Basement Impact Assessment

98 Maple Road

Contents

1 Introduction

The Basement Impact Assessment has been carried out by Andrew Smith MEng(Hons) CEng MIStructe MFPWS a Chartered Structural Engineer.

The requirements of the following reports were reviewed with respect to this project:

• The London Borough of Richmond Upon Thames, Planning Advice Note: Good Practice Guide on Basement Developments (May 2015).
• The London Borough of Richmond Upon Thames: Further Groundwater Investigations (March 2021).
• The London Borough of Richmond Upon Thames: Strategic Flood Risk Assessment Level 1 (March 2021).
• The London Borough of Richmond Upon Thames: Basement Assessment User Guide (March 2021).

1.1 Site

The site comprised a 325m2 broadly rectangular shaped plot of land, with a east to west orientation, located along the eastern side of Maple Road. The site was located within Surbiton, a mainly residential suburb in south-west London. A Site Location Plan is provided within Figure 1 and a plan showing the site development area is given within Figure 2.

The front of the plot is a mixture of over grown shrubs, hard standing and small tree of poor quality. To the rear of the property is grass and further over grown shrubs of poor quality. To the north is a 9” London stock boundary wall with a three storey flat development with basement. The flank wall of the flat development is currently 3m away from the existing flank wall of 98 Maple Road.

Figure 1 Site Location Plan

1.2 Existing Building

The existing building comprises two stories above ground. The building is constructed from traditional materials with tiled roofs, masonry walls internal walls upto first floor with timber walls above, with timber floors supported on the load bearing internal. There is a single storey garage to the side.

Figure 2 Existing Property

1.3 Site Topography

The site did not contain a basement/lower ground floor, site and the surrounding area are generally flat and level with no significant slopes, a value of 30m AOD is noted across the site.

1.4 Nearby Assets and Subterranean Developments

No railway cuttings were noted within a 250m radius of the site. No London Underground tunnels were noted within a 250m radius of the site. The site is not in close proximity to any National Rail lines. The site was considered to be not sufficiently close to underground transport services, in order for the property to affect these and there are no approved proposals for any TfL services in the

vicinity that would affect the development. To the north of the side as noted in section 1.1 is a three storey flat development, refer to Appendix D for site and basement plan for 100-104 Maple Road which has a partial basement under the footprint of the closet building.

To the south is St Andrew's and St Mark's COE Junior school, with wildlife garden and bike shed adjacent to the boundary wall and the school buildings set 10m away from the site boundary, with no basement noted.

1.5 Proposal

The proposal is to the demolish the existing property and construct four storey building with basement and communal roof garden and individual private terraces. Traditional reinforced concrete retaining wall will be used to form the walls around the basement The superstructure will be metal frame construction with steel frame clad in brickwork and rendered panels

Figure 3 Proposed 3D Render

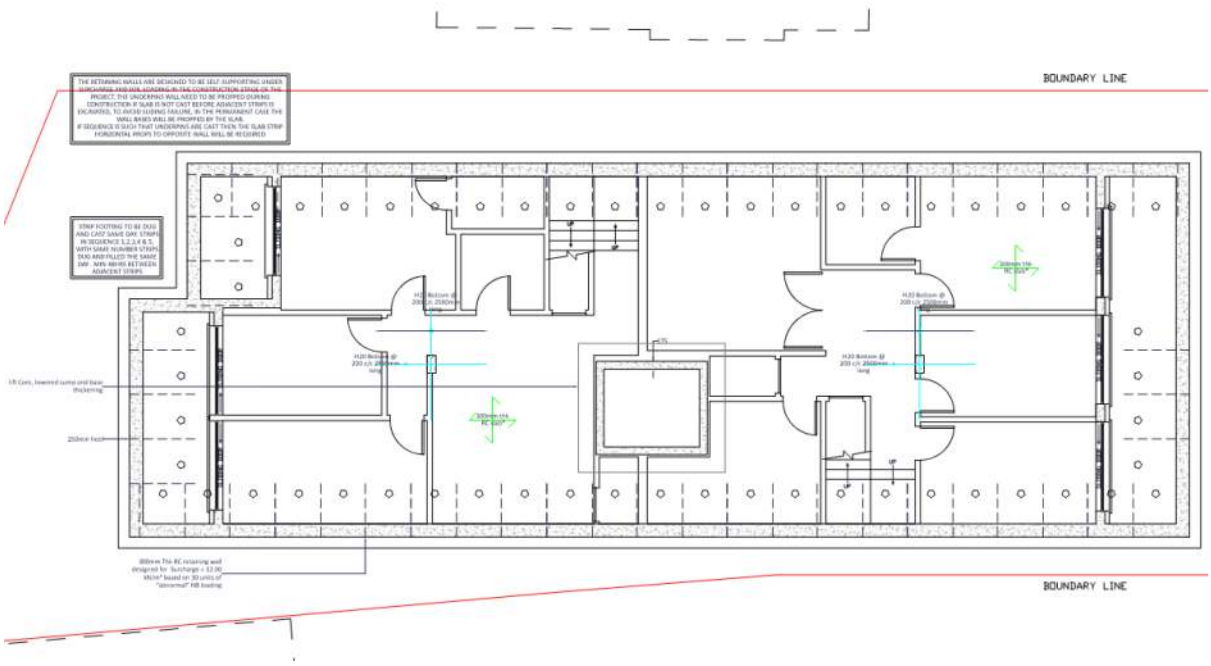


Figure 4 Proposed Basement Plan

2 Ground Conditions

At the time of submission, a full site investigation has not been carried out, however through the use of RGS Borehole logs and local information the geotechnical design parameters have been derived.

2.1 Geology

The BGS Solid and Drift Geological Map for the South London Area revealed that the site was underlain by the superficial Langley Silt Member-[Clay And Silt], underlain by the London Clay Formation bedrock. No superficial deposits, outcrops of other bedrock deposits or areas of Made/Worked Ground were noted within a 250m radius of the site.

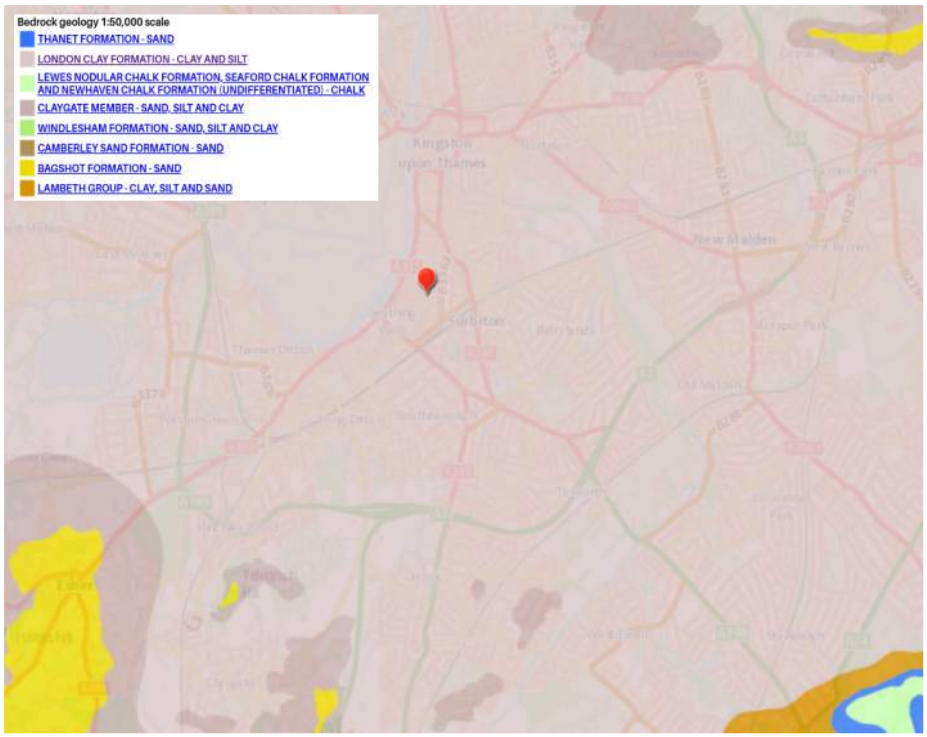


Figure 5 Bedrock Geology

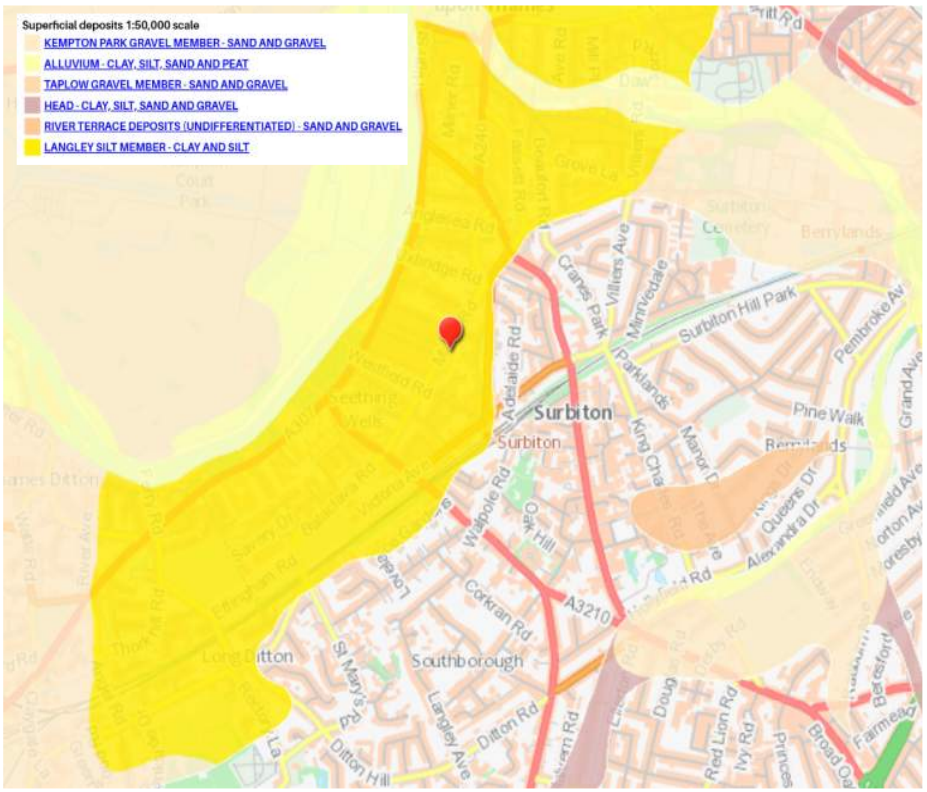


Figure 6 Superficial Deposits

2.2 RGS Borehole logs

There are number of local boreholes in the surrounding streets in all directions. The borehole logs whilst of differing age are very thorough, and all provide similar information on the strata in this area. The more recent boreholes carried out geotechnical testing in the form of SPT (standard penetration test) and from this expected soil design can be derived.

Figure 7 RGS Borehole Log

Description	Constituents	Depth to top of strata (m)	Thickness (m)
Topsoil/ Made Ground	Minimal cover	Ground Level	0.5-1.0
Stiff Brown Clay	Silty clay with pockets of gravel	1.0	2.5m
Stiff Grey Fissured Clay	London Clay	3.5	10m+

2.3 Engineering Design Parameters

Based on the historic RGS borehole logs, which give test data based on the Standard Penetration test (STP) and the number of blows to perform the test the following parameters have been used in the outline basement design.

The borehole logs suggest an of N = 23 increasing with depth.[Though the borehole descriptions suggest significantly higher values]. Based on the Wroth rule of thumb where

$q_a = 10N$

where q_a in kPa is the allowable bearing capacity of a shallow foundation and N is the SPT blow count. This gives a range of q_a = 230 KPa. For design purposes and to allow for the presence of water in the soil, (noting all borehole logs were dry) 50% of this value is used giving;

Allowable Bearing Pressure (kN/m^2) into the stiff grey clay	115
Buried Concrete Class	DS-1
Piling Concrete Class	DS-2

This is line with Stroud (1974). where SPT "N" Values were undertaken, the Cu could be calculated by multiplying by 5.

The relationship between Eu and Cu is generally dependent on strain levels. For small strains, a ratio of 750 can be adopted based on well documented publications. This is also reflected for the London Clay Formation, after extensive research, within graphs depicting strains and Eu/Cu ratios included in *"Burland JB, Standing, JR, and Jardine, FM (2001) Building response to tunnelling, case studies from construction of the Jubilee Line Extension CIRIA Special Publication 200". A Poisson's Ratio of 0.45 was considered suitable for these soils, given their cohesive nature."*

2.4 Bearing Capacity

Foundations should be taken through any Made Ground and extend 300mm below root penetrated soils, before founding onto the London Clay.

The anticipated formation / foundation depth for the basement is ~3.50m bgl a conservative Allowable Bearing Pressure value of 115 (kN/m^2)

Prior to final detailed design trial hole records, the results of in-situ testing, will be carried. Referral to BS 8004:2015, Code of Practice for Foundations, and based on a 5m long by 1m wide foundation and a maximum settlement of 25mm. However some heave (overburden release related) is anticipated and not settlement as a predominant ground movement for the basement.

2.5 Ground Water

The historic boreholes logs record the boreholes as dry upto 14ft, and the closest local water course is 375m from the site, therefore it is expected that the excavations will be dry, though design parameters at this stage have allowed for the presence of water. The borehole logs within the Zone 2 & 3 of the floor zone have higher perched water tables of 2.0m recorded on their logs

The London Clay is classified by the Environment Agency (EA) as Unproductive Stratum, referring to rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The London Clay is not capable of supporting a groundwater table, although isolated pockets of perched groundwater do occur within fissures and silt and sand partings. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10-11 m/s and 1 x 10 -9 m/s, with an even lower vertical permeability.

2.6 Landfill Gas

There are no records of landfill on the site and for the purpose of this report and the outline design no gas remediation measures have been included, this will be confirmed prior to detailed design.

2.7 Swelling/Shrinking

There are no major trees in the existing footprint of the site or the adjacent properties. The rear garden is grass and flower beds with large shrubs, but nothing of risk to cause Swelling/Shrinking of the soil. As the nearby trees are not close to the works area the depth of foundation required to support the new underpins and retaining wall should be sufficient to meet NHBC requirements for building near trees.

2.8 River Flooding

The site is approximately 375m to the south-east of the River Thames, but is outside the very low risk area, so river flooding is not considered a design parameter. Refer to extract below for the Environment Agency

Figure 8 Environment Agency Risk of River and Sea Flooding

2.9 Tidal flooding

The site is situated outside of the Environment Agency's Flood Zone 3, in zone 1. Therefore no special resistance/ flood resilience measures are required. Refer to Appendix E for Environment Agency Flood Map.

2.10 Surface Flooding

The site is situated outside of the Local council's areas for surface water risk

2.11 Radon

BRE 211 (2015) Map 5 London, Sussex and west Kent, indicated that the site is not located within an area where mandatory protection measures against the ingress of radon are likely to be required. The up-to-date UK Health Security Agency Database, included within www.UKradon.org, indicated that the site was located in an area where less than 1% of homes are above the action level.

Therefore, no risk assessment or radon protection measures are required. Basic Radon protection measures are required when 3% or more homes are estimated to be at or above the Action Level.

Section 6.12 of BRE211 (2015) states the following regarding basements/lower ground floors:

"It is important to ensure that basements and other occupied spaces below ground level are suitably protected against radon. These areas are more at risk because walls are in contact with the ground as well as the floor. For a house with a basement under the entire house, the area in contact with the ground could be several times that of a similar house without a basement. This, coupled with reduced natural ventilation below ground level, increases the risk of elevated radon levels. All basements are at increased risk of elevated levels of radon, regardless of geographic location.

Where a new basement is to be created, or an existing cellar converted, waterproofing will be required. A well-constructed waterproofing should be designed to protect against radon also. Guidance and recommendations on basement waterproofing are contained in BS 8102:2009[14], which also advises that radon be taken into account in the design and implementation of waterproofing schemes. Below-ground waterproofing and radon

management are specialist activities that can conflict. It is recommended that dual protection systems are designed and installed by specialists who are suitably qualified in both waterproofing and radon management.

Internally located cavity drain membrane systems are often used to provide belowground waterproofing. Some cavity drain membrane systems are certificated as providing an effective barrier to radon gas. However, using these to line the internal surfaces of a basement could cause the gas to be simply displaced up the cavity into the ground floor accommodation. It is therefore important to ensure that the basement wall membrane fully closes the cavity at its head where it meets the radon barrier within the ground floor or external cavity wall above ground. The cavity behind the membrane could be used later as part of a subfloor depressurisation system.

If the ground around a basement is likely to be waterlogged, there is little benefit in installing a radon sump as subfloor depressurisation is unlikely to work continuously. As with all radon-protective measures installed during construction, the first aim should be to provide a passive solution. This should also be the aim with basement protection."

3 Structural Design

3.1 Proposal

There is a single level of basement that forms both the rear gardens and the internal living space for the new flats. The basement box contains the primary building consisting of the basement and four above ground levels, with a communal roof garden.

Figure 9 Proposed Basement Plan & Section (100-104 in greyscale shown behind)

The proposed basement will be designed to level III, in accordance with BS8102:2009 for water retaining structures. To achieve this Caltite Concrete is specified to the concrete retaining walls. The external garden areas it would be possible to use standard concrete and achieve level II.

Table 2 **Grades of waterproofing protection**

Grade	Example of use of structure [A]	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use [B] Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's *Specification for piling and embedded retaining walls* [1].

3.2 Retaining Walls, Excavations and Stability

Shallow excavations in the Made Ground are likely to be marginally stable at best. Long, deep excavations, through these strata and into the underlying London Clay Formation are likely to become unstable. Appropriate propping and support should be incorporated during construction of the basement.

The excavation of the basement must not affect the integrity of the adjacent structures beyond the boundaries. The excavation must be supported by suitably designed retaining walls and temporary works. Monitoring points will be established on neighbouring properties/walls, these will be measured on a regular basis during the course of the basement works, and any excess movement shown beyond agreed trigger values will be notified and appropriate actions taken. Refer to Appendix C.

The retaining walls for the basement will need to be constructed based on the soils encountered with an appropriate angle of shear resistance (Φ') and effective cohesion (C') for the ground conditions encountered, regarding long-term considerations, as well using an appropriate undrained shear strength Cu for short-term considerations.

The overlying Made Ground needs to be considered in the design of the basement.

Based on the ground conditions expected to be encountered the following parameters tabulated below could be used in the design of retaining walls, for a long-term consideration.

3.3 Method Statements

The proposed method statement for the basement construction is outlined below.

- Stage 1- Demolish existing building with dust control measures in place
- Stage 2- Clear Vegetation and reduce dig to site down to -0.25m below ground level over footprint of new building, any existing foundations found will be broken out and removed from site to make way for the new basement construction.
- Stage 3- Stage 1 Retaining wall construction and backfill
- Stage 4- Local dig to central strip with battered side slopes to construct central columns and reinforced core lift core

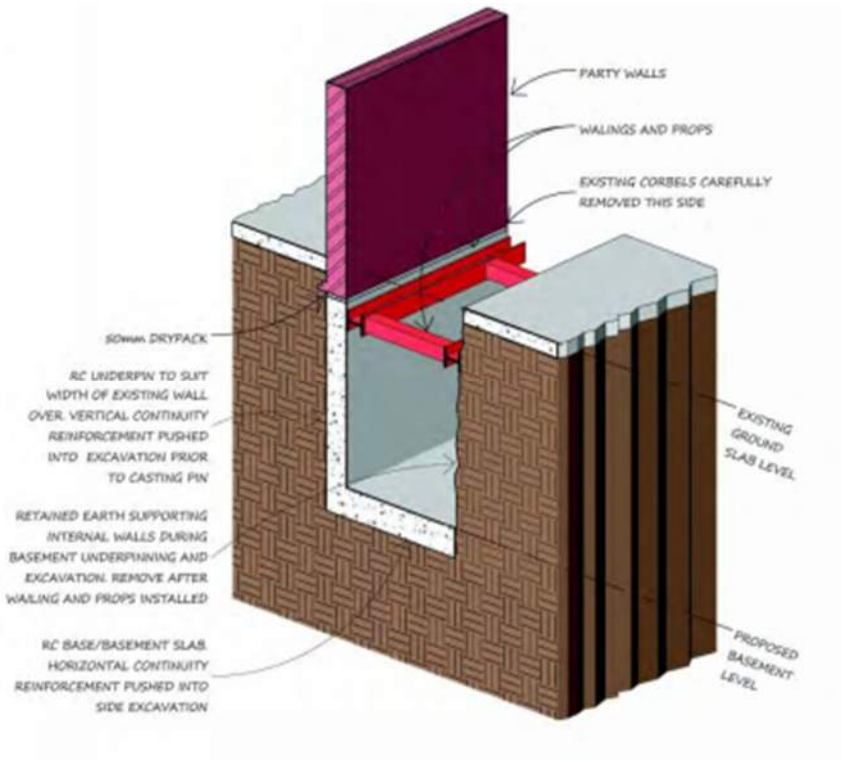
- Stage 5- Install ground level props across-Mabey struts, propped at their mid-span by the new walls/columns
- Stage 6- Reduce dig site down 0.5m above base of stage 1 pins
- Stage 7- Construct Stage 2 retaining walls and back fill
- Stage 8- Reduce dig site down to 0.5m above formation level
- Stage 9- Install low level Mabey struts and diagonal wall props and cast basement slab in strips
- Stage 10- Remove lower props a minimum 48hrs after casting the basement slab
- Stage 11- Install basement columns and walls
- Stage 12- Construct ground floor beams and slab
- Stage 13- Once ground floor slab has been constructed props can be removed
- Stage 14- Commence superstructure (noting temporary props to Party Wall with No.2 will still be in place and can only be removed in stages as the superstructure rises

3.4 Reinforced Concrete Retaining Walls

- The sequence of the retaining wall construction will be such that any given section will be completed, dry-packed, and a minimum period of 48 hours lapsed before am adjacent excavation commenced to form another underpin.
- The sacrificial cementitious boards will be installed at the back of the excavation. The method adopted to prevent localised collapse of the soil is to install these progressively one at a time, these will also control the setting out of the outer face.
- The access trench is first excavated, directly around the wall section to be constructed. The width of any base is individually assessed on site with due regard to the type and condition of the foundation and structural geometry above. The maximum width of any section will be 1000mm.

Construction of a RC Basement wall using the hit and miss sequence

- Excavate using hand and compressed air tools removing soil until the design depth is reached, and removed to muck away conveyor.
- Soils, where unstable in the temporary condition, will be shored. Soils is expected to be mixture of clay/gravel as the first 1-2.5m is a mixture of made ground and silty clay with local gravel pockets. Shoring system design will be undertaken by the contractor if required. If the face falls in, i.e. to back shutter fill with lean mix, to avoid an oversized and trespassing foundation
- Once the excavation is completed to the design depth and length. The stratum at the proposed founding depth is confirmed as being appropriate by the building control inspector.
- For Stage Two, the concrete reinforcement will be fixed in the slab section of the base and the vertical upstand. This will be checked by the building control inspector prior to concreting. Concrete to the base poured by the end of the same day as steel reinforcement fixing, the contractor may need to prefabricate reinforcement to achieve this.
- After 24 hours the temporary wall shutters are removed.
- A record will be kept of the sequence of construction, which will be in strict accordance with recognised industry procedures. The as-built records will be updated as necessary and issued to involved parties on completion of the works.



3.5 Reinforced Retaining Wall Adjacent to Existing Structures

- The principle of the retaining wall construction is similar to that of reinforced underpinning expect the walls are constructed in vertical stages
- The top 1m of the wall is cast in lengths not greater than 1m and the soil back filled top 25cm below ground level after each pin. Compaction of the soil in layers is critical to prevent movement of the wall.
- Repeat this process until the entire length of new wall has been cast or in 3m sections.
- Every third pin install temporary trench sheeting and dig down to formation level and cast new slab and wall as per section 3.4.
- Install racking prop between wall and slab, ensure prop is with 0.5m of the top of the wall
- Continue sequence every third pin, then return and complete remaining pins as per the specification [minimum period of 48 hours lapsed before am adjacent excavation commenced to form another underpin]

4 Impact on Surrounding Structures

The new basement construction is formed with a traditional reinforced concrete retaining wall.

The walls have been designed using the 'active' pressures (where movement of the retaining wall is likely and acceptable, as opposed to 'at rest' pressures (where movement of the retaining wall is unlikely and unacceptable). These movements will be small and have a negligible effect on the vertical settlement and surrounding structures.

The surrounding buildings fall into Group 1a defined by BS ISO 4866:2010 i.e. Ancient, Historic or Old, the foundations to the new construction fall into classes B & C and the soil as type E. Therefore, from table B1 BS ISO 4866:2010 the surrounding buildings fall with category 5/ 6 and can be considered to have a medium resistance to vibration as per table B1 BS ISO 4866:2010, and conversely they require little or no additional protection from vibration other than using low vibration construction techniques.

Figure 10 Aerial shot of existing property, adjoining and surrounding properties

The areas of underpinning of the existing property will be carried out in a sequential sequence; this method is generally accepted for basement construction of this type. Adoption of this method statement will limit any movement to the existing fabric of adjoining properties to practically none, or at worst, 'aesthetic' as described by the BRE document for movement in buildings. Ref: Table 1. BRE Digest 251; we would expect:-

Damage Category	Description of Typical Damage	Approximate Individual Crack Width
Negligible (0)	Hairline cracks	< 0.1 mm
Very Slight (1)	Very slight damage includes fine cracks which can be easily treated during normal decoration, perhaps an isolated slight fracture in building, and cracks in external brickwork visible on close inspection.	1 mm
Slight (2)	Slight damage includes cracks which can be easily filled and redecoration would [illegible] building, cracks which are visible externally and some repointing may be required, and doors and windows may stick.	[illegible]
Moderate (3)	Moderate damage includes cracks that require some opening up and can be patched by a mason, recurrent cracks that can be masked by suitable linings, repointing of external brickwork and possibly a small amount of brickwork replacement may be required, doors and windows stick, service pipes may fracture, and weather-tightness is often impaired.	5 mm to 15 mm or a number of cracks > 3 mm
Severe (4)	Severe damage includes large cracks requiring extensive repair work involving breaking-out and replacing sections of walls (especially over doors and windows), distorted windows and door frames, noticeably sloping floors, leaning or bulging walls, some loss of bearing in beams, and disrupted service pipes.	15 mm to 25 mm but also depends on the number of cracks
Very Severe (5)	Very severe damage often requires a major repair job involving partial or complete rebuilding, beams lose bearing, walls lean and require shoring, windows are broken with distortion, and there is danger of structural instability.	> 25 mm

Table 1: Severity of Cracking Damage[4, 5]

CATEGORY 1

1 - Fine cracks that can be treated easily using normal decoration. Damage generally restricted to internal wall finishes; cracks rarely visible in external brickwork. Typical crack widths up to 1 mm.

- Although the construction will be further below ground level than the existing building it will not be significantly deeper than the lowest level of the surrounding buildings which typically have local basements similar to that of the existing property at 4 Wilton Road.
- The building will be formed off of the stiff clay, which have a significant bearing capacity, and the foundations will be designed to reflect the recommended permissible pressures and ensure they will not be compressed by more than 10mm
- Removal of the existing construction will generate little relief and consequent heave in the London Clay that underlies which will in part be counteracted by the proposed structure.
- Excavations for the pins that will form the new lower ground floor walls can be undertaken using small excavators, which will be low-impact technique and known not to generate excessive vibration, without detriment to the existing, surrounding construction.

4.1 Drainage

The formation level of the proposed works is approximately 3.5m below the existing Ground Floor level. Historic boreholes indicate the ground to be dry.

Small rises in level are likely to be significantly less than the natural variations in the water table associated with seasonal variations. The local gravel sub-strata will still allow groundwater flows and the impact of the subterranean development on groundwater flows will be negligible as groundwater flows will find an alternative route.

In the event that ground water is encountered during the course of excavation a localised excavated sump of size 1m x 1m x 1m is to be formed at a level lower than the progressive base of excavation being carried out. A perforated shell is to be constructed to support the perimeter of the temporary working sump and placed within the excavated zone.

Any ground water which is present will naturally pull within the sump area and at this point a 50mm diameter semi trash water pump unit is to be introduced with a 50mm diameter discharge hose. Once located adjacent to the excavation level sump the solids pump hose is to be routed to the nearest adjacent manhole for discharge.

The proposed waterproofing that the concrete retaining walls and new floor slab will act as the primary barrier to water ingress with an internal drained cavity system will be installed to form a watertight enclosure.

The Delta cavity drain system will include a cavity drain sump to collect any water ingress which will be pumped to the main private drainage system. The system will include twin pumps and battery backup to increase protection in the event of an abnormal storm. A sump and drainage will also be provided in the front lightwell for this reason with protection to the door required to resist a 1m head of water in the lightwell.

The existing foul and storm wall sewer runs through the centre of the property. This will be reconfigured within the perimeter of the property and an additional sump included for the foul drainage from the new basement level.

4.2 Noise & Nuisance

Construction works generally are a source of noise and nuisance which can affect both operatives with the work site as well as neighbours and passing members of the public. Demolition and excavation works are particular sources of this potential harm, so it will be necessary during these works for the contractor to mitigate the extent and impact of noise, dust, traffic and vibration.

4.2.1 Noise

Generated by the mechanical equipment used to demolish existing construction and excavate for the new lower ground floor; Mitigated by using electrical equipment where possible and mufflers or attenuators on diesel engines or generators, by working only within agreed and designated hours;

4.2.2 Dust

Generated by excavation works and the transfer of arisings from the works area to the disposal skip or wagon; Mitigated by damping conveyors when in operation, by installing a weatherproof cover over the site, by washing-down vehicle wheels before leaving site;

4.2.3 Traffic

Generated by delivery and removal vehicles travelling to and from site; Mitigated by establishing a traffic management plan, by identifying and using routes appropriate to the vehicles, by scheduling vehicle movements to avoid peak traffic periods, by ensuring vehicles are low-emission standard

4.2.4 Vibration

Generated by use of heavy breakers for sustained periods and by heavy vehicles; Mitigated by using light, hand-held and electrical breakers, by avoiding excessively heavy vehicles.

4.2.5 Protection

Robust hoarding will be erected around the site, front rear and sides, to secure the site from intrusion as well as provide protection to neighbours and passing public from noise, dust and arisings material

5 Conclusion

The development is within firm, stiff London Clay of substantial bearing capacity and will not lead to or generate movement beneath or around the plot; heave potential following excavation will develop but more than 50% of this will be relieved by excavation, a further 50% of the residual will be relieved during the works period; the remainder will be managed by the weight of the existing and added construction. Furthermore:

- The area is not within a flood risk zone identified by EA.
- There is no ground water to affect or be affected by the development.
- The new development will not influence or divert surface water drainage which will still be managed by the existing system.
- The works or completed development will be executed in manner that will preserve and protect neighbouring structures, which are close enough to be impacted.
- The construction sequence and strategy will ensure that surrounding foundations and buildings will not be affected by the new construction, which will be formed off firmer & stiffer formation and so will not consolidate when complete and loaded.
- The site is on level ground in any case but, notwithstanding this, the construction techniques and sequences proposed minimises the risk of instability, ground slip and movement.
- There are no critical utilities or infrastructure beneath the site that cannot be relocated easily to accommodate the construction.
- The main surrounding roads are wide enough and without tight bends or corners that will hinder or prevent site traffic and will not cause site traffic to hinder or delay local and residential traffic

Appendix A [Historic Borehole Logs]

TQ 16NE/44

B/H Site: SURBITON			B/H No.: TQ 16/50/B
Rig Type: Ruston Bucyrus 60RL	Elevation(m)	Date 2.10.86 - 31.10.86 and 12.1.87 - 5.3.87	

Depth(m)	Lithology	Symbolic Log	Stratigraphy	Reduced Level (m)	Sample/ Test Type	Water Content(%) Porosity	Permeability (m/sec)
5	Soil, silty clayey sand and flint gravel		DRIFT				
90	CLAY: Olive grey(5Y3/2) slightly silty becoming silty clay		LONDON CLAY		Small Disturbed Bag Samples		
100	CLAY: Greenish grey(5G6/1)mottled greyish red(1CR4/2),dark reddish brown (10R3/4),light bluish grey(5B7/1)silty clay 95.00-95.50m Greenish grey(5G6/1) clayey very silty fine sand below 97.00m :becoming moderate yellowish brown(10YR5/4)mottled greenish grey(5G6/1), moderate reddish brown(10R4/6) below 101.00m :becoming medium grey(5N5) mottled red greyish purple(5RP4/2)and yellowish/orange(10YR6/6).Pockets of dark reddish brown(10R3/4)and moderate brown (5Y4/4) below 105.00m :becoming greenish grey (5G6/1)mottled red brown(10R4/6) and light brownish grey(5YR6/1)		WOOLWICH AND READING BEDS				
105							

COMMENTS: 1.Continuous U100 coring between 93.00 and 116.00m
2.Bulk bag samples between 116.00 and 124.00m due to "blowing-running sands"
3.Large groundwater inflows between 107.00-110.25m and also below 113.00m with the water levels rising rapidly to within 10m of the ground surface

RECORD OF BOREHOLE No: 3

Location : 29, PORTSMOUTH ROAD, KINGSTON
Contract No. : F69/751
Type of Boring : Shell and Auger
Date (started) : 15th October, 1970.

Borehole Dia : 8ins. and 6ins.
Casing : 8ins. to 20ft.
Ground Level :

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0'-0"	1'-0"	GRAVEL
		2'-6"	D	1		1'-0"		
		5'-0" (N=16)	D	2			10'-0"	Firm brown silty very clayey SAND with fine gravel in parts.
		7'-6"	D	3				
		10'-0" - 11'-3"	U	4		11'-0"		
		12'-6"	D	5			7'-0"	Medium dense sandy coarse, medium and fine GRAVEL.
		15'-0" (N=23)	D	6				
		17'-6"	D	7		18'-0"		
		20'-0" - 21'-1"	U	8				
		22'-6"	D	9				
		25'-0" - 26'-3"	U	10			42'-0"	Stiff grey silty CLAY becoming very stiff with depth.
		27'-6"	D	11				
		30'-0" - 31'-1"	U	12				
		32'-6"	D	13				
		35'-0" - 36'-1"	U	14				
		37'-6"	D	15				
		40'-0" - 41'-0"	U	16		40'-0"		/Cont'd....

REMARKS:

Water encountered at 14ft. Seepage sealed at 20ft. by casing.

SCALE 1" = 5'

Foundation Engineering Ltd.

RECORD OF BOREHOLE No: 3

Location : 29 PORTSMOUTH ROAD, KINGSTON
Contract No. : F69/751
Type of Boring : Shell and Auger
Date (started) : 15th October, 1970.

Borehole Dia : 8ins. and 6ins.
Casing : 8ins. to 20ft.
Ground Level :

Sheet 2 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						(40'-0")		
		42'-6"	D	17				
		45'-0" - 46'-5"	U	18				
						42'-0"		Very stiff grey silty CLAY.
		47'-6"	D	19				
		50'-0" - 51'-0"	U	20				
		52'-6"	D	21				
		55'-0" - 56'-0"	U	22				
		57'-6"	D	23				
		58'-6" - 59'-6"	U	24				
						60'-0"		End of Borehole.

REMARKS:

SCALE 1" = 5'

Foundation Engineering Ltd.

Department of the Environment CIVIL ENGINEERING LABORATORY Cordington	Investigation No. FGE / 1515	Appendix A Sheet No. 4
T. E. Extension	SURBITON	

BOREHOLE LOG TQ 16NE/40b

Borehole No 2
Ground Level 34·6m A.O.D
Date 15th - 18th December 1981

Note:-
1. Light Cable Percussion Boring to 25·0m
2. Casing 200mm dia. installed to 3·0m
3. Piezometer installed response zone from 13·0 - 19·0m

Description of Strata	Legend	Sample	Depth (m)	O.D. (m)	Remarks
					Scale 1:50
MADE GROUND:- Black, sandy, clayey silt with recent roots, occasional pieces of gravel & bricks			G.L	34·6	
MADE GROUND:- Brown soil with cobbles			0·6	34·0	
MADE GROUND:- Brown, gravelly, silty coarse, medium and fine sand with occasional leaves and recent roots		117	0·7 1·2	33·9	
MADE GROUND:- Orange brown gravelly, coarse medium and fine sand with abundant pieces of brown clay		200	1·8 2·0 2·5	32·8	
MADE GROUND:- Friable brown silt with abundant mostly coarse gravel		48	3·0 3·5 4·0	31·6	
CLAY:- Firm becoming stiff, fissured and laminated, brown with a little grey, silty, with occasional thin laminations of dark brown silty fine sand and occasional shell fragments. Abundant clusters of gypsum crystals occur to (WEATHERED LONDON CLAY) 5·5m	WLC	35 44	4·5 5·0 5·5 6·5 7·0	30·1 27·6	
CLAY:- Stiff to very stiff, fissured and laminated, grey varying to brown grey with isolated shell fragments	LC	128	8·0 8·5		Possibly collapse of material from between 3·0 and 4·5m caused disturbed and softened zone from 9·0 to 9·5m
Softened and disturbed with pieces of chalk from 9·0 to 9·5m (LONDON CLAY)		117	9·5 10·0		

Department of the Environment
CIVIL ENGINEERING LABORATORY Cordington

Investigation No. FGE/1515

Appendix A
Sheet No. 5

T. E. Extension

SURBITON

BOREHOLE LOG TQ 16 NE/40b

Borehole No 2 contd.
Ground Level
Date

Note:-

Description of Strata	Legend	Sample	Depth (m)	O.D. (m)	Remarks
					Scale 1:50
CLAY:- as described on sheet 4 becoming very silty with irregular pockets of dark grey silty fine sand from 10.5m (LONDON CLAY)	LC	•	10.0	24.6	
			11.0	23.6	
CLAY:- Friable, dark grey, sandy very silty, with abundant irregular pockets of light grey and light brown silty fine sand and occasional fossil roots (LONDON CLAY)	(LC/S)	148 I	11.3	23.4	From piezometer 12 & 22.12.81
			11.5		
		•			
		109 I	12.5		
			13.0		
		•	13.5	21.1	
CLAY:- Stiff to very stiff, fissured grey, slightly sandy, very silty with some pockets of light brown silty fine sand and brown silt and scattered shell fragments		151 I	14.0		
			14.5		
		•			
		107 I	15.5		
			16.0		
	LC	•			
		116 I	17.0		
			17.5		When borehole left at 17.5m overnight, water entered and rose to 16.0.
		•			
		44 II	18.5		Undisturbed sample attempted, no recovery. Bag sample taken from 18.5m to 18.7m
			18.7		
...laystone nodule encountered at 18.7m (LONDON CLAY)					
...AY:- as described on sheet 6 (LONDON CLAY)	LC	•	19.5	15.1	
			20.0	14.6	

Department of the Environment CIVIL ENGINEERING LABORATORY Cardington	Investigation No. FGE/1515	Appendix A Sheet No 6
T. E. Extension	SURBITON	

BOREHOLE LOG TQ16NE/40b.

Borehole No 2 contd.
Ground Level
Date

Note:-

Description of Strata	Legend	Sample	Depth (m)	O.D. (m)	Remarks
					Scale 1:50
			20.0	14.6	
CLAY:- Stiff to very stiff, fissured, laminated in places, grey, silty, with isolated horizontal laminations of light brown silt Gray brown in colour from 21.0m to 22.5m Isolated nodules of pyrite present at 22.5m	LC	101	20.5		
			21.5		
		191	22.0		
		200	23.0		
			23.5		
(LONDON CLAY)		200	24.5		
			25.0	9.6	End of borehole

Appendix B [Procedures For Control Of Noise, Dust & Nuisance]

To control the disturbance due to noise and vibrations, all works on site will be restricted to the hours of Monday to Friday 8 am to 6 pm, Saturdays 8 am to 1 pm. Works that create excessive noise and/or vibration are prohibited, as are any works on Sundays and the bank holidays. The contractor employed to undertake the work will be a member of the considerate constructor scheme.

Appropriate measures will be taken to keep dust pollution to a minimum, which are compliant with the Local Authority SPD. Such measures will include the use of water to suppress dust and soil being excavated from reduced level, covers for conveyors and skips, and barriers installed around dusty activities that are undertaken externally.

All work will be carried out in accordance with BS 5228-1:2009 and BS 5228-2:2009.

All works will employ Best Practicable Means as defined by section 72 of the Control of Pollution Act 1972 to minimise the effects of noise and vibration. All means of managing and reducing noise and vibration which can be practically applied at reasonable cost will be implemented.

The following measures will be taken:

- Consultation/ communication with neighbours/affected others prior to the start of the works.
- Use only of modern, quiet and well-maintained equipment, all of which will comply with the EC Directives and UK regulations set out in BS 5228-1:2009
- Use of electrically powered hand tools rather than air powered tools and a compressor will be used for to the minimum extent practicable
- Avoidance of unnecessary noise (such as engines idling between operations or excessive engine revving, no radios, no shouting)
- Use of screws and drills rather than nails for fixing hoarding.
- Careful handling of materials, so no dropping off materials from an excessive height (no more than 2m) into skip etc.
- Ensuring that the conveyor is well maintained with rollers in good working order and well oiled.
- Isolating the neighbouring properties from vibration /breaking out work where practicable.
- Collection/delivery vehicles will not loiter/wait in the area before the allowed times

- No site run-off of water or mud until the water has been left to settle and is free from particles

During Demolition:

- Special Care to ensure the site is closed-over
- Dust suppression with water if necessary if needed (recommended)
- Cutting equipment to use water suppressant or local extraction & ventilation

Appendix C Movement Monitoring

This movement monitoring specification relates to the Party Wall between No's 2 & 4 Wilton Road and the neighbouring property at 6 Wilton Road

The proposed works at 4 Wilton Road involve the formation of a new three storey structure with a basement, replacing a delipidated two storey Victorian property. The proposed basement will be formed from traditional underpinning sequence of reinforced concrete retaining walls with a ground bearing RC slab. The superstructure (above the concrete ground floor slab) will be load bearing masonry, with timber floors with steelwork locally bearing into the party wall.

Monitoring will start prior to the demolition of the existing building and may require a revised base set and new monitoring points once the basement dig commences. This will allow background sets of mean data to be obtained, to confirm the feasible accuracy of the readings.

The site excavations and substructure works up to finished ground slab stage have the potential to cause vibration and ground movements in the vicinity of the site due to the following:

a) Demolition of existing building exposing the party wall and the provision of temporary works
b) Courtyard retaining walls and lower ground terrace adjacent to the rear garden of 2 & 6 Wilton Road
c) Traditional reinforced concrete underpinning to the party wall with between 2 & 4 Wilton Road
d) Excavations within the site

The purpose of the Monitoring is a check to confirm building movements are not excessive and within the agreed specification.

This Specification is aimed at providing a strategy for monitoring of potential ground and building movements at the site.

This Specification is intended to define a background level of monitoring. The PC may choose to carry out additional monitoring during critical operations.

Existing building comprised two stories above ground and was constructed from traditional materials with masonry walls internal walls upto first floor with timber walls above. Timber floors supported on the load bearing internal walls with evidence of historic opening up through the use of downstand steel beam. This structure has been demolished, with the retention of the return walls/piers to the front/rear elevations, internal central spine wall at ground floor and the internal

chimney breasts. The neighbouring properties are of Victorian era construction, with load bearing masonry walls externally and internally at ground floor, with load bearing timber partitions and floors above.

1 Equipment to be used

Leica TCRP 1201 one second total station. The instrument will be up to date calibrated and serviced according to manufacture recommendations:

- Angular standard deviation 1” arc
- Distance standard deviation 3mm + 2ppm (For Retro targets)

Please note the standard deviation values are related to precision of the instrument e.g. measurement of the correct distance.

All instruments are to be adequately protected against any damage from construction plant or private vehicles using clearly visible markings and suitable head protection e.g. manhole

2 Accuracy

The frequencies of monitoring for each Section of the Works are given in section 6.

The following accuracies/ tolerances shall be achieved:

- Party Wall settlement +1.5mm
- Crack monitoring +0.75mm

Please note accuracy is best described as measuring the same distance repeatedly over time.

3 Survey Control

Multiple new survey control will be established away from the zone of influence outside of the site.

These will be placed on stable structures and act as a reference to all readings. Control positions will be arranged so as to be rigid so that the position of the control stations will be established sufficiently accurately.

Attachment of Tell tales or Demec Studs to accurately record movement of significant cracks, noted during visual inspections.

The number and precise locations of instrumentation may change during the works; this shall be subject to agreement with the Principal Contractor (PC).

4 Monitoring Positions

The location of targets will be on the exposed flank wall of No. 6 Wilton Road, typically three on the corners of the exposed wall (only required during the basement construction. Prior to demolition four targets will be required on 2 Wilton Road, (2 front and 2 back), then two additional targets to the exposed party wall during the basement construction.

Survey targets will be 25mm x 25mm Retro targets fixed to bare brick or if the angle of observation is too acute, we will install fitted brackets which will be glued. Targets will be removed after the project and by the use of a degrading adhesive the existing surface will not be damaged.

5 Frequency of Monitoring

The frequency of the readings at each stage will be as follows:

Demolition: Initial monitor prior to demolition and then weekly during

Pre-construction - Monitor twice to set new baseline

During construction - Take readings from all targets weekly for the first 4 weeks of the project and then on a fortnightly basis, subject to trigger levels remaining green as per section 7.

Post-construction - Readings are to be taken monthly over a period for 6 months after the structural works and temporary props have been removed for the subterranean works and during the superstructure works

6 Reporting and Presentation of Information

The schedule and format of our measurements, data processing and reporting shall be tabular and graphical to enable the simple interpretation of data. Differences from the base line readings will be calculated and presented.

7 Trigger Levels

The method of construction by use of sequential underpins limits the deflections in the party wall.

The maximum movement across the length of the party wall must not exceed 5 mm.

Between the trigger points, which are no greater than 2 m apart, there should be no more than 3mm movement.

During works measurements are taken, these are compared with the limits set out below:

GREEN (0-5mm) – Activities OK to proceed.

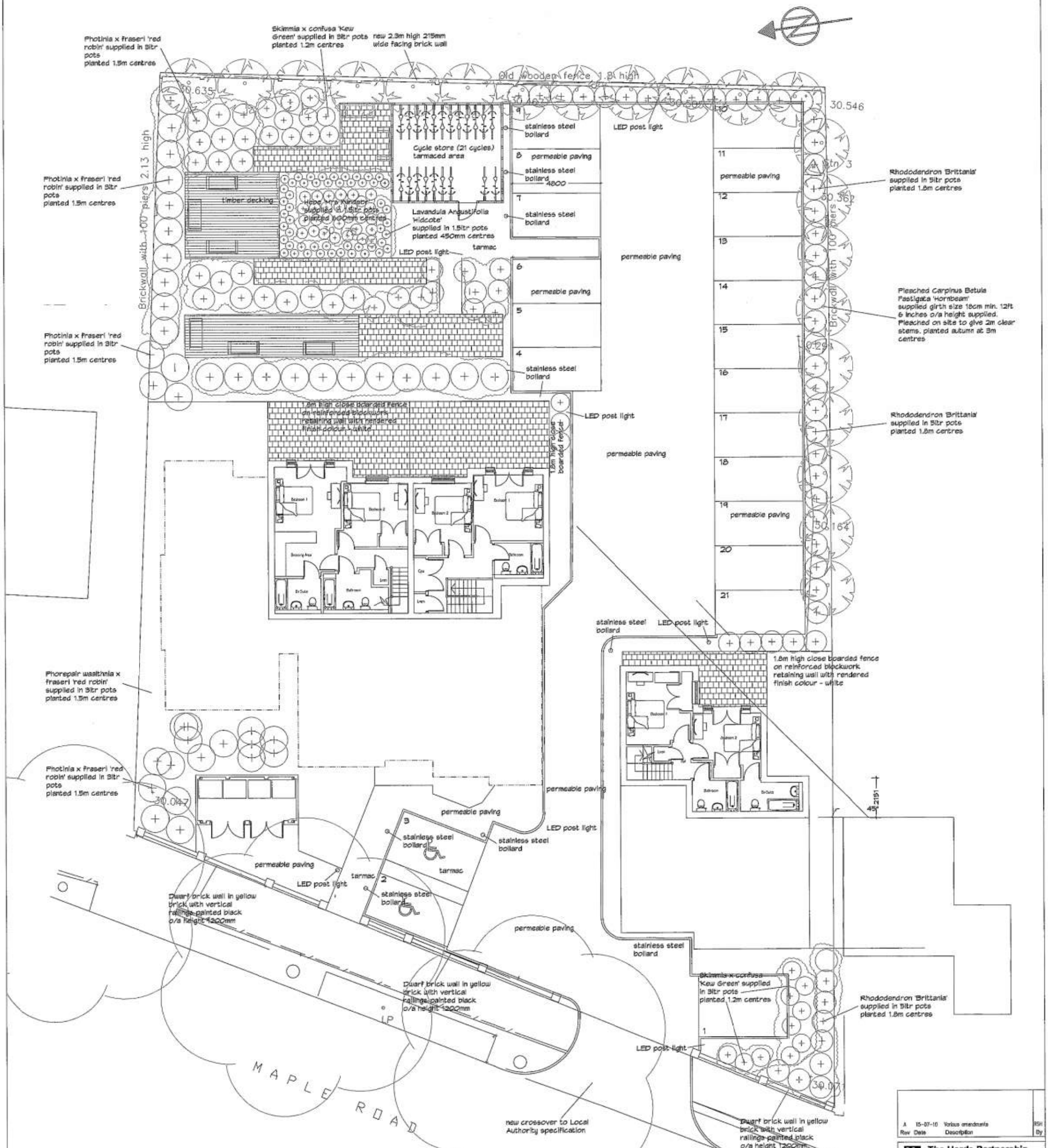
AMBER (5-10mm) – Increase the monitoring frequently (to after every pin), review of structural scheme and start implementing contingency measures if trends indicate the Red trigger may shortly be reached. [Showing recorded values are close to maximum projected settlement (say max. 80% of predicted settlement)]

RED (>10mm) - Implement measures to secure site, cease movements and stop all construction works. [Showing recorded values are at, or above tolerable levels, exceeding serviceability limit states.]

Where maximum movements are recorded exceeding Amber/Red trigger values these should immediately be reported to the design team along with a description of all recent on- site activities. A review of the results should be undertaken and readings re-checked to confirm their accuracy, the design team should not assess the movement focussing solely on the affected areas but also review the site as a whole, checking for non-proximate contributory factors. Appropriate repair specifications and reviews of working practices should be specified and implemented to minimise risk of progressive settlement.

Where required, measures may be implemented or prepared as determined by the specific situation and combination of observed monitoring measurement data.

Appendix D 100-104 Site Plan



A	15-07-10	Various amendments	RSH
Rev	Date	Description	By

The Hards Partnership
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Clients
Grayswood Properties Limited.

Project
100-104, Maple Road, Surbiton, Surrey.

Title
Basement Floor Plan.

5 0 5 10 Metres.

Drawn RSH Checked
Date : April 2010 Paper A1 Scale 1:100 @ A1

Drawing Number New Scheme-003A.

Rev fde 10/16172 KC

A1

Appendix E Environment Agency Flood Map

Flood map for planning

Your reference	Location (easting/northing)	Created
98 Maple	**517911/167658**	**27 Feb 2023 15:12**

Your selected location is in flood zone 1, an area with a low probability of flooding.

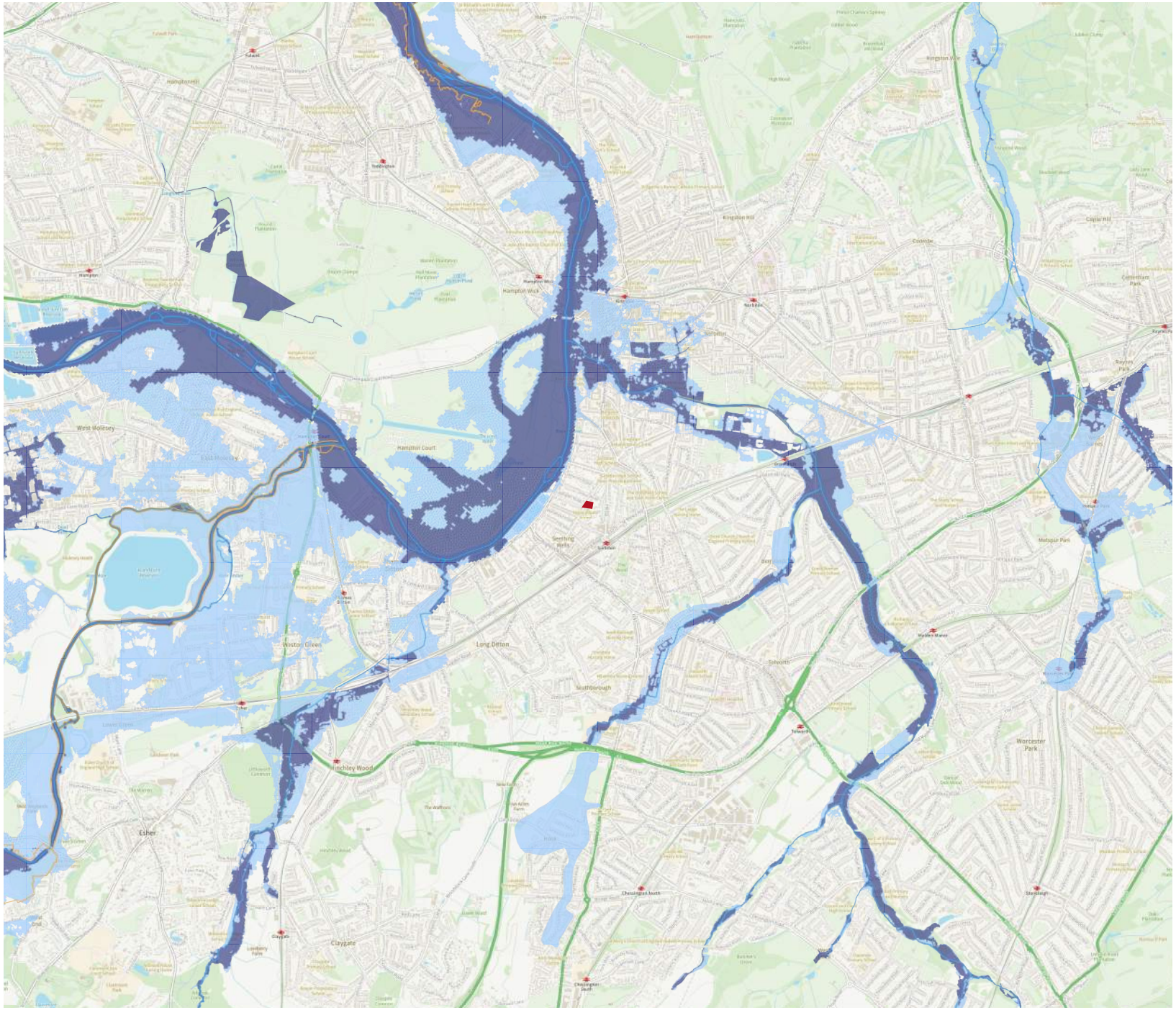
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



98 Maple

517911/167658

1:50000

27 Feb 2023 15:12

0 500 1000 1500m