansion and contraction causing stresses at the curved corners to the wall.
12. Later clay heave (a clay which has become desiccated will expand as it reabsorbes water) may have occurred following the removal of the Horse Chestnut between piers 5 and 6 lifting and pushing outwards on the wall.

5.0 Recommendations:

1. Questions have been raised as to the stability of the wall and whilst some areas remain relatively sound the three bays between piers 4 and 7 are significantly over stressed and latterally displaced.
2. Clearly we are unable to assess the risk, or possible time line, of immediate collapse as theoretically the wall should be unstable in its present condition and we could not make an estimate as to a time period within which the wall will remain stable. This may be weather related and the winter period with higher rain fall could add additional presure to the rear of the masonry.
3. As there is, being adjacent to a footpath, a risk to the public and, bearing in mind your liabilities, third party insurances etc. , we would recommend that the area between the 4 piers is fenced off with Heras or similar safety fencing and a temporary sheeting laid on the grass verge to allow continued public right of way. Local authority Highways department would need to be approached to agree any works before proceeding.
4. The wall could be provisionally reduced in height in the affected area and if possible the bricks cleaned and setaside for reuse.
5. The width of clearance between the wall face and the road is approximately 5.0 m. which would allow 2.00 – 2.50 m. clearance from the wall as a safety/ work zone.
6. As discussed on site the location of the gas supply in this area of wall makes this vunerable and we have recommended that the supplier is contacted to meet on site to discuss the present situation and proposed remedial works. It will obviously be imperative that the gas supply should remain operative with the minimum of disruption.
7. With regard to remedial works themselves, as a **very minimum** the vulnerable section of wall, between piers 4 and 7, should be taken down and wall and foundation rebuilt to current standards.
8. We would initially envisage an ' L ' shaped wall and foundation entirely on the Eaton House land and not overlapping the boundary on to the path. *Note however the this may be changed dependant on discussion with other parties.*
9. A finished exposed wall face, to the road and to the rear of the wall, of reclaimed bricks and a lime mortar bedding should satisfy the conservation department.
10. Some further ground investigation will be required to determine ground conditions in the area of the rebuild, but tree roots and the possibility of clays in the area will determine the type of construction. In the worst instance (in terms of costs) mini piles may be required to achieve a sound foundation where roots or desiccated clay, which may be subject to heave, is found.
11. Obviously Conservation, (we understand that the property has grade 2 listing), Highways, all service suppliers (works are close to the path and other services as well as gas may be below the path and close to the line of the wall) and building control will all need to be consulted and give approval for the works before these begin.
12. Other options, although these may be difficult with conservation, may be to take down the wall and regrade the ground behind down to path level thus removing the need to provide a retaining wall. A free-standing wall with piers as existing could be

rebuilt but foundations, although still problematic due to the presence of trees existing and past, would be simpler than a retaining wall.

13. If the wall is only taken down to ground level at the path and rebuilt upright off the existing foundations this may solve the instability problem temporally but continued future stability could not be guaranteed.
14. We would note that the section of wall between piers 8 and 10 exhibits some cracking and severe weathering. This area moderately upright but will require some remedial attention in the near future.
15. You will note that although other areas of the wall are currently relatively sound but there are some signs of historic movement and it cannot be guaranteed that these will remain stable in the future and they may eventually suffer the same fate as the currently damaged areas. We of course understand that costs are a major factor, but you may wish to consider expanding the area of remedial works at this stage to reduce future risks.
16. Trees overhanging the path are another consideration, particularly the yew, and these should be regularly inspected by an arboriculturist to ensure that the risk to the public is minimised.

6.0 General Notes: Additional Information

A. Pollution and Contamination

1. We would note that this report specifically excludes any inspection or advice in respect of pollution or contamination to the site, in either ground, air or water. The Client should satisfy themselves as to the risk of contamination or pollution, past, present or future, and we cannot accept liability for any losses or damages arising out of or in connection with this.
2. Should the Client have any concerns in this respect, a specialist consultant must be engaged to advise in this regard.

B. Tree Planting

1. In areas where clay sub-soils are predominant, special care should be taken in planting or setting new trees and shrubs. Generally, trees should not be planted closer than 1.5 times their mature height from existing or new foundations, and species of high-water demand should not be used. If any doubt exists, the advice of any arboriculturist should be sought before planting begins.

C. Party Wall Act

1. Where new beams are supported on a party wall, legislation requires that you obtain written agreement from your neighbours giving approval for such works to be undertaken.
2. The foundations to this building being close to the boundary will fall within the requirements of the Party Wall Act 1996, and 3 or 6 metre notice will need to be issued and agreed with the adjacent building owners. If you require any further assistance in this respect, you should contact either ourselves or the architect to discuss these requirements.

D. CDM (Construction Design and Management) Regulations

1. Health and Safety legislation introduced in 6 April 2015 require that a Principal Designer is appointed to all works which will exceed 30 man days or involving greater than 4 persons on site, (works for a domestic client being excluded).
2. These proposed works will fall within the scope of this legislation, and you and your contractors will be required to undertake the works to comply with the requirements of the Health and Safety Work Act.

E. British/ European Standards

1. Unless noted otherwise, all materials used in these works should comply with and be undertaken so as to comply with the current relevant Standards.

F. Specialist Materials

1. Specified specialist materials should be used in accordance with the manufacturers recommendations details and instructions.

Yours sincerely

[redacted]

Appendix:

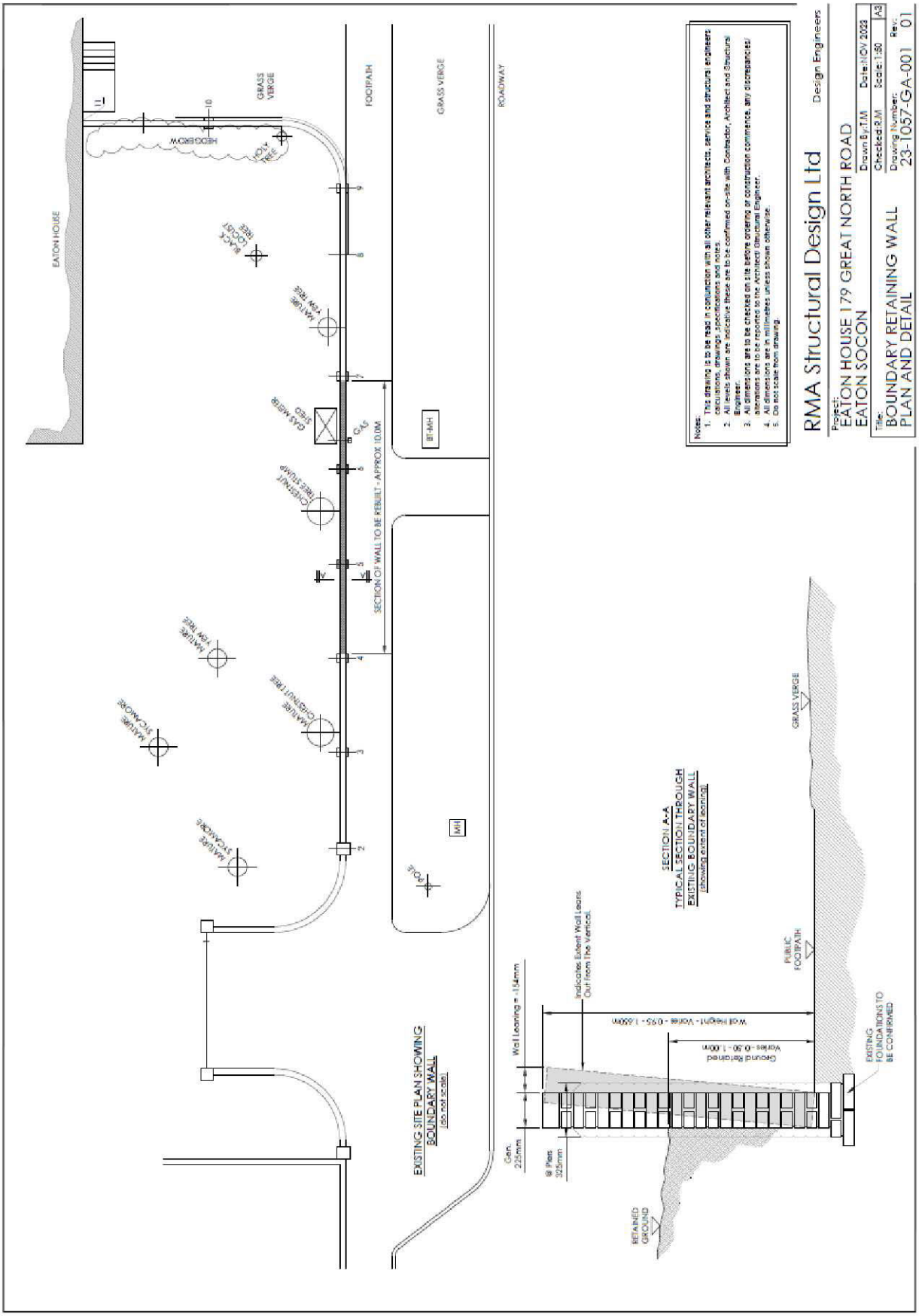


Figure 1: General Wall Layout and Detail

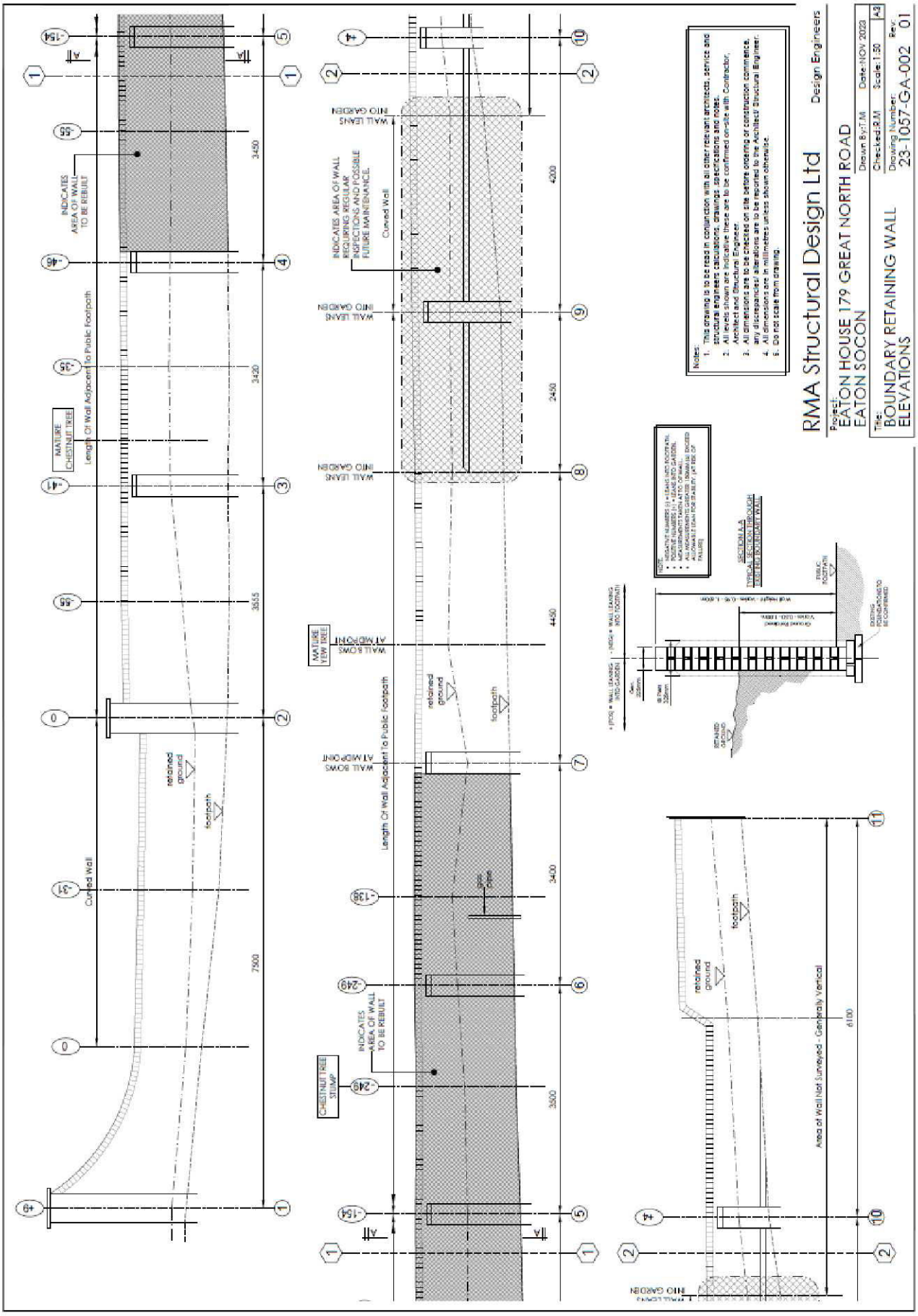


Figure 2: Elevation of Existing Wall

Figure 3: Wall Survey Data

Retaining wall: Eaton House 179 Great north Road Eaton Socon PE19 8EG

Survey Data:

		levels: m.								
Ref:	staff reading, m.	ground level at base of wall external: road	top of wall	ground level at earth at back of wall	height of wall road side. m.	top of wall to earth rear side: m.	plumb measure. out + in / 1.20m	plumb measure. out + in / wall ht.	assume 225 wall through out. Is cg outside mid 1/3 - 75mm	retained earth height m.
MH cover	1.537	10.000								
1	0.766	10.771	12.831	10.971	2.060	1.860	-5	-9	PASS	0.200
1a	1.023	10.514	11.544	10.754	1.030	0.790	0	0	PASS	0.240
1b	1.286	10.251	11.491	10.651	1.240	0.840	-30	-31	PASS	0.400
2	1.404	10.133	11.463	10.613	1.330	0.850	-5	-6	PASS	0.480
cl pier							-40	0	PASS	
2a	1.423	10.114	11.714	10.684	1.600	1.030	-40	-53	PASS	0.570
2b	1.445	10.092	11.742	10.812	1.650	0.930	-40	-55	PASS	0.720
3	1.434	10.103	11.753	10.993	1.650	0.760	-30	-41	PASS	0.890
3a	1.444	10.093	11.753	11.013	1.660	0.740	-25	-35	PASS	0.920
4	1.432	10.105	11.765	10.995	1.660	0.770	-35	-48	PASS	0.890
4a	1.392	10.145	11.785	10.985	1.640	0.800	-40	-55	PASS	0.840
5	1.357	10.180	11.790	10.990	1.610	0.800	-115	-154	FAILS	0.810
5a	1.290	10.247	11.777	11.037	1.530	0.740	-195	-249	FAILS	0.790
6	1.263	10.274	11.804	11.144	1.530	0.660	-195	-249	FAILS	0.870
6a	1.232	10.305	11.805	11.225	1.500	0.580	-110	-138	FAILS	0.920
7	1.194	10.343	11.803	11.163	1.460	0.640	see sketch			0.820
7a	1.150	10.387	11.777	11.287	1.390	0.490	see sketch			0.900
8	1.100	10.437	11.797	11.227	1.360	0.570	see sketch			0.790
9	1.055	10.482	11.842	11.262	1.360	0.580				0.780
back site	1.957									
9a	1.214	10.743	11.773	11.253	1.030	0.520				0.510
10	1.033	10.924	11.884	11.384	0.960	0.500	5	4	PASS	0.460
10a	0.863	11.094	12.294	no measure	1.200	no measure	bow			
11	0.610	11.347	12.367	no measure	1.020	no measure				



Figure 4: Boundary Wall Elevation – Northern End



Figure 5: Boundary Wall Elevation – Southern End

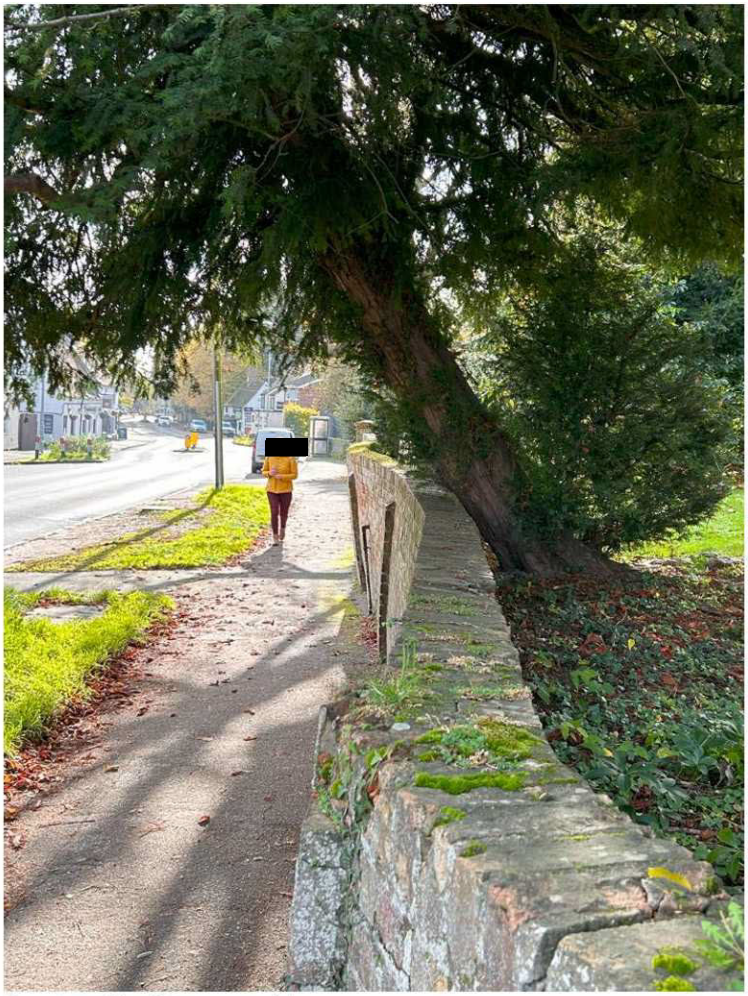


Figure 6: Wall Deflection (looking south)



Figure 7: Cracking at Corner (northern end)



Figure 8: Cracking in Middle of Panel (in front of tree stump)



Figure 9: Tree Stump Behind Wall (assumed to be chestnut)



Figure 10: Existing Gas Pipe Feed (and meter housing)