Lorna and Peter Klimt

10 Elsworthy Road

London, NW3

Structural Planning Report

ENTUITIVE

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1. CONTENTS

2. SCOPE AND GENERAL INFORMATION

Entuitive were asked to advise on the structural engineering part of the BIA associated with the proposed works at 10 Elsworthy Road, NW3 3DJ.

This document describes the engineering assumptions made in the design of the new basement at 10 Elsworthy Road. It also describes a possible construction sequence. It does not address the works above ground floor.

3. SITE AND DEVELOPMENT APPRAISAL

3.1. Existing building and location

Elsworthy Road is a residential street located in London Borough of Camden.

10 Elsworthy Road lies on the northern side of Elsworthy Road approximately half way down the street and shares party walls with residential properties, 8 and 12 Elsworthy Road, to the east and west respectively. It is also bounded to the north by King Henry's Road. The building is located in Elsworthy Conservation Area. Please refer to the relevant extracts which are provided in Appendix A.

Historic maps of this area indicate that the site was developed around c.1895 along with the extension to King's Henry Road to the north of the site. The rail tunnel running beneath the rear garden is understood to have been constructed at a similar time. There is no record of significant bomb damage to the site. Please refer to the relevant extracts which are provided in Appendix A.

The Lost Rivers map indicates that the nearest watercourse is a tributary of the River Tyburn, roughly 350m to the west of the site.

The house is a three storey semi-detached building. There is also an undercroft below the existing ground floor with a reduced head height of c.1.5m. The rear garden is c.1.m below the ground floor level and includes a detached brick garage with access onto King Henry's Road.

The soil investigation was carried out in August 2017. The investigation included eight trial pits and two boreholes located at the front and to the rear of the building. The results of the investigation are shown in the report No. LBH4482 Ver. 2.0 prepared by LHB Wembley Engineering.

It is assumed that the existing house has loadbearing masonry walls, suspended timber floors throughout and loadbearing masonry and timber internal walls. The roof is assumed to be of timber construction with a slate finish. The existing foundations consist of stepped brick foundations.

From a review of Camden's planning records it appears that a similar sized basement extension has been undertaken below the neighbouring house at no.8 to the east of no.10. We also understand that planning permission has been granted for a similar sized basement extension below the neighbouring house at n.12 to the west of no.10. For the purposes of this report we have assumed that by the time the works to no.10 are undertaken the basement extension works to no.12 will have been completed.

3.2. Proposed Development

The proposed alterations involve creating a new basement floor below the extent of the house with a new light well, to the front and an extension into the rear garden. We propose that this work be undertaken by dowelling in reinforcing bars into the existing underpinned foundations below the party walls, to lap with the proposed reinforced concrete basement raft slab. The new basement walls to the front lightwell and that extend into the rear garden will be formed, as required, via a hit and miss sequence in reinforced concrete underpins.

The building is currently divided into three separate flats with the first floor under separate ownership.

The scheme design for the alterations to the substructure is illustrated in sketches in Appendix C.

3.3. Existing Ground Conditions

For the purpose of the planning application, a site investigation has been carried out and the results are given in the report No. LBH4482 Ver. 2.0 prepared by LHB Wembley Engineering. This allowed us to develop the scheme with some certainty for this stage of the project.

For the purpose of this report, we have taken the site specific geotechnical investigation results which are shown in the aforementioned report. The house is underlain by made ground of a depth varying from 1.0m deep in the rear garden to 1.7m deep in the front garden over London Clay formation to a proved depth of c.7.3m below ground level.

From the trial pits that were undertaken the existing stepped brick foundations, below the perimeter walls were originally founded on a variable thickness of lean mix and concrete around 500mm deep. We understand that party wall with no. 8 has been underpinned with mass concrete underpins, these pins may vary in thickness but should at least align with the inside line of the party wall above.

3.4. Site Hydrogeology

From the knowledge of the site and the local conditions, the following was encountered:

Groundwater was not encountered within the envisaged depth of the basement extension and a shallow groundwater table is not present beneath the site.

There remains the possibility that perched water bodies above the water table may develop from time to time during heavy precipitation, leading to groundwater ingress above the standing groundwater table. In such circumstances, or where surface water run-off enters into excavations, it is expected that water could be adequately managed by natural drainage or pumping from sumps.

The site does not lie within the designated floodplain of the River Thames, nor is it located within a Groundwater Vulnerability Zone or located within a groundwater source protection zone as defined by the Environment Agency.

The Environment Agency mapping indicates that the site is not located within a zone at risk of flooding by rivers, seas or reservoirs. The site however is located within Flood Zone 1 and the EA indicate the area of the site to be a very low risk of surface water flooding; this is defined as a chance of flooding of less than 0.1%.

Based on the available information, it is considered that the risk due to surface and foul water flooding is relatively low.

3.5. Slope Stability

The existing site is generally level and the new landscaping will not change the site slopes, as such no issues relating to slope stability need to be addressed.

3.6. Surface Flow and Flooding

From a review of the Environmental Agency surface water flood maps it would appear that the property is near an area of low risk of flooding from surface water (see surface water flood map in Appendix A). With the proposed introduction of a modest sized basement lightwell to the front and a small extension of the basement into the rear garden of the property the resultant surface water runoff will need to be adequately drained and increase the current volume of water entering the public sewer. The below ground drainage design strategy will incorporate the requirements for SUDS and this will be designed out in full as part of the design stage of the project and will include a form of attenuation for the surface water runoff in accordance with LBC and Thames Water guidance. The surface water drainage pipe will be fitted at the end with a non-return valve to minimise the risk of the water back flowing up through our drainage system if the public sewers are in flood.

The below ground foul water drainage design will incorporate enlarged foul water manhole, to take the waste water from the basement extension only and incorporate pumps to deliver the foul water to the public sewers. The rising foul main pipe would discharge into the last manhole, within the property's boundary before it enters the public sewer, and then fall under gravity to the public sewer. The foul drainage pipe will be fitted at the end with a non-return valve to minimise the risk of the water back flowing up through our drainage system if the public sewers are in flood.

4. PERMANENT WORKS

4.1. Foundations in General

The underlying strata will provide a suitable bearing stratum for the support of the proposed new basement. The design of the basement will be driven by the stability of the London Clay Formation and maintaining the stability of existing walls, adjacent land and properties and any existing buried services.

4.2. Basement Construction

It is proposed to excavate the existing cellar in order to create the new basement below the entire footprint of the property. The basement will also extend into the rear garden and a lightwell will be formed at the front of the property.

The adjoining property at no. 8 has an existing basement floor at a similar level to the basement floor proposed for no.10 and we understand that as part of these works the party wall was underpinned with mass concrete underpins. Similarly the approved works for no.12 will be constructed in a comparable fashion. Therefore the differential depths of the foundations in

relation to the adjoining structures are not expected to be significantly increased by the development at no.10.

The reinforced concrete basement slab to no.10 will be constructed by lapping the slab reinforcement onto dowel bars that will be chemically anchored into the base of the mass concrete underpins below the party walls. This will be constructed following a similar arrangement to the outline sequence indicated on our basement plan. The reinforced concrete walls to the front lightwell and to the extension into the rear garden will also be formed following a hit and miss sequence as noted on the basement plan. A section of the flank front wall will be extended up to the boundary with no.8 and this wall will be constructed in an identical fashion. The formation level of the new basement slab will be founded in the London Clay Formation and there will be some small amount of heave expected.

The scheme for the basement and temporary works is illustrated in sketches in Appendix D. An indicative sequence of works is provided later in this report.

4.3. Impact on Adjacent Structures and Services

Both adjacent buildings affected by these works directly adjoin No. 10.

With good construction practice, actual settlements should be kept within the 'Negligible to Very Slight' range in the Classification of damage visible in walls (refer to Appendix B). Based on the foundations at the underside of the party wall with the adjoining property at no. 8 has already been underpinned and existing basement floor will be at a similar level to the basement floor proposed for no.10. Similarly the approved works for no.12 will be constructed in a comparable fashion. Therefore the differential depths of the foundations in relation to the adjoining structures are not expected to be significantly increased by the development at no.10.

Monitoring points will be installed and continually monitored by the contractor as the basement extension works progresses. The contractor will follow the 'traffic light' trigger values as outlined in Section 8 of LBH's BIA report. If any cracks develop in the structure of the adjacent buildings then normal Party Wall procedures provide a mechanism for completing any repairs. Also as part of the Party Wall procedures it is likely and highly recommended that condition surveys will be undertaken on the adjacent properties to record the condition of neighbouring properties prior to the commencement of the works at no.10

In view of the depth to the foundations, fine grained London Clay Formation soils are plastic and specific precautions are considered to be required with respect to protecting foundations from the effects of seasonal soil heave/ shrinkage induced by trees. This will need to be taken into account during the final design.

An analysis of the predicted vertical and horizontal displacements in the existing footings has been undertaken by LBH in their BIA report and it is noted that there will not be any significant damage to adjacent properties as a result of the proposed works.

As noted earlier in this report there is an existing rail tunnel that runs below the rear garden. The rail tunnel that is c.10m in diameter runs in a northeast to southwest direction and is part of the Primrose Hill fast line rail route. The proposed basement extension into the rear garden finishes in and around the line of the 5.0m exclusion zone around the rail tunnel. We understand that LBH Wembley have reached agreement with Network Rail that the proposed basement extension will only cause negligible ground movement to the crown of the Network Rail Tunnel.

It is not anticipated that the work will have an impact on buried services passing across the site e.g. sewers, cables etc. Detailed searches into the locations of any mains services will be carried out in due course, but at this stage there are no known services in the vicinity of the basement excavation. In the course of the normal design development these will be considered and appropriate designs developed for rerouting or protection should it be required.

During the demolition and excavation of the works the contractor will ensure that all works are carried out safely and in such a manner that it will not inconvenience pedestrians or other road users, and with a positive consideration to the needs of the local residents, site personnel and visitors as well as the general public. Airborne dust will be dealt with by dampening down areas with water prior to the works being undertaken.

Public footways and carriageways will be kept tidy, in safe condition and regularly inspected and washed down. Hoardings, safety barriers, lights and other features will be maintained in a safe and tidy condition. The site is to be kept clean and in good order at all times with surplus materials and rubbish controlled within the site and not allowed to spill over into the surroundings.

In addition to this, working times as stipulated within the contract particulars will be complied with and contractor would look to discuss with London Borough of Camden these times as a proactive approach to control of noise emissions from the site.

As the proposed works will directly affect the foundations to the adjoining properties the works will be notifiable under the various sections of the Party Wall etc Act 1996. We understand that our client has been in contact with his neighbours at no.s 8 & 12 to discuss the extent of his works through active dialogue.

4.4. Basement Water tightness

It is expected that the basement will need to meet a minimum level of Grade 3 water-tightness in accordance with BS8007 and BS 8102. Grade 3 implies full water and vapour tightness within the useable space.

We recommend that the basement design will incorporate the use of a drained cavity construction for the perimeter walls and slab. This is a system of drainage blankets, slots and sumps used to control and discharge any below ground water leakage, via burst pipe, through the retaining structure.

For an additional level of security, the below ground reinforced concrete walls and slabs will be designed to minimal crack widths and hydrophilic strips at all construction joints to minimise the risk of moisture ingress. Final design of the waterproofing strategy should be carried out by the architect in due course.

5. TEMPORARY WORKS

5.1. Responsibilities

The following is a suggested construction sequence that would allow the proposals to be built safely. It must be recognised that the contractor will be responsible for determining the actual construction sequence, designing the necessary temporary works and correctly executing the works.

A detailed method statement will be required from the contractor even if the contractor chooses to follow this suggested construction sequence. Should the contractor follow this suggested construction sequence it in no way relieves them of the responsibility to ensure the stability of the building and neighbouring structures during construction stage.

5.2. Groundwater Control

The Contractor will provide any necessary small temporary sump points to control water ingress during the excavation works.

6. SUGGESTED CONSTRUCTION SEQUENCE

6.1. Casting the basement lightwell walls to the rear and below the flank wall with no.8

The basement lightwell and the basement structure that extends into the the rear garden must be constructed in reinforced concrete underpinning inline with a sequence as shown on the structural basement plan S-L-01 and the sequence of work drawing S-L-SK10 and 11. The excavations for each pin will generally be in excess of 1.8m high and approximately 1.0m wide. The base of the pin formed each time should be wide enough to support the vertical loads from above, refer to the section details on drawings S-D-01 and 02. Where the lightwell wall backs onto the rear garden this section of the retinaing wall will be formed via a bulk excavation where the garden soil is battened back to allow for a larger sections of the retaining walls to be cast in one go.

Prior to the commencement of the basement works below the existing house, the contractor must install a grillage of needle props to temporarily support the back of the house and a high level temporary wailer and horizontal cross props to ensure that the existing building is stable while the ground floor is removed to allow for ease of access to form the basement slab below.

There will also be a section of the flank front wall will be extended up to the boundary with no.8 and this reinforced concrete retaining wall will be constructed in an identical fashion. The contractor should start with pins marked as pin 1 as noted the on basement plan S-L-01. Each pin should be backfilled with well compacted arising soil following the installation of the dry packing between the top of the pin and the underside of the existing foundation. By backfilling, following the completion of underpins, the lateral stability of the basement walls will be maintained as the construction progresses. From a review of the available drawings for the adjoining buildings the differential depths of the foundations in relation to the adjoining structures are not expected to be significantly increased by the development at no.10.

Steel reinforcing bars should be left protruding from the sides of each cast underpin section to lap with subsequent underpin walls and slab pours. Prior to the casting of adjacent wall and slab sections the contractor must ensure that there is hydrophilic strip, or similar approved placed into all construction joints.

Following the installation of all the number 1 and 2 pins the contractor should excavate trenches, to just above the top of basement slab level, from party wall to party wall and install a low level of temporary wailer and horizontal cross props. These low level props will ensure that the lateral stability of the existing building while the basement floor is dug out and cast following the sequence as outlined on basement plan S-L-01.

6.2. Casting the walls to the front light well

Similar to the underpins below the house the excavations for each pin to the front light well will generally be in excess of 3.0m high and approximately 1.0m wide. The base of the pin formed each time should be wide enough to support the vertical loads from above, refer to drawings S-D-01 & 02.

In order to form retaining walls to the lightwell the contractor should install temporary sheet piles to act as temporary lateral support with temporary cross props installed close to the ground floor level. Following the completion of the flank walls to the lightwell the contractor must install a grillage of needle props to temporarily support the front of the house.

Following the installation of all the pins the contractor should install the temporary horizontal steel beams as shown on the basement floor plan appended to the report. See the appendix D. These beams will ensure that the lateral stability to the below ground walls will be maintained while the light well basement slab is constructed.

6.3. Casting basement slab

The adjoining property at no. 8 has an existing basement floor at a similar level to the basement floor proposed for no.10 and we understand that as part of these works the party wall was underpinned with concrete underpins. Similarly the approved works for no.12 will be constructed in a comparable fashion. From a review of the available structural drawings that we downloaded from Camden's planning website for both adjoining properties we understand that there may be a lot of mass concrete underpinning that has been cast beyond the party wall line during these basement extension works.

As noted on our sequencing drawings and our basement plan the contractor will locally excavate a trench spanning from party wall to party wall to a level above the top of the basement slab. The protruding concrete from the previously undertaken underpinning works, to the underside of the party walls must be broken away and then a low level horizontal temporary prop should be installed spanninig from party wall to party wall as noted on the sections drawings S-D-01 and 02.

Once all the low level cross props are in place excavate to the basement slab formation level in sections as noted on the basement plan S-L-01 and chemically anchor reinforcing bars into the existing underpins and lap the basement slab reinforcement onto them.

Likewise the steel reinforcing bars should be left protruding from the end of the cast basement slab to lap reinforcement in the subsequent basement slab pours. Prior to the casting of the basement slab the contractor must ensure that there is hydrophilic strip, or similar approved placed into all construction joints.

6.4. Remove propping

Once the basement slab has reached its design strength and the ground floor structure has been fully installed with ply decking fixed to the top of the timber floor joists the temporary lateral propping may be removed.

7. ASSESSMENT OF KEY SAFETY ISSUES

The following issues will require further consideration in order to mitigate or eliminate inherent risks:

- Underground Services- A detailed survey of the existing services will have to be undertaken. All existing services will need to be terminated prior to any excavation.
- Agreement has be reached with Network Rail that the level of ground movement that could be expected to occur close the the existing rail tunnel will be negligible.
- Intrusive Structural Survey– investigation will be needed to ensure that assumptions about the existing structure can be verified.

- Construction workers in direct contact with the made ground risk of ingestion and inhalation. With the level of contaminants present in the made ground as noted in the SI report and this risk will be mitigated through the use of appropriate site practices and using full PPE.
- Bulk Deliveries- Delivery and handling of large or heavy structural elements (e.g. reinforcement bars) from the main road entrance. Reinforcement can be detailed to provide smaller bars at more regular centres, which will help reduce the weight of hand-lifted elements. However parking licences maybe required from the local council for the delivery trucks.
- Excavation in confined spaces - Normal protection measures to be taken whilst excavating in confined spaces.
- Detailed Temporary Works Design with Site Monitoring– the sequence of work needs to be developed in detail by an experienced professional engineer, and regular site visits and reports made to ensure that site operatives understand and follow the designed sequence. The contractor will undertake a regime of site monitoring to record any movements in the façade of the building and the adjacent structures.
- An outline construction programme has been included in Appendix C however this should not be relied upon the appointed contractor will produce their own programme for these works following their appointment.

8. CONCLUSIONS

Our judgment based upon the investigations carried out, the geological records and our experience of basement developments in similar conditions in London is as follows:

a. The development will maintain the structural stability of the existing building and neighbouring properties in the temporary and permanent stages. The engineering of basements of this kind is well understood and there are no difficult or peculiar issues that arise in this case.

b. The development will have no adverse effects on drainage, run-off or hydrogeology. We do not consider that this site raises any unusual or adverse groundwater or drainage issues.

John Maguire

BSc Eng CEng MIStructE

Entuitive

23rd November 2017

APPENDIX A – DESK MAPS

Image of 10 Elsworthy Road

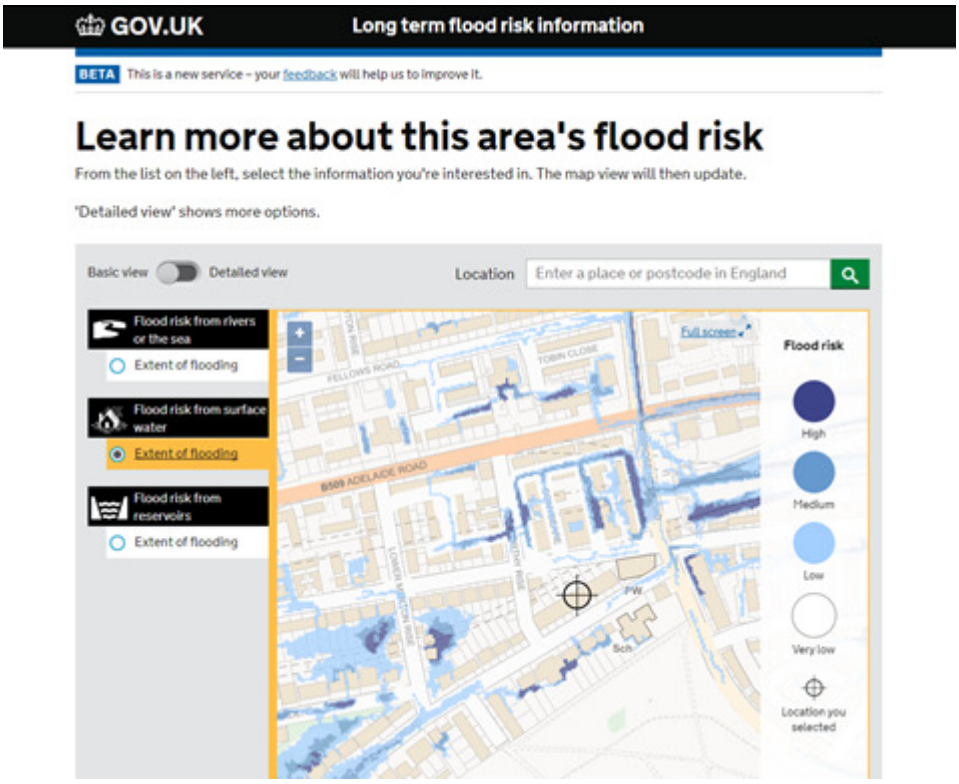
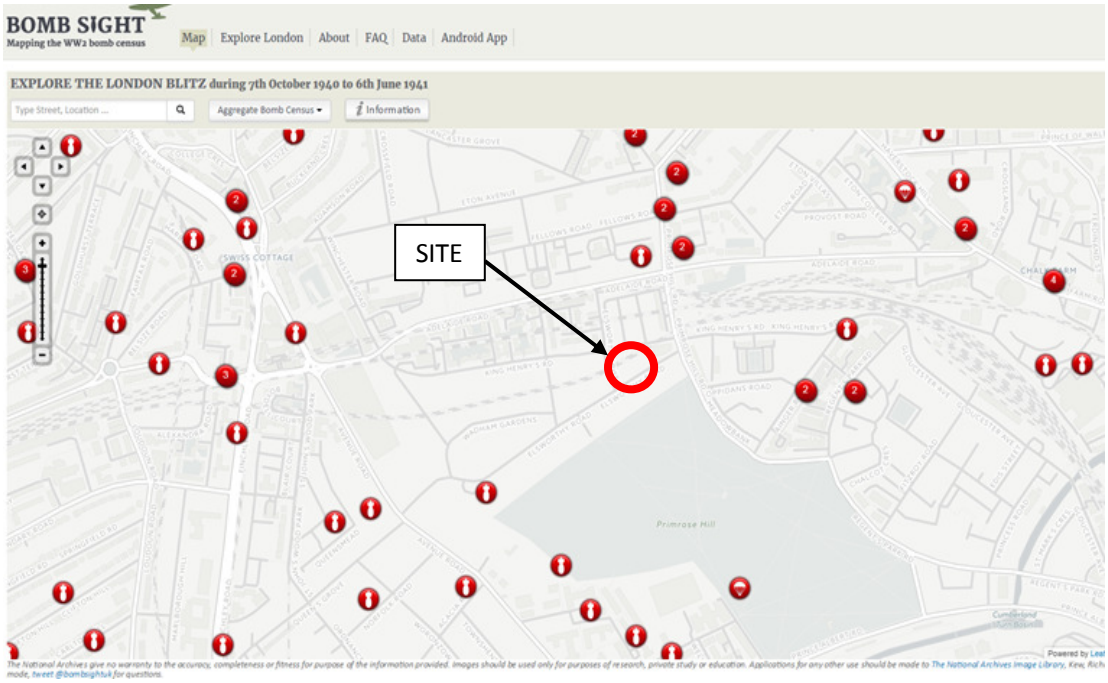


Image of 10 Elsworthy Road from the Environmental Agency surface water flood map that appears to show that the property is in an area of very low risk of surface water flooding



Bomb map of the local area

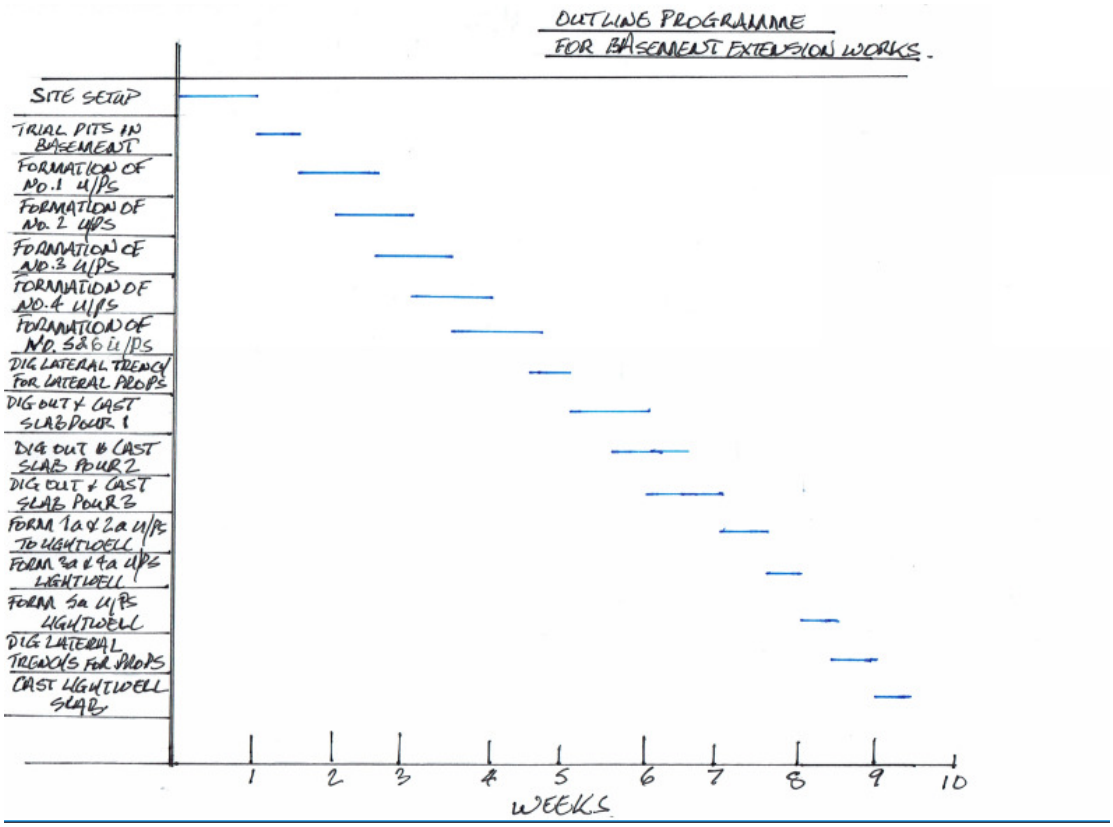
Lost river of London Map

APPENDIX B – BRE DAMAGE CLASSIFICATION TABLE

BRE classification table of visible damage to walls with particular reference to ease of repair of plaster and brickwork or masonry

Category of damage	Degree of damage	Description of typical damage [ease of repair]	Approximate crack width [mm]
0	Negligible	Hairline cracks of less than about 0.1 mm width are classified as negligible	Up to 0.1 mm
1	Very slight	Fine cracks which can easily be treated during normal decoration. Perhaps isolated slight fracturing in building. Cracks rarely visible in external brickwork	Up to 1 mm
2	Slight	Cracks easily filled. Re-decoration probably required. Recurrent cracks can be masked by suitable linings. Cracks not necessarily visible externally; [some external repointing may be required to ensure weather tightness]. Doors and windows may stick slightly.	Up to 5 mm
3	Moderate	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Sertvice pipes may fracture. Weather tightness often impaired.	5 to 15 mm [or a number of cracks up to 3]
4	Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows] Windows and door frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably. Some loss of bearing in beams. Service pipes disrupted.	15-25 mm but also depends on number of cracks
5	Very severe	This requires a major repair job involving partial or complete re-building. Beams lose bearing, walls lean badly and require shoring. Windows broken with distortion. Danger of instability	Usually greater than 25 mm but depends on number of cracks.

APPENDIX C – OUTLINE PROGRAMME FOR THE BASEMENT EXTENSION WORKS



APPENDIX D – STRUCTURAL DRAWINGS AND OUTLINE SEQUENCING DRAWINGS