Basement Impact Assessment: 22 Ferncroft Avenue

(Groundwater)

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Prepared for

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Basement Impact Assessment: 22 Ferncroft Avenue

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Groundwater

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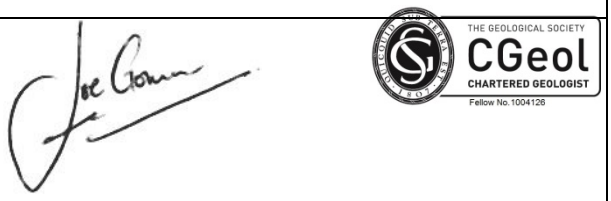
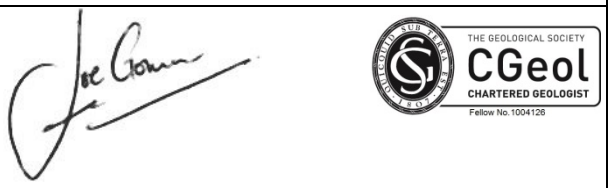
Checked by	Joe Gomme (CGeol)	
Reviewed by	Joe Gomme (CGeol)	

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REPORT SUMMARY

The assessment findings are summarised as follows:

2. Impacts to groundwater flows and related flooding	High	
	Med	
	Low	

Key:			
	High		*There is a high potential risk*
	Med		*There is medium potential risk*
	Low		*There is a low potential risk*

RECOMMENDATIONS (FOR NEXT STEPS)

The development described in this report will cause a small increase in impermeable surface area across the Site. The implementation of a Sustainable Urban Drainage System (SUDS) on site will allow for the capture of additional runoff water allowing it to drain naturally into the underlying geology; this will avert any potential increase in surface water runoff and related flood risk resulting from the development.

Groundwater was found to be present beneath the site within the underlying Claygate bedrock. Given the generally low permeability of the bedrock, the overall volume of groundwater flowing beneath the Site is considered to be low.

Given that the proposed basement would only penetrate the water table to a minor degree (one end of the proposed basement extends 0.1 m below the maximum recorded groundwater elevation) along with the low overall volume of water expected to be flowing within the Claygate Member, the impacts of the proposed basement on groundwater flows and related flood risk are considered to be minor. This was confirmed by groundwater modelling which calculated a groundwater elevation rise of only a few centimetres, a negligible change in the context of natural groundwater elevation fluctuations.

It is recommended that groundwater levels are monitored during construction, using the existing site boreholes and any new excavations, and the above conclusions should be reviewed if groundwater levels are found to be markedly different than those presented in this report.

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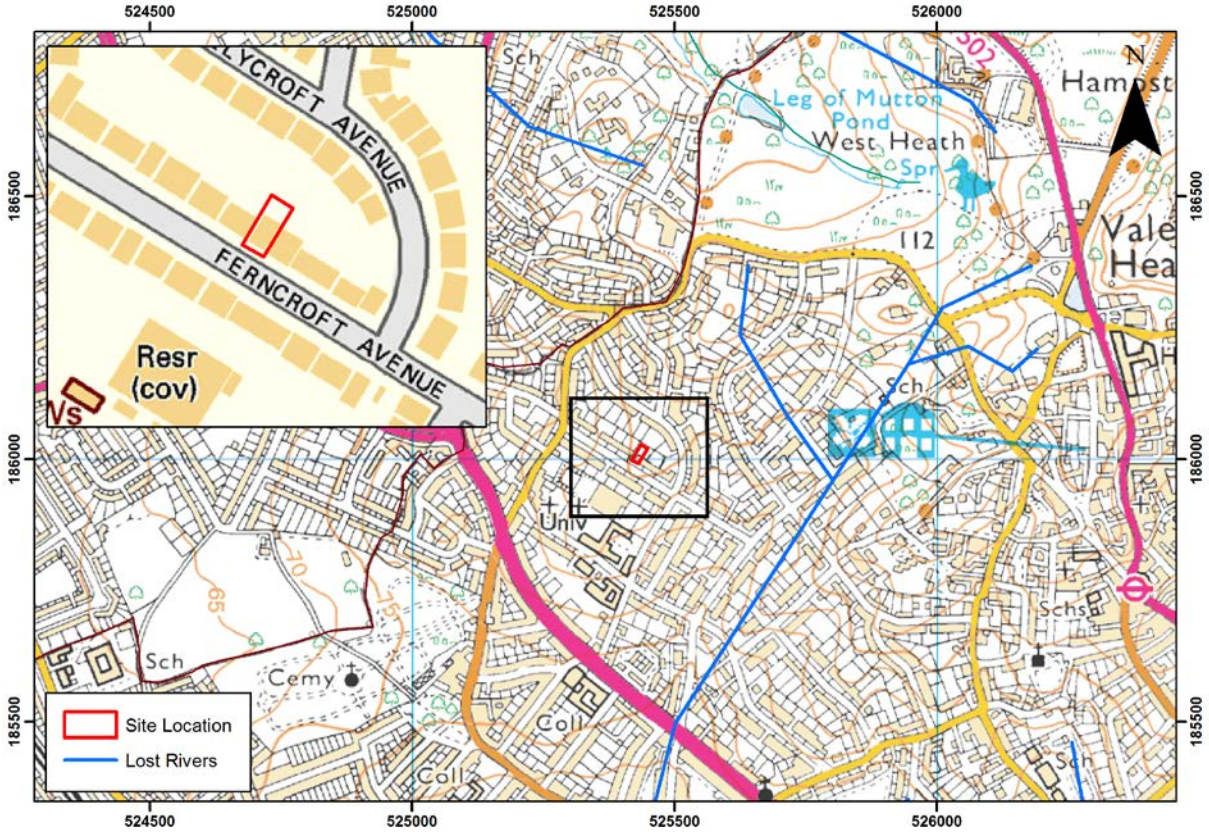
1 INTRODUCTION

1.1 Background

ESI Ltd (ESI) was commissioned by Mr Konstanty Zablocki in July 2014 to undertake a Basement Impact Assessment (BIA) for the proposed development at 22 Ferncroft Avenue, NW3 7PE (the Site). It is proposed that a new single-storey basement should be located beneath an existing three-storey house. The Site is at an elevation of approximately 100 mAOD, with a variation of almost 5 m across the Site (see Site survey plan in Appendix A) and on a hill crest feature with the topography sloping gently up from the south west to the north east. It is located at the approximate national grid reference of TQ 25433 86004 in the London Borough of Camden (Figure 1.1).

Figure 1.1 Site Location



This document is a desk study which considers the potential impact relating to the proposed basement development in terms of groundwater flow and flooding and complies with guidance issued by the London Borough of Camden. This report will be used for submission to the Planning Authority in support of the planning application for the proposed development.

1.2 Scope of Works

The scope of works requested was an assessment of the impacts of the proposed development on groundwater flow and groundwater levels, and the likelihood of groundwater flooding. This report outlines the hydrogeological conditions with relevance to construction of the basement at the property. The assessment conforms to the requirements of guidance for groundwater assessment set out by the London Borough of Camden which provides comprehensive guidance on planning applications for basement extensions. These guidelines for basement impact assessments (ARUP (2010), Camden Borough Council,

(2011)) have been consulted in order to complete a screening analysis of key hydrological and hydrogeological issues that will satisfy the relevant planning requirements.

The works undertaken follow the procedure outlined below:

1) Screening – this process aims to identify sites that are a priority for investigation.
2) Scoping – this process uses simple calculations to try to demonstrate whether the potential hazards identified in the screening stage pose a risk as a result of the development, and whether the actual risk is significant.
3) Recommendations – recommendation are made based on the outcome of the scoping stage.

1.3 Proposed Basement Works

The proposed redevelopment will comprise the installation of a new, single-storey basement beneath the footprint of an existing three-storey house. The maximum depth of the proposed basement is planned to be 2.3 mbgl at the front of the building and 3.3 mbgl to the rear and it is planned to be approximately 11 m by 20 m in area (precisely 209.9 m^2 overall). Site plans are shown in Appendix A.

2 SCREENING

The screening stage for Impact Assessment has been considered as set out in CPG4 (Camden Council, 2011) as follows.

2.1 GROUND WATER (Subterranean (ground water) flow screening chart (Figure 1, CPG4 (Camden Council, 2011))			
Impact question	**Answer**	**Justification**	**Reference**
1a) Is the Site located directly above an aquifer?	**Yes**	The Site is located upon the Claygate Member, described by the BGS as comprising "dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt. Ferruginous concretions and septarian nodules occur in places". This may contain high porosity, low permeability horizons within generally low permeability and low porosity material that is classified as a "Secondary A aquifer" by the Environment Agency. The logs of several borehole logs which are within close proximity to the site describe the local geology. Borehole 3 of the site investigation is immediately to the rear of the property and states topsoil/Made Ground to a depth of 0.5 m, underlain by sandy silty Clay to 5 mbgl. Silt lies below the clay to 6 mbgl which is the full extent of the borehole. Borehole 4 towards the front of the property has Made Ground to 0.3 mbgl with clay, silt and sand of the Claygate Member to the full depth of the borehole at 6 mbgl. Borehole TQ28NE119 is located 260 m to the south of the Site; this log states that the geology is Claygate Member to a depth of 5.8 mbgl. Beneath this depth London Clay is recorded to the full depth of the borehole.	Ashdown Site Investigation Ltd., 2014. British Geological Survey, 2014. Environment Agency, 2014.
1b) Will the proposed basement extend beneath the water table surface?	**Yes**	Borehole 3 of the site investigation is immediately to the rear of the property and water was struck here between 4 and 5 mbgl; it rose to 3.2 mbgl after one hour. Water strike in Borehole 4, at the front of the property, occurred at 5 mbgl with the water level recorded at 4.1 mbgl at the later visit. Since the total depth of the proposed basement is 2.3 mbgl at the front of the property and 3.3 mbgl to the rear, the basement may penetrate slightly below the water table towards the rear of the property.	Ashdown Site Investigation Ltd., 2014.
2) Is the Site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	A tributary of the "lost" River Westbourne runs c. 260 m to the north east of the proposed development. It is highly likely that this "lost river" and its tributary are culverted. There are no recorded wells within 100 m of the Site according to the BGS website. Given the local geology and topography there is the possibility of a spring line at the interface between the Claygate Member and the overlying Bagshot	British Geological Survey, 2014. Ordnance Survey Mapping. 2014. Barton, 1992. Arup, 2010

		Formation (sand) c. 100 m north of the Site. Spring lines may occur at the junction of two geological formations where there is a marked permeability contrast. However, since the upper part of the Claygate Member contains water on Site, it is likely that any water in the Bagshot Formation is in continuity with the Claygate and it is therefore unlikely that there will be a spring line in this area: water from the Bagshot Formation would be expected rather to pass down into the Claygate Member. Given this interpretation and the distance to the mapped junction between the formations, significant impact in this context is very unlikely.	
3) Is the Site within the catchment of the pond chains on Hampstead Heath?	**No**	The Site is not located within the catchment for any of the Hampstead Heath ponds.	Arup, 2008.
4) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	**Yes**	The introduction of the lightwell at the front of the property and the subterranean patio area to the rear of the property increases the impermeable surface area by 51.7 m^2.	Site Plans.
5) As part of the Site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SuDS)?	**Yes**	There will be will be a change to the total area covered by hard standing with the proposed development and there are plans to avoid an increase in run-off by implementing a SuDS scheme on site.	Pers. Comm. with architect July 2014.
6) Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	**No**	There are no known ponds or spring lines within close proximity of the Site. The nearest mapped surface water feature is the Leg of Mutton Pond located c. 680 m to the north of the Site.	Ordnance Survey Mapping.

3 SCOPING

3.1 GROUNDWATER (Subterranean (ground water) flow flowchart (Figure 1, CPG4 (Camden Council, 2011))			
Impact question	**Answer**	**Justification**	**Reference**
1a) Is the Site located directly above an aquifer?	**Yes**	The Site is located above the Claygate Member (comprising clay, sand and silt) which is classed as a "Secondary A Aquifer". Groundwater was discovered below the Site during the site investigation confirming that water is present. The Claygate is a heterogenous formation containing lenses of more permeable silts and sands within a predominantly low permeability material. As such, the overall volume of groundwater flowing within the Claygate beneath the Site is considered to be low, and confined to these more permeable layers of sands and silts within the formation.	Ashdown Site Investigation Ltd., 2014. British Geological Survey, 2014. Environment Agency, 2014.
1b) Will the proposed basement extend beneath the water table surface?	**Yes**	The proposed basement is likely to penetrate the water table at the rear of the property, at least at certain times. At Borehole 3 the highest groundwater level was recorded at 3.2 mbgl which is above the maximum basement depth of 3.3 mbgl. The basement should remain well out of the groundwater towards the front of the property where the proposed basement depth is 2.3 mbgl and the highest detected groundwater level was 4.1 mbgl. A relatively small proportion of the basement therefore is likely to intercept the groundwater limited to the far rear of the proposed basement. This relatively small impact on the water table has also been assessed quantitatively using modelling of the groundwater in the following section of the report.	Ashdown Site Investigation Ltd., 2014.
4) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	**Yes**	There is an increase in impermeable hardstanding due to the proposed lightwell and subterranean patio. The increase of 51.7 m^2 is an increase of 23.3% over the existing footprint of the current building (170.1 m^2) which is a relatively small increase when the size of the existing development is considered. The additional run-off from the hardstanding will be managed through a SuDS scheme (see below).	Site plans
5) As part of the Site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SuDS)?	**Yes**	The excess run-off from the additional hardstanding will be managed through an appropriately sized SuDS scheme to avert any increased risk of flooding offsite due to the proposed development. Rainwater falling on the area that is to become hardstanding currently infiltrates to ground or runs off naturally. Following construction this area will drain to the SuDS and hence will still infiltrate to ground. There may be a small increase in the amount of local infiltration because of the reduction in natural run-off and evapotranspiration, but this is not expected to be significant. The details of the SuDS scheme are not yet available, pending discussions with the Planning Authority, but more precise assessment of this could be done when details become available.	Site plans

4 GROUNDWATER MODELLING

4.1 Model Design

A two-dimensional scoping model has been developed of the area around the Site, to estimate the magnitude of groundwater level change in the vicinity of the proposed basements at The Site. The details of the model are as follows.

The basement is represented in the model as a block of impermeable cells within the relevant model layer (it is reasonable to assume that it is sealed as it penetrates the aquifer and therefore must be constructed to limit groundwater ingress). The neighbouring properties were included into the model purely as a visual representation as they do not possess basements and therefore do not influence groundwater flow.

Model results are compared between two scenarios, with the existing construction and with the proposed basement extending down to a lower elevation.

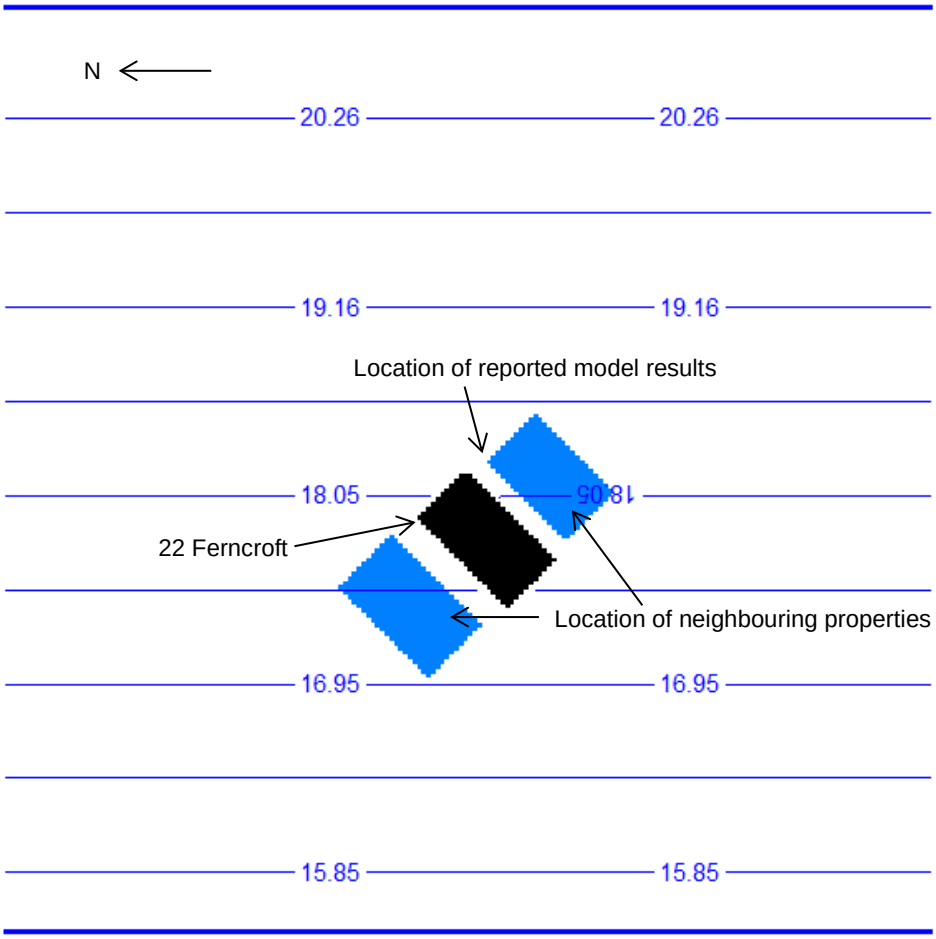
The conceptual model is of a thin aquifer (Claygate Member) overlying an essentially impermeable base (London Clay). The model has not been calibrated to groundwater level except to match approximately the observed hydraulic gradient and saturated thickness at the Site.

A sample output from the model, showing geometry, boundary conditions and groundwater heads is presented in Figure 4.1 below.

4.2 Model Parameters

- The model was developed using Groundwater Vistas, running MODFLOW in steady state mode.
- The model is made up from 40,000 cells arranged in a 200 x 200 cell grid; cell size is 1 m x 1 m.
- The aquifer is constructed of three homogenous layers; layer 1 thickness is 2.05 m (to represent the depth of the existing lower ground floor at the property); layer 2 thickness is 1.25 m (to represent the additional depth to the base of the proposed basement); and layer 3 thickness is 3.7, giving a total of 7m (estimated depth to London Clay, given that the Claygate was proven to a depth of at least 6 mbgl at the Site). All layers represent the same Claygate geology.
- Hydraulic conductivity is set to 0.1 m/day (taking a typical value of 10 m/d for fluvial sands (Hiscock 2009) multiplied by 0.01 given that only around 1% is estimated to be sandy material, and the rest low permeability silt and clay, which has typical hydraulic conductivity of less than 0.1 m/day).
- Hydraulic gradient utilised was 0.027; this is the average gradient of the London Clay established using up-gradient and down-gradient boreholes at a distance of approximately 600 m from the Site: borehole IDs TQ28NE102 & TQ28NE119. Heterogeneity within the superficial deposits means that the hydraulic gradients can vary significantly over relatively short distances; this method produces a value for the modelled area as a whole. The London Clay in this region forms an essentially impermeable layer and is the lower boundary of the Claygate superficial aquifer. For this reason it is used as a best estimate of the gradient across this area.

Figure 4.1 Scoping model grid and example results (numerical values represent groundwater elevation above an arbitrary datum)



4.3 Model Results

Without the proposed basement in the model, simulated groundwater level in the cell immediately adjacent to the up-gradient property to the north east (marked in Figure 4.1) was 18.24 m above an arbitrary datum. When the proposed basement was added to the model, the simulated groundwater level in the same cell remained at 18.24 m above datum indicating a negligible/non-existent rise at this location.

4.4 Sensitivity Analysis

There are few parameters that lend themselves to sensitivity analysis in this simple, steady-state model but hydraulic gradient has been varied to assess the range of likely outcomes. The range of sensitivity values used was 0.015 to 0.05; this was conducted by raising or lowering the general head boundary to the north and south of the model domain. This range was used to reflect how the modelled local groundwater would react to approximately doubling and halving of the hydraulic gradient. These are not based upon observed values but used to check that the model is operating as expected i.e., to see how perturbation of parameters alters model output. Increases in the hydraulic gradient tend to cause an increase in the modelled groundwater flow leading to an increase in up-gradient groundwater level rise.

Under these parameters, the range of increase in groundwater level in the cell immediately to the north east of the proposed basement were as follows:

Table 4.1 Simulated rise in water table elevation post-construction

Hydraulic gradient	Change in water level post-construction
0.015	0.00 m
0.027	0.02 m
0.050	0.04 m

These results indicate the model was sensitive to changes in hydraulic gradient. The modelled water level rise was 0.04 m in the model cell adjacent to the proposed basement with a hydraulic gradient of 0.05 in this analysis.

The local gradient may be as high as the topographic gradient, which can be estimated at approximately 0.08 from OS mapping. Unfortunately such a gradient applied across a model of the scale needed makes the model unstable (using the simple scoping model to assess the site specific conditions). However, extrapolating from the table above, it seems likely that such a gradient would potentially give rise to a groundwater level increase of the order of 6 to 7 cm.

Furthermore, the hydraulic conductivity used in the model represents interconnected higher permeability horizons rather than isolated lenses which are typical of the Claygate Member. This represents a conservative modelling approach, since the change in water levels may be expected to increase if hydraulic conductivity is reduced. However, when modelled hydraulic conductivities were reduced (as far as 0.01), there was no significant variation in the modelled change in head.

5 CONCLUSIONS

Potential impacts of the proposed basement development on 22 Ferncroft Avenue have been considered as set out in the scope of works. The following summary conclusions are made.

5.1 Groundwater

- The proposed basement will be constructed to a maximum depth of approximately 3.3 m below ground level into the underlying Claygate Member. The Claygate Member is classed a Secondary A aquifer and is therefore likely to permit groundwater flow. No superficial deposits are anticipated on Site however; on-Site borehole records indicate that Made Ground is present.
- Groundwater is present beneath the Site. Investigation boreholes indicated a variable depth to groundwater, between 3.2 and 5 m below ground.
- The maximum planned depth of construction is 3.3 m below ground and this may therefore reach the groundwater table, although it is not expected to extend below it significantly or across the whole of the proposed basement.
- Modelling indicates that the resulting rise in groundwater levels will be of the order of a few centimetres: this is not considered significant, particularly because natural water level variations are likely to be much larger.

5.2 Drainage

- A SuDS system is proposed to allow infiltration of run-off from the additional proposed hardstanding resulting from the development, which is of the order of 50 m^2. The details of this system are not yet available, but the impact on groundwater is expected to be small because of the small size of the area to be drained.
- The SuDS system will avert any increase in run-off and therefore the development will not result in any additional surface run-off from the Site.

The overall risk from the proposed development is considered to be low, based on the above findings.

5.3 Recommendations

A watching brief should be maintained during construction, using the existing site boreholes and any new excavations, and the above conclusions should be reviewed if groundwater levels are found to be markedly different than those presented in this report.

If required, the likely impact of the SuDS on groundwater levels can be estimated once the design has been finalised; we note, however, that this impact is expected to be minor.

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Ordnance survey mapping, 1:10,000. © Crown copyright. All rights reserved. Licence number AL 100015683

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APPENDICES

APPENDIX A

Data from Client

INTRODUCTION

Soarbond received E Mail instructions on Thursday 28th. November 2013, from Mr. Roger Meadows, a director of the Architect's Company, "21st Architecture Ltd", on behalf of the Owners of 22 Ferncroft Avenue, NW3, Mr. and Mrs. Torns, to carry out a site Inspection of the property, its rear garden and location of trees, a check on the house fabric walling and house stability and integrity. Any other material information that could be added to this Basement Impact Assessment report was also noted.

This Basement Impact Assessment report has been updated in June 2014 to consolidate all of the information now available and to set out why we consider all of the requirements of Camden's Planning Department CPG 4 and DP 27 are satisfied for this small basement construction.

PART 1

Screening Assessment - Available Information:

The property is a medium sized, detached house built during the Edwardian period; about 110 years ago. It is close to the top of one of the many hills in Hampstead. The whole estate is residential with many rows of houses of similar construction and of similar age. In the last few years, many neighbouring properties have been extended and redeveloped following the granting of planning permissions that appear to need careful consideration by Camden before planning is granted. The present application will include a proposal for an 11 metre by 12.5 metre by 3.5 metre single storey, rectangular basement to be constructed under the footprint of the existing house with a small, rear light-well at the north east corner where an existing patio area occurs at the moment and with discrete light wells to the front.

The area to the rear of the house will be open to the elements. It will be approximately 3 metres by 4 metres. It will allow a rear garden access up from the basement. Similarly, there will be small well areas to the front of the house to allow diffuse light to the basement. The front garden is 10.0 metres in depth so the light-wells here are not considered as obtrusive and will be hidden, generally, from the footpath to the front of the house.

This area in Hampstead has a substantial slope from rear garden to frontage. There are typical step details employed to overcome varying levels from front to back. Additionally, there is a pronounced 1 in 17 slope down from the two neighbouring detached houses that form 24 and 26 and to the next two blocks along; i.e. 18 and 20 / 20A. However, this is less than the critical 1 in 8 (7°) slope.

We would ask that reference is made to the architectural drawings which show full scale ground, first and second floor renovation details, albeit, there will remain distinct room layouts on each floor.

A site investigation was carried out both for this property recently and for one of the neighbouring properties (18) a few years ago and this has allowed us to cross reference the strata and give a determination of the London Brown clay overlying the London Blue clay with the Claygate lenses of silty, clayey sands that make- up the geology of the first six metres in depth of the site.
The caveat that there may be significant changes within 20 to 30 metres has been noted but, we feel, it is unlikely to occur in this hilly area as we now possess 4 borehole details within 30 metres of each other.

The two soil information reports are now given in Appendices A and B of this report. The report for 18 Ferncroft Avenue has been reproduced by courtesy of the Owner of 18 Ferncroft Avenue, two doors away, and can be found under Appendix B.
Appendix A contains the soil sampling taken at boreholes 3 and 4 at 22 Ferncroft Avenue, NW3. The interpretation of the latest material is given under Appendix D which has been edited since its issue in May 2014. The editing has been carried out to ensure the references to attachments are consistent with this modified and ENLARGED document that follows CPG 4 layout requirements (2.7) and is split into parts for easy reference.

PART 2

CPG 4 Key Messages - Initial statements concerning this site.

1/ Using our engineering know-how, gained over 45 years of contracting work, both site based and design office based, as well as many, many years of consultancy in the foundation, basement, soil mechanics reporting etc., we can confirm that the proposals to form a concrete box with a structural steelwork and timber ground floor grillage will be similar to all other right-minded solutions to this question of forming a new basement.

The support given to the honeycombed " stiffness " box that is the superstructure will enhance the stability and carry loading to a lower more, appropriate founding level Pumping out a minor amount of water that will inflow the site (see inflow controls later) will not destabilize the soil locally nor HAVE ANY INFLUENCE of the bulb of pressure to the loading locations on the underside of the neighbouring properties (their foundation invert levels). There will be no measurable subsidence under this property or the neighbouring houses, one 3 metres away and the other 4 metres away, assuming works are carried out as described further in this report. All existing subterranean water flow lines will generally be maintained and where water previously found its way into site manholes, then this will probably continue.

2/ Forming a basement here will have NO influence on the natural environment as this zone is already given over to foundations, walls, under floor ventilation, piping, M and E cabling, ducting, insulation etc. Removal of this and taking the walling in concrete down to a lower level will not influence the local environment.

Consequently, the same applies to any consideration of amenity requirements and impacts for the " as built " environment. During works, the well system proposed for 5 or 6 wells formed around the perimeter of the works and stabilized using 100 mm diameter plastic pipes in 150 mm diameter drill holes, will keep the site dry for working purposes and the water arising will be pumped to the top of the hill and put to a temporary soak-away pit. We consider that the envisaged 30 to 40 litres per hour of pumping will be easily manageable and have no detrimental effect on the nearby environs.

3/ Camden confirm themselves that North Camden / Hampstead higher ground will have a very low flood risk attached to it. Further down the hill i.e. Finchley Road then the risk is likely to increase. We note that Camden have confirmed that their surface water drainage system, the river Fleet retention zone and totality of a likely torrential rain episode here would mean that Camden is far better prepared to cope with this occurrence.

Flooding is likely to be of smaller concern on Ferncroft Avenue than elsewhere.

4/ The Main Contractor will be constrained to form the basement in the classical manner, using classically available procedures, temporary works, sequencing, bracing,

monitoring of control points to ensure early warning signs of movement, which always remains a slight possibility, are not missed etc.
The applications to prevent movement and the selected procedures to give a " belt and braces " method of working are given later in this document.

PART 3

Further Screening Information additional to that given above.

The soil's geology for the site appears to be a stiff, slightly silty, sandy CLAY with silty, clayey sands where no proportion of the three particle sizes is in a majority. These lenses, known as the Claygate bands, occur over or in some places under the weathered London Brown Clay overlying London Blue Clay. and will become much firmer with depth down to 10 metres and below. It would appear that there is a deep band of dense silty, clayey sand below the 4 metre level i.e. the level to which the Contractor will be digging and there appears to be a possibility of water seepage at this level. Great care in forming the foundations will need to be taken and this matter will feature in the documentation for tender as will suitable proposals to reduce the water ingress action.

The initial structural checks were carried out on the fabric of the house on 10th. December 2013. A fuller picture was available from this assessment. Some details, but not a complete structural assessment which would require exposing the house fabric in many areas and a full, written survey prepared, are given in here whilst a typical sketch of the site for reference purposes is given under Appendix C.

The house is suffering subsidence at the moment close to the plane tree at the north west corner of the house demise. The house has not been well maintained over the last 10 to 15 years and this gave us the possibility to study the house more carefully as renovation would have hidden most latent defects. There were various settlement cracks at the front of the house but many more towards the rear, especially close by the PLANE tree whose roots evidently have a great impact on the strip, concrete footings that go down to the assumed 1.0 metre depth. The plane tree is less than three metres away from the proposed house construction and there is discontinuity in the walling, some overturning. Cracking appears to have been repaired recently i.e. within the last 9 months. This matter will be addressed in full in the tender documents and during the redevelopment.

PART 4

Scoping Assessment - Extent of the Works:

The bulk of the main works will involve the full excavation to minus 4.0 metres of the footprint of the house with a new rectangular, patio section at the rear and a full width increase of basement forward of the principal front elevation. There will also be a partial demolition of internal stud or common brick walling together with major alterations to the ground, first and second layouts, including stairs.

The basement construction will be generally in concrete flooring and walls; formed as individual underpins on a " hit and miss " technique for 5 underpins in a sequence of 1,4,2,5,3. Each underpin will be tied to the next using reinforcement in the concrete. The new ground floor will be a grillage of new timber joists and structural steelwork grillage with a floating floor to separate basement from ground floor levels unless an alternative concrete beam and block floor construction is found to be cheaper and quicker. All the above is shown on the drawings included under Appendix E.

Internally, the basement concrete slab will be cast in a chequer-board style to reduce shrinkage. To achieve the above, soil excavation will proceed in such a way as to seal the exposed dig to formation level with concrete blinding and usage of plastic sheeting to prevent water ingress from below.
For house renovation, the remainder of the structural work will be in traditional timber joists, masonry, stud walling and steel beams, where necessary, to supplement the existing fabric which will be retained as much as physically possible. This will go some way to maintaining the heritage aspect of the house etc. Finishes will be as dictated in the Architect's schedules etc.

Qualifications:

To satisfy clause 2.11 of CPG 4, we confirm that this Report has been prepared by a Chartered Civil Engineer with 45 years experience of works. Within that time, such major projects as the M4 and M6 motorways where soil mechanics was a major factor in coal mining areas of Staffordshire for instance, multi storey housing, office and industrial block construction, pile and various foundation designs, formation of 5 housing basements within the last 10 years in London alone, major underpinning schemes including the largest underpinning scheme in Europe during the middle 90's when a whole estate in Basildon at Langdon Hills had to have its basement brick walling replaced by concrete underpins following attack by subterranean, waterborne chemicals etc.
All these various schemes were undertaken as designer or site engineer.

Secondly, that section concerning subterranean water flows on this site which will be of minor consequence here compared to major works in King's Cross, Fitzrovia, or Bloomsbury etc., has been signed off by Ashdown Soil Investigation Ltd., a commercial and well respected organisation who must be deemed acceptable in length of experience and knowledge of water movements below ground.

PART 5

Site Investigation and Study.

The four boreholes that make up the provided data for the two sites and which we propose to attach to this assessment to give a more rounded picture of the area are given under appendices A and B as indicated in part 1.
A soil desk top study as a report was previously prepared and sent to Camden.
It needs to be withdrawn now as it is based on two boreholes only.
The report given under appendix D is now the operative report for this site.

PART 6.

Basement Impact Assessment

The following tables address the specific requirements of Camden's Planning Guidance documents CPG 4 and DP 27 as screening information and we conclude that they show that a more detailed BIA does not need to be produced.

Subterranean (ground water) flow		Answers
Q1a	Is the site located directly above an aquifer?	No
Q1b	Will the proposed basement extended beneath the water table surface?	No
Q2	Is the site within 100m of a watercourse, well or potential spring line?	No
Q3	Is the site within the catchment of the pond chains on Hampstead Heath?	No
Q4	Will the proposed basement development result in a change in the proportion of hard surface/paved areas?	Yes
Q5	As part of the site drainage will more surface water than at present be discharged to the ground?	No
Q6	Is the lowest point of the basement excavation close to or lower than the mean water level in any local pond or spring line	No

Q4 At the rear there will be an approximate increase of 63% in hard surfaced areas (from 16% to 26%) which corresponds to a total proportion of 26% of the rear garden area being hard surfaced. These proportions are similar to those permitted. In addition there will be the area of the front light well and basement access that will be hard surfaced.

Slope stability screening flowchart

Q1	Does the site include slopes, natural or manmade, greater than 7°?	No
Q2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7° ?	No
Q3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7° ?	No
Q4	Is the site within a wider hillside setting in which the general slope is greater than 7° ?	No
Q5	Is London Clay the shallowest strata at the site?	Yes (refer to the attached site investigation)
Q6	Will any trees be felled as part of the development or are any works proposed within any tree protection zones where trees are retained	No

Q7	Is there a history of shrink/swell subsidence in the local area or evidence of such effects on site	Yes(refer to the attached structural report)

Q8 Q9	Is the site within 100m of a watercourse or potential spring line Is the site within an area of previously worked ground	No No
Q10	Is the site within an aquifer	No
Q11	Is the site within 50m of the Hampstead Ponds	No
Q12	Is the site within 5m of a highway or pedestrian right of way	No
Q13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.	Yes
Q14	Is the site over or within the exclusion Zone of any tunnels	No

Q5 & Q7 The soils report for a neighbouring property confirms that the soil is a stiff to a very stiff, silty clay becoming firmer with depth down to 5m. This soil should provide adequate bearing for the new underpinning foundations. Below 4 metre depth at the rear the soil becomes more sandy and water bearing. At the front the boreholes were not sufficiently deep to reach the sand strata, which is probably dipping to a greater depth because of the general slope of the ground bearing strata. Tests on the clay below the foundations showed it to have a high modified plasticity index (above 40 %) which, together with the presence of tree roots beneath the existing basement foundations, accounts for the recent settlement cracking that has been reported by neighbouring properties and confirmed here as well. There is cracking to the front corners causing cracks to category 2 to BRE Digest 251 : 1991 in the walls over. The proposed basement construction will have foundations below the tree roots and the desiccated clay. It should eliminate the settlement problem although the cracks in the superstructure will still require repairing. Recent redecoration appears to have hidden a lot of the cracking as the externals at higher levels rely on white painted rough render to hide distress in the fabric.

Q13 The foundations will be up to 3m deeper than those of adjacent properties. There are no party wall details to concern us as the basement construction can proceed after the issue of the 3m / 6m notices. It may be prudent to carry out a photographic survey of the paths to the boundary lines for future reference. All walling will be away from the boundary lines between Nos. 20 and 22 as well as 22 and 24. The basement will be formed using underpins with a reinforced concrete, 250 mm thick, retaining wall to the underside of the existing brick walls and constructed in 1.2m lengths connected with either steel dowel bars or continuous reinforcement to tie all of the underpins together. The side wall of No. 22 is separated from No. 24 by a passage way about 1.2m wide which will remain in place so this will avoid any effect on the foundations to No. 24. This same situation occurs between 22 and 20.

Surface Flow and Flooding

Q1	Is the site within the catchment of the pond chains on Hampstead Heath	No
Q2	As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No
Q3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	Yes (see comments on Q4 above)
Q4	Will the proposed basement result in changes to the profiles of the inflows of surface water being received by adjacent properties or downstream watercourses?	No
Q5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No

PART 7

Design and Construction : Basic Method Statement

a/ The minor demolition works will be carried out generally within the demise of the existing house and will not require any altered access or cause difficulties for the neighbours. These works will allow greater access to the under floor areas at ground floor level so that underpinning works can be carried out from within the property. There will be scaffolding erected within the site boundary to give access to higher levels of the property to allow completion works to windows, balconies, doors, walls and roofs.
There will be a requirement to positively fix the scaffolding to the shell of the house by using drill fixings and non-ferrous expanded bolt combinations into the brickwork. With short scaffolding tubes and circular bolt connectors, these can be used as restraints to the scaffold and allow it to carry storage loads and access ways.

b/ A set of six by 150 mm diameter wells will be drilled to approximately 6 metre depth and 100 mm diameter plastic pipe will be lowered into the dig before low capacity pump heads lowered into the bottom.
Further drill holes around the site where the number, depth and sizing will be determined by a specialist grouting company, will be formed so that grout injections can be carried out into the sandy silty clayey material and a form of concrete prepared around the site to reduce the inflow of water at any one time.

c/ The walls of the basement will be designed as reinforced concrete cantilevers from a spread, thickened footing as traditional construction. The design parameters for pressure on the walls will be in accordance with those recommended values given in the Reinforced Concrete Designer's Handbook (by Charles E. Reynolds and James C. Steedman) for the relevant clay soil type. In addition it will be assumed that pressure from ground water could be present to a level of minus 0.75 metres below ground level as this could easily happen after backfilling with clay instead of sand to a depth of retained material. The walls will also be designed to support a surcharge load of 2.5kN/m^2 on the surface of the ground adjacent to the wall as well as the effects of pressure from any existing foundations (especially to the neighbours). Each wall section will be checked for overturning and sliding in the temporary case and the reinforcement adjusted as necessary to take the worst case loading.

d/ The underpin walls and basement edge thickening beneath the house will be constructed in traditional hit and miss lengths of not more than 1.2m with the top of the wall packed with sand / 10 mm pea shingle : cement 3 : 1, dry mix with non shrink additive, rammed hard into the 75 mm gap between the concrete underpin and the cleaned bottom of the spread brick footing. Adjacent lengths will be connected with high tensile steel dowel bars or reinforcement. Steel dowels will also be used to tie the concrete to the underside of the stepped down brick walls. It is anticipated that these walls will be cast against the face of the excavated soil or against a temporary " concrete " plug following grouting.
For a typical sections see Appendix E.

e/ The walls to the rear side boundaries will be of similar construction except that the upper parts in top soil will require double shuttering. This procedure will maintain the stability of the ground and neighbouring properties at all times apart from minor disturbance of the soil at surface level.

f/ The floor of the basement will be checked for uplift due to possible water pressure and designed to span between the walls. It is likely that the slab will require reinforcing on each face and, depending on the ground conditions, it will probably be necessary to provide a layer of hardcore or MOT type 1 compacted stone and a layer of 50 mm blinding concrete before casting the basement slab on 1000 gauge polythene and 100 mm heavy duty insulation board.

The ground floor construction will be a combination of structural steel beams spanning between basement walls and "beam and block" precast concrete floor units or timbered joists and infill
" noise reduction" insulation and flooring.

g/ Further temporary works measures that will be part of the scheme are given as:-

Water arising from the 5 to 6 wells will be pumped to a 1 metre by 1 metre by one metre deep soak-away formed at the rear of the back garden i.e. at the top of the hill. The soak-away will contain special plastic boxes from Drain Station specifically for this purpose.

If any areas of underpin dig expose areas of virgin soil not stabilized with grout then we will include in the tender documents that the main Contractor shall use metal trench sheets or poling boards to stabilize the excavation prior to casting the concrete underpin.

h/ In the unlikely event that it is found that the soil under the house is unstable and

the grouting techniques have not been successful (although first indications are positive that grouting will be 100 % successful in this material) then as a fall back we may suggest to the Contractor that he considers the use of contiguous piling to 6 metre depths to 2form a ring around the house.

This is a fall back situation only and is an insurance method and not a front line proposal.

PART 8

Additional Information to BIA - Flooding:

The site is not in a location that is subject to flooding and with the ground sloping away from the site in two directions, future flooding does not appear to be a possibility as described in part 2, Camden accept this premise.

Springs:

At this elevational level, Ferncroft Avenue in Hampstead may be susceptible to the possibility of springs occurring where there is sufficient sand or gravel in the soil. The trial bore holes at 18 indicated that the soil below ground level was a stiff silty clay becoming stiffer with depth. There was also no sign of water or water bearing strata down to a depth of 4m. Below this, there was standing water in the boreholes. In

boreholes 3 and 4 where the soil was slightly varied and to different depths, the same argument about springs applies. This type of soil is unlikely to carry springs and there were no signs or any indication of surface disturbance giving evidence of spring water arising in the rear garden of 22.

Trees:

There are 6 significant, mature trees close by. A mature, plane tree grows less than 3 metres from the north-west corner of the house. Its girth is very large but it has been severely pollarded over the years and only four or five main branches remain. Again, this tree will need specialist attention to reduce its water intake. In the neighbour's garden to the north, there are three specimen trees, one ash and, apparently, two elder trees. These are 20 metres away and their influence is minimal at best. In number 24's garden there appears to be two mature fir trees with the nearest one some 15 metres away. The root system for these cylindrical conifers does not apparently influence the proposed basement slab or retaining walls.
The front of the house does not have any significant influences from pavement trees or front garden bushes and the like.

Neighbouring Properties

The property at No. 20 / 20A Ferncroft Avenue is a detached house with its walling being some 4.0 metres away from the location of underpins.
The boundary line, will, in all probability, see the reinstatement of an existing timber fence after the basement has been constructed. 24 is approximately 3.0 metres away from the underpin / house line.

On both sides, i.e. the 20 and the 24 sides, the wall of the proposed basement underpinning will be along the edge of the side of the passage. The basement wall will be constructed from the inside of the house in an underpinning sequence without affecting Nos. 20 and 24. For the basement extension at the rear, the back face of the new basement wall will be on the line of the gable wall and the 1.2 metre gap to boundary will be maintained.

Foul and Surface Water:

The proposed basement construction is below the existing part house basement. Consequently, all surface water arisings, be they from front well area, rear patio area (both rainwater) or from water penetration through the underpins or basement slab, will be directed to a new basement sump and water, thus accrued, will be pumped out to surface water main drainage manhole within the front house garden and then by gravity allowed fall to the existing surface water drainage into the road. New foul water arising will be similarly dealt with i.e. from collection in a second sump in the basement to the foul manhole in the front garden and away to the outfall into the road.

PART 9

Review and Decision Making - Summary:

The subject property is a medium sized, imposing, single family, detached dwelling formed, initially on 3 usable floors including a small basement for coal storage and food cold room. It had nominally four bedrooms but now could be considered to have six bedrooms. These properties do not have garages linked to the fronts or sides of the houses as there would have been stabling and a private family "landau" coach housing nearby.

The construction implications of a formation of a basement are indicated in the preceding parts. The assessment of the subterranean water flows, flooding and land stability when works, as described, have been carried out, are all satisfactory and an extended BIA does not need to be prepared at this stage.

All the processes indicated to ensure full stability of house, ground and neighbour's property (save the contiguous piling) are additive and will be incorporated in the tender documents for construction pricing.

Prepared by

Konstanty Zablocki B.Sc. (Hons.), C. Eng. MICE
for and on behalf of
SOARBOND LTD.,

Reference: 1250/Report File BIA - 2nd edition.
24th. June 2014

Appendix A

Soil Investigation for this site

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D

GEOTECHNICAL
AND
ENVIRONMENTAL
ENGINEERS

Date: 27th May 2014 **Our Ref:** LW25160

Konstanty Zablocki
Soarbond Ltd
17 Clarendon Road
Ealing
London
W5 1AA

Dear Konstanty,

22 Ferncroft Avenue, Hampstead
Ground Investigation

Thank you for your instruction on this project. Please find attached the logs and site plan, including explanatory notes, for the works recently carried out at the above site.

I have taken the opportunity to include a client feedback form and would welcome your comments on our performance. We look forward to working with you again in the near future.

Yours sincerely

T Howard.

Tim Howard
Ashdown Site Investigation Limited
Encl.

Prepared logs and site plan
Client Feedback Form

Head Office
The Old Dairy
Swanborough Farm
Swanborough
Lewes
East Sussex
BN7 3PF

Telephone
0870 777 1574

Fascimile
0870 777 1577

Website
www.AshdownSI.co.uk

Email
contact@AshdownSI.co.uk

Regional Office
Hertfordshire
(Contact via Head Office)

Managing Director
J.E.Bewick
BSc MSc CEnv CEng MICE

Company Secretary
V.Bewick
BSc MSc FRSS

Company Registration Number
242 6786

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U 'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo Sample not obtained.
U* Full penetration of sample not obtained.
U** Full penetration obtained but limited sample recovered.
Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D Disturbed Sample.
R Root Sample.
B Bulk Disturbed Sample.
W Water Sample.
J Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T Tub Sample
Vi Vial Sample
E Environmental Suite (including a jar sample, tub sample and vial sample)

In situ Testing

S Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the 'N' value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved. In the latter case, the symbols below are added to the test index letter:-
S(R) Refusal of standard penetration test. Blow count reported includes seating blows. Total penetration of refused SPT reported in mm in brackets on borehole record.
So 'Split spoon' SPT sampler sank under its own weight.
The test is usually completed when the number of blows reaches 50 (25 blows for seating count). The depths of both the top and bottom of the test drive are shown in the sample column on the Borehole Record. If a sample is not recovered in the sampler, a disturbed sample is taken over the depth of the test as boring continues.

C Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60º apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).

V Shear Vane Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

H Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

P Perth Penetrometer Test: See "In Situ Testing Notes" for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

2 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002) and Part 2 Principles of classification (BS EN 14688-2:2004) as well as the BS5930:1990 + A2:2010 code of Practice for Site Investigations.

Fine Grained Soils

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

Consistency	**Manual Test**
Very Soft	Soil exudes between fingers when squeezed in hand
Soft	Soils can be moulded by light finger pressure
Firm	Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling
Stiff	Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again
Very Stiff	Cannot be moulded and crumbles under pressure, can be indented by thumbnail

Based on BS EN ISO 14688-1:2002

The terms used for the designation of the undrained shear strength are as follows:

Undrained Shear Strength	
Extremely to Very Low	<20 kPa
Low	20-40 kPa
Medium	40-75 kPa
High	75-150 kPa
Very High	150-300 kPa
Extremely high	300-600 kPa

Based on BS EN ISO 14688-2:2004

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand penetrometer or shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

Coarse Grained Soils

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

SPT 'N' Value	**Relative Density**
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Greater than 50	Very Dense

ASHDOWN SITE INVESTIGATION LIMITED
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: BH3

Site Name: 22 Ferncroft Avenue, Hampstead, London

Job No.: LW25160

Start Date: 16/05/2014 | End Date: 16/05/2014

Standpipe Installation	Samples and Testing: Sample Type	Depths: From (m)	Depths: To (m)	Vane/ Pen Test N Value	DPSH Profile Blows/100mm (5 15 25)	Strata: Legend	Depth / Reduced Level	Strata Descriptions
							0.00	Ground Level
								Topsoil.
							0.30	
							0.50	MADE GROUND: Brown and black slightly gravelly silty sandy clay. Gravel is fine to coarse flint, brick, sandstone, clinker and ash.
	H	0.60		60				Firm brown orange and grey mottled slightly sandy silty CLAY with occasional pockets of orange sandy silt. (Claygate Member)
	H	0..90		90				
	D V	1.00		100				
	H	1.20		90				
	H	1.50		90				with selenite crystals below 1.50m depth.
	H	1.80		90				
	D V	2.00		>130				becoming stiff below 2.00m depth.
	H	2.10		115				
	H	2.40		90				
	H	2.70		115				
	D V	3.00		>130				becoming dark brown below 3.00m depth.
	H	3.00		140				
	H	3.30		90				
	H	3.70		90				
	D V	4.00		>130				
	H	4.10		140			4.20	
	H	4.50		225				Very stiff / hard dark brown grey and orange mottled slightly sandy silty CLAY with thiin lenses of orange silty sand. (Claygate Member)
	D H	4.90		170			5.00	

Remarks:

Groundwater seepage between 4.00m and 5.00m depth.

Standing water depth at 5.80m on completion, rising to 3.80m after 30 minutes and 3.20m after 1 hour.

Borehole collapsed to 3.60m after 1 hour.

Excavation Method: Dynamic sampler

Borehole Diameter: Various

Made By: DC

ASHDOWN SITE INVESTIGATION LIMITED
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: BH3

Site Name: 22 Ferncroft Avenue, Hampstead, London

Job No.: LW25160

Start Date: 16/05/2014 | End Date: 16/05/2014

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths From (m)	Depths To (m)	Vane/ Pen Test N Value	DPSH Profile Blows/100mm (5 15 25)	Legend	Depth / Reduced Level	Strata Descriptions
	V	5.00		>130				Medium dense brown and orange clayey sandy SILT with some fine to medium mudstone. (Claygate Member)
	D	6.00					6.00	
								End of Borehole

Remarks:

Excavation Method: Dynamic sampler

Borehole Diameter: Various

Made By: DC

ASHDOWN SITE INVESTIGATION LIMITED
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: BH4

Site Name: 22 Ferncroft Avenue, Hampstead, London

Job No.: LW25160

Start Date: 16/05/2014 | End Date: 16/05/2014

Standpipe Installation	Samples and Testing: Sample Type	Depths: From (m)	Depths: To (m)	Vane/ Pen Test N Value	DPSH Profile Blows/100mm (5 15 25)	Strata: Legend	Depth / Reduced Level	Strata Descriptions
							0.00	Ground Level
							0.30	Block paving (80mm) over, MADE GROUND: Grey fine to medium gravel of crushed rock sub base.
	H	0.40		90				Stiff brown orange and grey mottled slightly sandy silty CLAY with occasional pockets of orange sandy SILT. (Claygate Member)
	D	0.50						
	H	0.70		115				
	V			>130				
	H	1.00		140				becoming very sandy CLAY between 1.10m and 1.60m depth.
	H	1.30		140				
	D	1.50						becoming very stiff below 2.00m depth.
	H	1.60		115				
	H	1.90		170				
	V			>130				
	H	2.10		195				
	H	2.40		195				
	D	2.50						
	H	2.70		170				
	H	3.00		170				
	V			>130			3.10	
	D	3.50						Loose orange and light grey laminated slightly clayey silty fine SAND with laminations of firm grey CLAY and orange sandy SILT. (Claygate Member)
								becoming medium dense below 4.40m depth.
	D	4.50						
							5.00	

Remarks:

Groundwater seepage below 5.00m depth.

Borehole collapsed to 2.50m depth 20 minutes after completion.

Excavation Method: Dynamic sampler

Borehole Diameter: Various

Made By: DC

ASHDOWN SITE INVESTIGATION L•I•M•I•T•E•D
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: BH4

Site Name: 22 Ferncroft Avenue, Hampstead, London

Job No.: LW25160

Start Date: 16/05/2014 | End Date: 16/05/2014

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths From (m)	Depths To (m)	Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
	D H	5.50		90			6.00	Interbedded firm to stiff brown silty sandy CLAY, medium dense SILT and medium dense fine SAND with occasional thin beds of ironstone. (Claygate Member)
								End of Borehole

Remarks:

Excavation Method: Dynamic sampler

Borehole Diameter: Various

Made By: DC

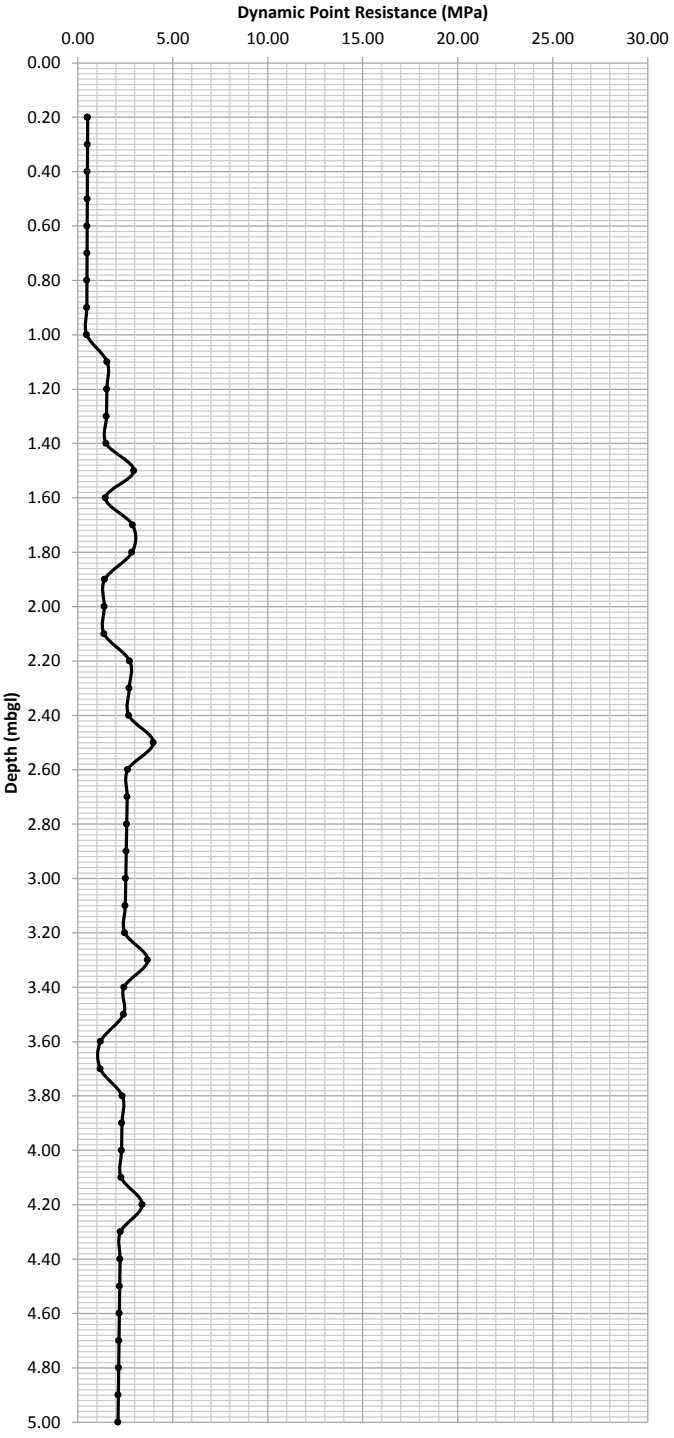
ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE 22 Ferncroft Avenue, Hampstead, London **Report Ref.** LW25160

Test Location Reference	BH3

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	0.3	0.33	0.54	0.52
0.30	0.3	0.33	0.54	0.51
0.40	0.3	0.33	0.54	0.51
0.50	0.3	0.33	0.54	0.50
0.60	0.3	0.33	0.54	0.49
0.70	0.3	0.33	0.54	0.49
0.80	0.3	0.33	0.54	0.48
0.90	0.3	0.33	0.54	0.47
1.00	0.3	0.33	0.54	0.47
1.10	1.0	0.10	1.81	1.55
1.20	1.0	0.10	1.81	1.53
1.30	1.0	0.10	1.81	1.51
1.40	1.0	0.10	1.81	1.49
1.50	2.0	0.05	3.62	2.95
1.60	1.0	0.10	1.81	1.46
1.70	2.0	0.05	3.62	2.89
1.80	2.0	0.05	3.62	2.85
1.90	1.0	0.10	1.81	1.41
2.00	1.0	0.10	1.81	1.40
2.10	1.0	0.10	1.81	1.38
2.20	2.0	0.05	3.62	2.74
2.30	2.0	0.05	3.62	2.71
2.40	2.0	0.05	3.62	2.68
2.50	3.0	0.03	5.43	3.98
2.60	2.0	0.05	3.62	2.63
2.70	2.0	0.05	3.62	2.60
2.80	2.0	0.05	3.62	2.57
2.90	2.0	0.05	3.62	2.55
3.00	2.0	0.05	3.62	2.52
3.10	2.0	0.05	3.62	2.50
3.20	2.0	0.05	3.62	2.48
3.30	3.0	0.03	5.43	3.68
3.40	2.0	0.05	3.62	2.43
3.50	2.0	0.05	3.62	2.41
3.60	1.0	0.10	1.81	1.19
3.70	1.0	0.10	1.81	1.18
3.80	2.0	0.05	3.62	2.34
3.90	2.0	0.05	3.62	2.32
4.00	2.0	0.05	3.62	2.30
4.10	2.0	0.05	3.62	2.28
4.20	3.0	0.03	5.43	3.39
4.30	2.0	0.05	3.62	2.24
4.40	2.0	0.05	3.62	2.22
4.50	2.0	0.05	3.62	2.21
4.60	2.0	0.05	3.62	2.19
4.70	2.0	0.05	3.62	2.17
4.80	2.0	0.05	3.62	2.15
4.90	2.0	0.05	3.62	2.13
5.00	2.0	0.05	3.62	2.12



Notes:

Hammer Mass	63.5	kg
Fall Height	0.76	m
Cone Area	0.0019	m^2
E_{theor}	473	J
Energy Ratio	0.7268	
Anvil Mass	1.25	kg
Rod Mass	8.79	kg/m

ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE 22 Ferncroft Avenue, Hampstead, London **Report Ref.** LW25160

Test Location Reference	BH3

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
5.10	3.0	0.03	5.43	3.15
5.20	3.0	0.03	5.43	3.12
5.30	4.0	0.03	7.24	4.13
5.40	3.0	0.03	5.43	3.08
5.50	3.0	0.03	5.43	3.05
5.60	4.0	0.03	7.24	4.04
5.70	4.0	0.03	7.24	4.01
5.80	4.0	0.03	7.24	3.98
5.90	4.0	0.03	7.24	3.95
6.00	4.0	0.03	7.24	3.92
6.10				
6.20				
6.30				
6.40				
6.50				
6.60				
6.70				
6.80				
6.90				
7.00				
7.10				
7.20				
7.30				
7.40				
7.50				
7.60				
7.70				
7.80				
7.90				
8.00				
8.10				
8.20				
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8.60				
8.70				
8.80				
8.90				
9.00				
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9.60				
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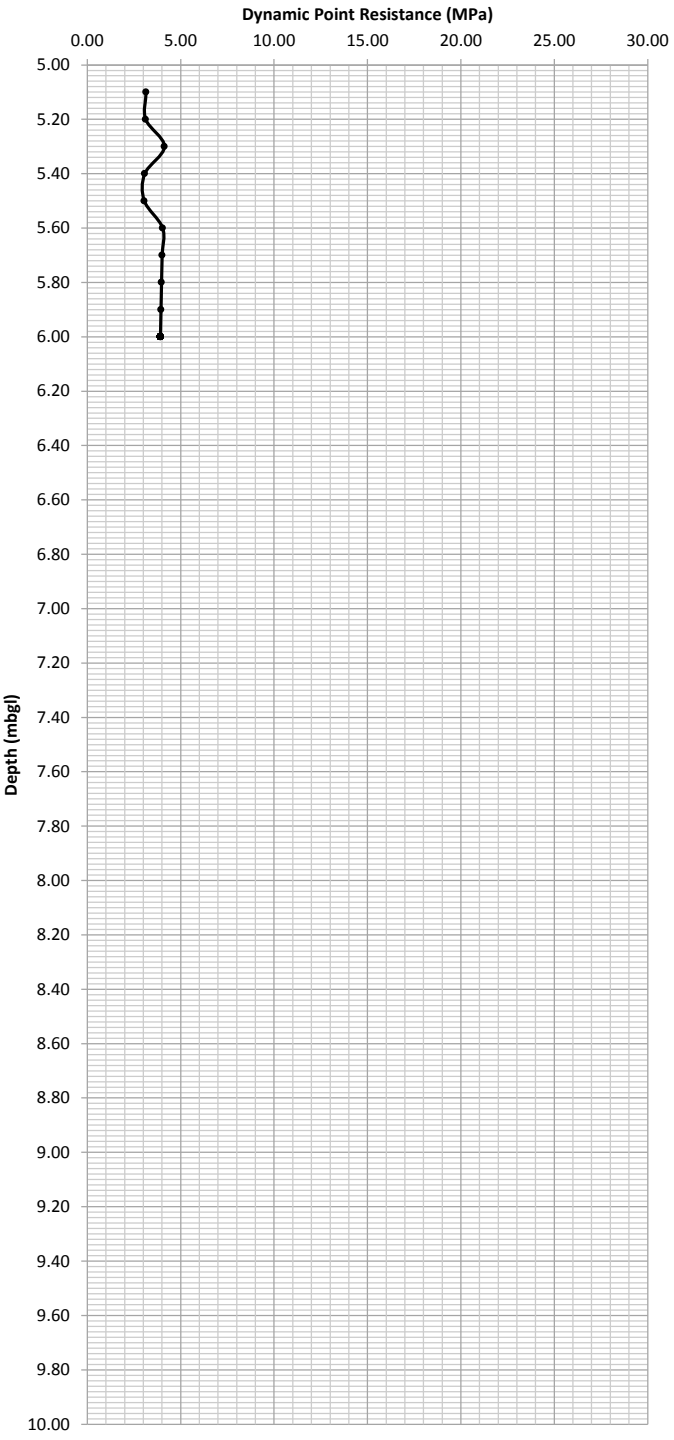
9.80				
9.90				
10.00				



Notes:

Hammer Mass	63.5	kg
Fall Height	0.76	m
Cone Area	0.0019	m^2
E_{theor}	473	J
Energy Ratio	0.7268	
Anvil Mass	1.25	kg
Rod Mass	8.79	kg/m

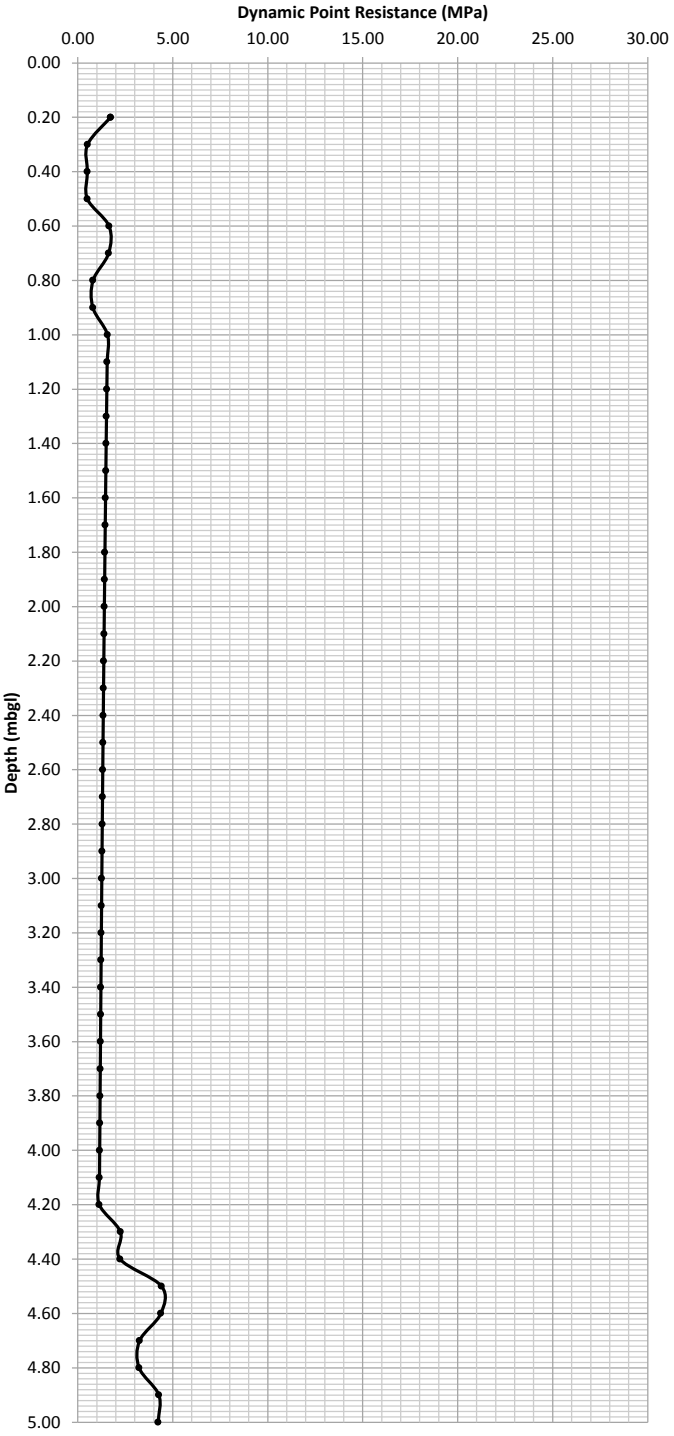
ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE 22 Ferncroft Avenue, Hampstead, London **Report Ref.** LW25160

Test Location Reference	BH4

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	1.0	0.10	1.81	1.73
0.30	0.3	0.33	0.54	0.51
0.40	0.3	0.33	0.54	0.51
0.50	0.3	0.33	0.54	0.50
0.60	1.0	0.10	1.81	1.64
0.70	1.0	0.10	1.81	1.62
0.80	0.5	0.20	0.91	0.80
0.90	0.5	0.20	0.91	0.79
1.00	1.0	0.10	1.81	1.56
1.10	1.0	0.10	1.81	1.55
1.20	1.0	0.10	1.81	1.53
1.30	1.0	0.10	1.81	1.51
1.40	1.0	0.10	1.81	1.49
1.50	1.0	0.10	1.81	1.48
1.60	1.0	0.10	1.81	1.46
1.70	1.0	0.10	1.81	1.44
1.80	1.0	0.10	1.81	1.43
1.90	1.0	0.10	1.81	1.41
2.00	1.0	0.10	1.81	1.40
2.10	1.0	0.10	1.81	1.38
2.20	1.0	0.10	1.81	1.37
2.30	1.0	0.10	1.81	1.35
2.40	1.0	0.10	1.81	1.34
2.50	1.0	0.10	1.81	1.33
2.60	1.0	0.10	1.81	1.31
2.70	1.0	0.10	1.81	1.30
2.80	1.0	0.10	1.81	1.29
2.90	1.0	0.10	1.81	1.27
3.00	1.0	0.10	1.81	1.26
3.10	1.0	0.10	1.81	1.25
3.20	1.0	0.10	1.81	1.24
3.30	1.0	0.10	1.81	1.23
3.40	1.0	0.10	1.81	1.22
3.50	1.0	0.10	1.81	1.20
3.60	1.0	0.10	1.81	1.19
3.70	1.0	0.10	1.81	1.18
3.80	1.0	0.10	1.81	1.17
3.90	1.0	0.10	1.81	1.16
4.00	1.0	0.10	1.81	1.15
4.10	1.0	0.10	1.81	1.14
4.20	1.0	0.10	1.81	1.13
4.30	2.0	0.05	3.62	2.24
4.40	2.0	0.05	3.62	2.22
4.50	4.0	0.03	7.24	4.41
4.60	4.0	0.03	7.24	4.37
4.70	3.0	0.03	5.43	3.25
4.80	3.0	0.03	5.43	3.23
4.90	4.0	0.03	7.24	4.27
5.00	4.0	0.03	7.24	4.23



Notes:

Hammer Mass	63.5	kg
Fall Height	0.76	m
Cone Area	0.0019	m^2
E_{theor}	473	J
Energy Ratio	0.7268	
Anvil Mass	1.25	kg
Rod Mass	8.79	kg/m

ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE 22 Ferncroft Avenue, Hampstead, London **Report Ref.** LW25160

Test Location Reference	BH4

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
5.10	4.0	0.03	7.24	4.20
5.20	3.0	0.03	5.43	3.12
5.30	3.0	0.03	5.43	3.10
5.40	3.0	0.03	5.43	3.08
5.50	4.0	0.03	7.24	4.07
5.60	3.0	0.03	5.43	3.03
5.70	3.0	0.03	5.43	3.00
5.80	2.0	0.05	3.62	1.99
5.90	3.0	0.03	5.43	2.96
6.00	3.0	0.03	5.43	2.94
6.10				
6.20				
6.30				
6.40				
6.50				
6.60				
6.70				
6.80				
6.90				
7.00				
7.10				
7.20				
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7.90				
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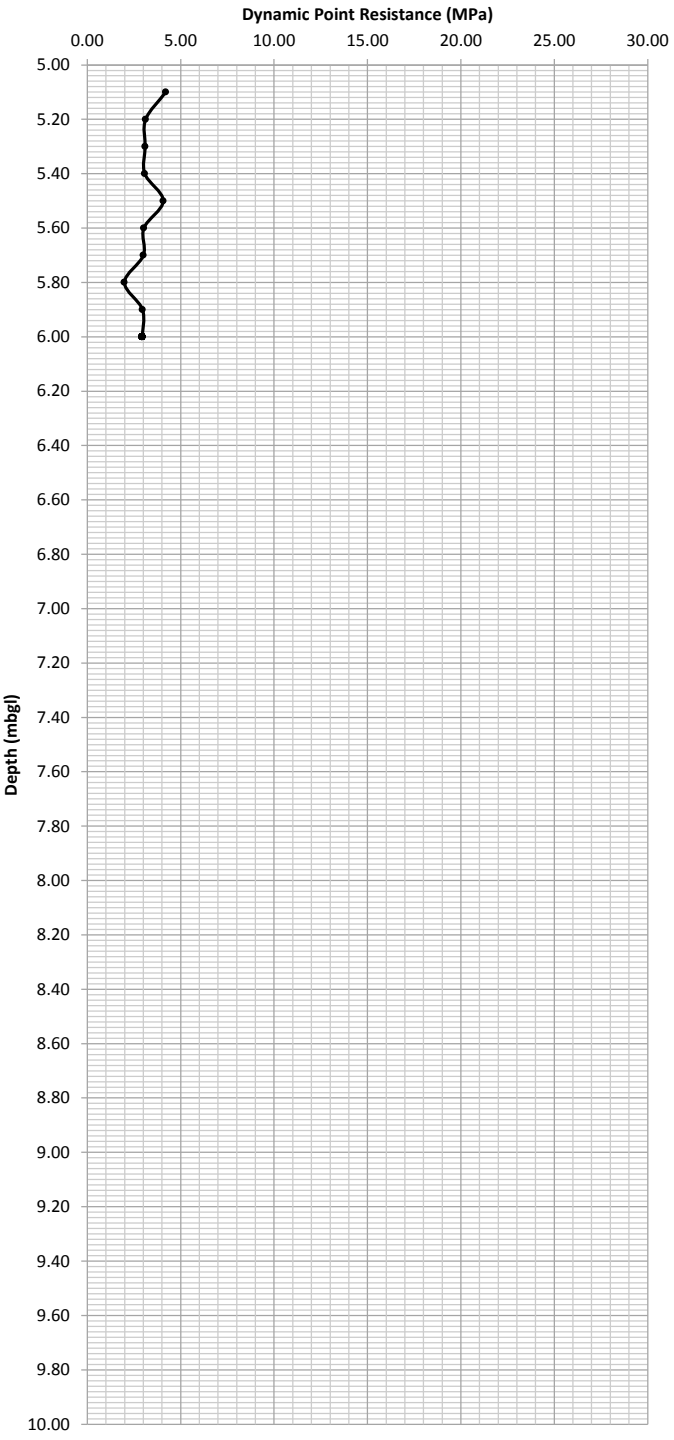
9.50				
9.60				
9.70				
9.80				
9.90				
10.00				



Notes:

Hammer Mass	63.5	kg
Fall Height	0.76	m
Cone Area	0.0019	m^2
E_{theor}	473	J
Energy Ratio	0.7268	
Anvil Mass	1.25	kg
Rod Mass	8.79	kg/m

Appendix B

Soil Investigation for No. 18 Ferncroft Ave.,

A Report of the

Site Investigation Undertaken

at

18 Ferncroft Avenue
London NW3

CSI Ref: 2553

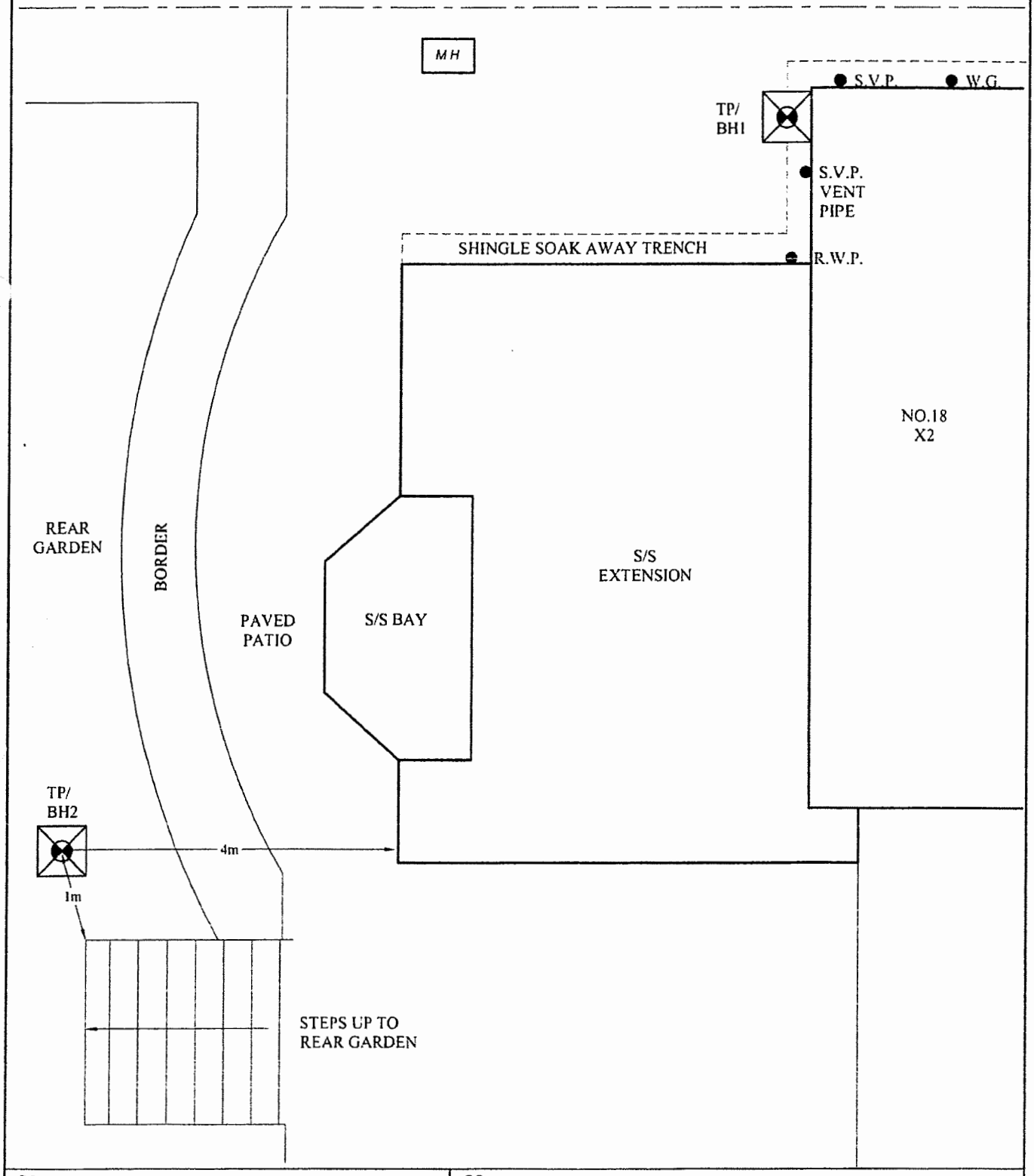
On

23rd March 2011

Chelmer Site Investigation Laboratories Ltd. Unit 15 East Hanningfield Industrial Estate, Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933 Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client: J D Bennett	Scale: N.T.S.	Sheet: 1 of 1	Date: 23.3.11	
Location: 18 Ferncroft Avenue, London NW3	Job No: 2553	Weather: Fine	Drawn by: JG	Checked by: ME



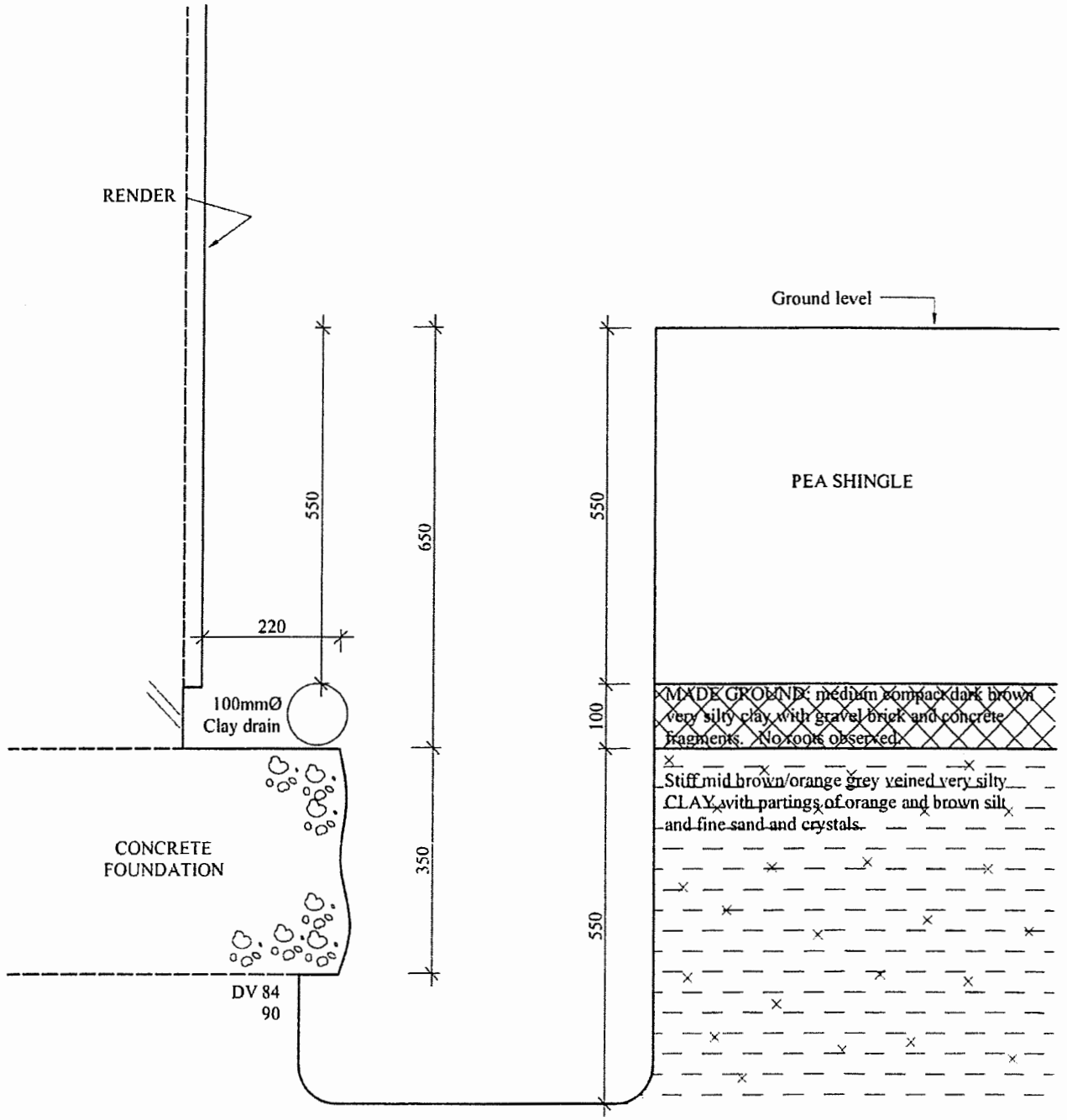
Notes: LARGE SYCAMORE IN REAR GARDEN APPROX. Ht.20m AND APPROX. 15m FROM REAR OF PROPERTY.
On site tree identification for guidance only. Not authenticated.

Key:

Tree/Shrub | Borehole | Trial Pit | G Gully | Tree Stump | Rain Water/ Soil Pipe | MH Manhole

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client: J D Bennett	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Date:** 23.3.11
Location: 18 Ferncroft Avenue, London NW3	**Job No:** 2553	**Trial Pit No:** 1	**Weather:** Fine
Excavation Method: Hand tools		**Drawn by:** JG	**Checked by:** ME



FOR STRATA BELOW 1200mm - SEE BH LOG

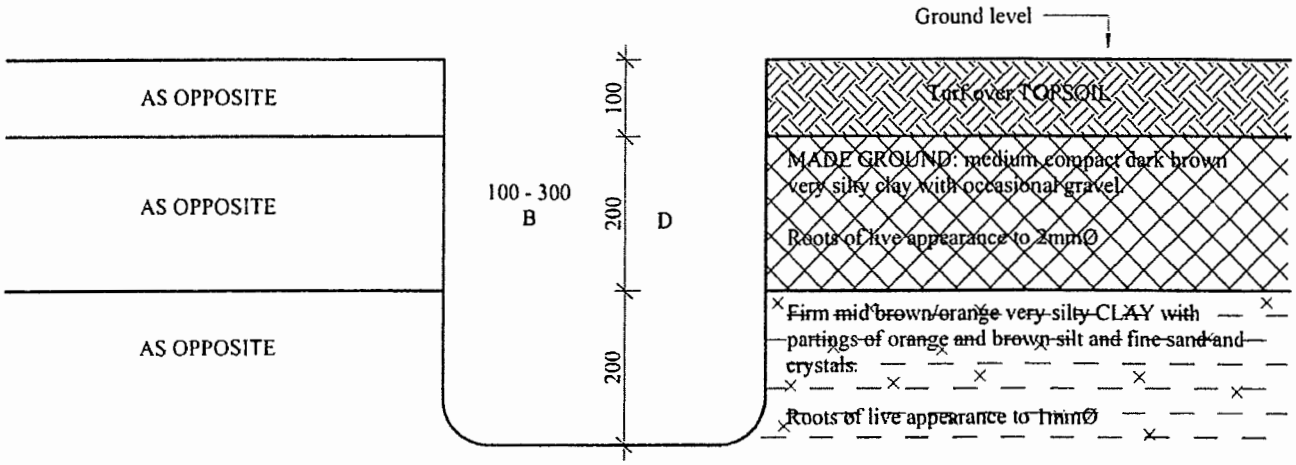
Remarks:

Key:

D Small disturbed sample	J Jar sample
B Bulk disturbed sample	V Pilcon Vane (kPa)
U Undisturbed sample (U100)	M Mackintosh Probe
N Standard Penetration Test Blow Count	W Water Sample

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client: J D Bennett	**Scale:** N.T.S.	**Sheet No:** 1 of 1	**Date:** 23.3.11
Location: 18 Ferncroft Avenue, London NW3	**Job No:** 2553	**Trial Pit No:** 2	**Weather:** Fine
Excavation Method: Hand tools		**Drawn by:** JG	**Checked by:** ME



FOR STRATA BELOW 500mm - SEE BH LOG

Remarks:

Key:
- D Small disturbed sample
- B Bulk disturbed sample
- U Undisturbed sample (U100)
- N Standard Penetration Test Blow Count
- J Jar sample
- V Pilcon Vane (kPa)
- M Mackintosh Probe
- W Water Sample

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client:	J D Bennett	Scale:	N.T.S.	Sheet No:	1 of 1	Weather:	Fine	Date:	23.3.11
Site:	18 Ferncroft Avenue, London NW3	Job No:	2553	Borehole No:	1	Boring method:	Hand auger		

Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
	As trial pit one.	1.2							
1.2	Stiff mid brown/orange grey veined very silty CLAY with partings of orange and brown silt and fine sand with crystals.	0.7		D	V	98 104	No roots observed.		1.5
1.9	Stiff moist as above.	0.9		D	V	112 118		*1.9*	2.0
2.8	Very stiff mid brown grey veined silty CLAY with partings of orange/brown silt and fine sand and crystals.	1.6		D	V	124 132			2.5
				D	V	140+ 140+			3.0
				D	V	140+ 140+			3.5
				D	V	140+ 140+			4.0
4.4	Medium dense mid brown/orange clayey silty fine and medium SAND with lenses of clay.	0.4		D	M	41 50(50) 50(20) T.D.T.D.		*4.6*	4.5
4.8	Borehole ends at 4.8m Too dense to hand auger.								

Drawn by: JG **Approved by:** ME

Remarks: *Water seepage at 1.9m.*
Standing water at 4.6m on completion.
Borehole open on completion.

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Van (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count

Chelmer Site Investigations
Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

Client:	J D Bennett	Scale:	N.T.S.	Sheet No:	1 of 1	Weather:	Fine	Date:	23.3.11
Site:	18 Ferncroft Avenue, London NW3	Job No:	2553	Borehole No:	2	Boring method:	Hand auger		

Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
	As trial pit two.	0.5							
0.5				D			Roots of live appearance to 1mmØ to 1.8m		0.5
	Firm mid brown/orange very silty CLAY with partings of orange and brown silt and fine sand and crystals.	0.8		D	V	70 74			1.0
1.3									
				D	V	80 82			1.5
							Hair and fibrous roots to 2.4m		
				D	V	90 96			2.0
	Stiff mid brown/orange grey veined as above.	2.0							
				D	V	106 114	No roots observed below 2.4m		2.5
				D	V	122 130			3.0
3.3								*3.3*	
				D	V	140+ 140+			3.5
	Very stiff mid to dark brown grey veined sandy very silty CLAY with partings of orange and brown silt and fine sand and crystals.	1.7		D	V	140+ 140+			4.0
								4.3	
				D	V	140+ 140+			4.5
5.0				D	V	140+ 140+			5.0
	Borehole ends at 5.0m								

Drawn by: JG | Approved by: ME

Remarks: *Water strike at 3.3m.*
Standing water at 4.3m on completion.
Borehole open on completion.

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Van (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count

Chelmer Site Investigations,
Unit 15, East Hanningfield Industrial Estate, Old Church Road,
East Hanningfield, Essex CM3 8AB
Telephone: 01245 400930 Fax: 01245 400933
Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

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^2) 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.

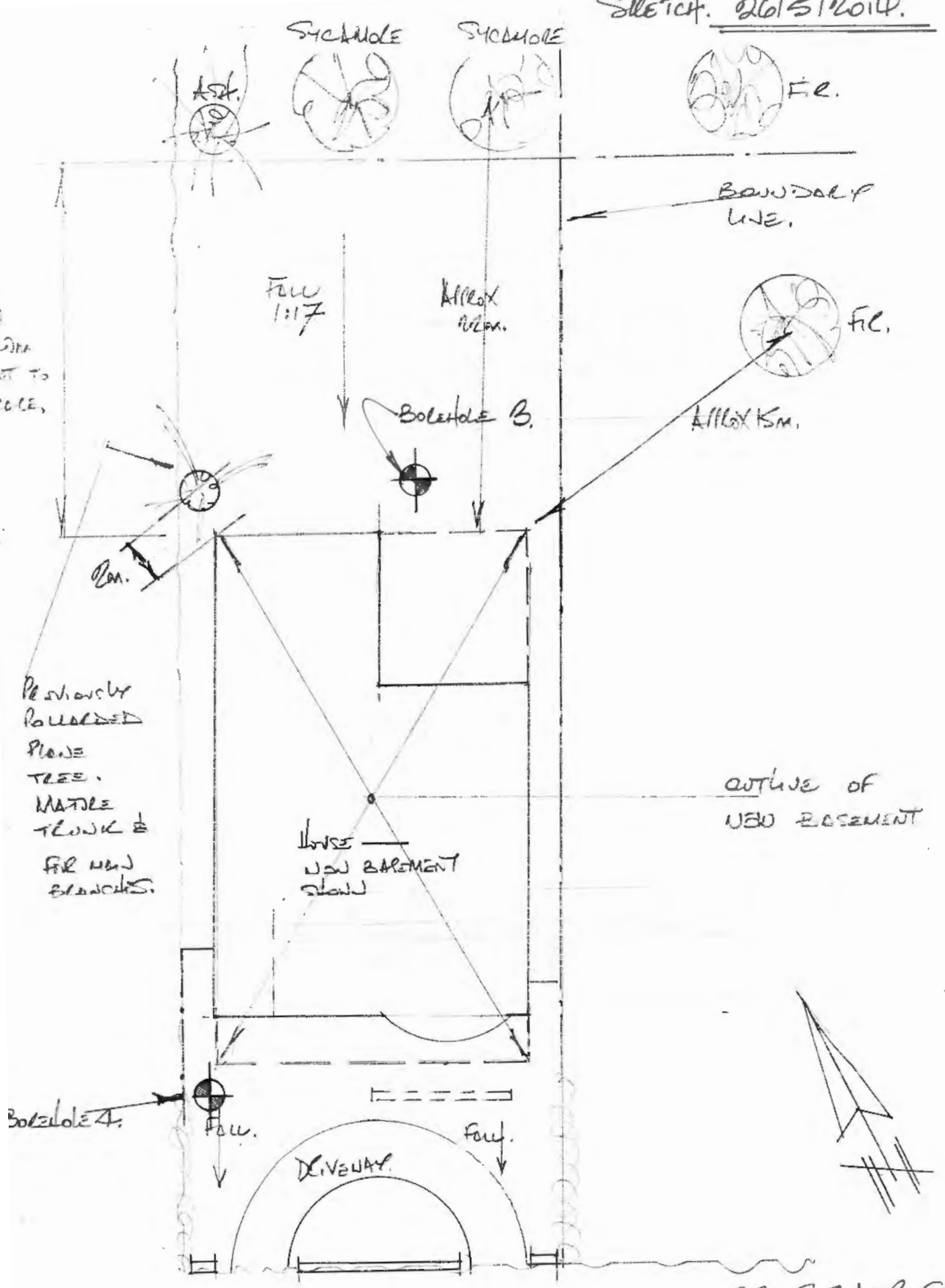
We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

Appendix C

Site location sketches and soil cross section.

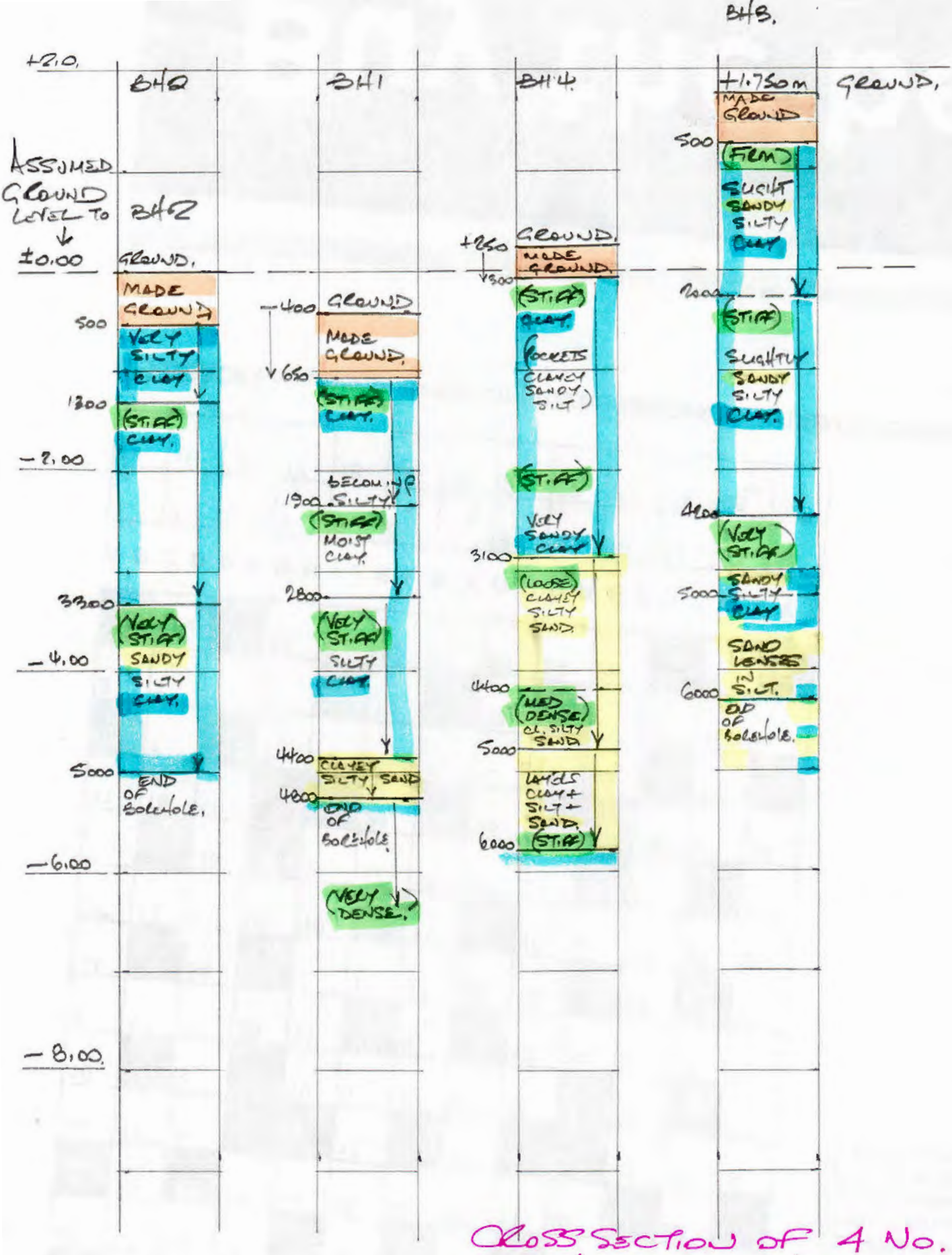
SKETCH. 26/5/2014.



PLAN ON BASEMENT @ 1:100

22 GOLDCROFT AVENUE, HAMPSTEAD NW3

JOB No. 1250.



CROSS SECTION OF 4 No. BOREHOLES TO 10/22 FERNCROFT AVENUE, HAMPSTEAD, NW3. JOB No 1250. 27/5/2014

Appendix D

Soil Investigation Report - May 2014.

A Report

concerning the soil investigations carried out

at

22, Ferncroft Avenue, Hampstead,
LONDON NW 3 7 PH.

Prepared by
Soarbond Ltd. for Mr. and Mrs Torns,

Chartered Civil & Structural Engineers.

17, Clarendon Road,
Ealing,
London W5 1AA.

Tel: 0208 997 8663

1250 / 27 May 2014.

1.0. Introduction.

1.1 The brief given provided is to check the soil sampling carried out at the above property and also the soil sampling carried out " 2 properties away " i.e. within 15 metres of the subject property. In all, 4 number 5 to 6 metres deep boreholes were sunk and the soil sampled for all four boreholes. Under Appendix A of this document can be found the borehole logs for BH 3 and 4; the previous boreholes at 18 were numbered 1 and 2 so we have decided to continue with this numbering. Also included with this information are the dynamic point resistance values which show that the sandy silty clay material with lenses of sandy clayey silt and clayey silty sand are relatively soft to 5 metres depth and retain a great deal of water within their mass. There is ingress of water noted into the boreholes between the wet / moist mass of silty, sandy CLAY but it is not a large amount of water that cannot be controlled by pumping out the dig to basement in a controlled manner. Refer proposals for temporary works for details.

1.2 22 Ferncroft Avenue is a detached house on the western side of Hampstead Hill and, locally, we have estimated that the ground is falling towards the road at a gradient of 1 in 17. The house appears to be late Victorian or Edwardian.

1.3 This report is required by the Planning Authority to satisfy itself that granting planning permission to carry out the formation of a full plan demise basement will not have a detrimental effect on the neighbouring properties and our proposals to counter any soil movement will be satisfactory and adopted by the Main Contractor.

1.4 As Structural Engineers, we consider the permanent works to form the basement are fully described on the Architect's drawings and will be further detailed to by us, as the Structural Engineers in future when the detailed design of the project proceeds.

1.5 The temporary works are considered crucial here as the first stage of works will entail excavation to form underpins in discrete, small areas and away from other underpins. We consider that there will be no possibility of subject house movement or localised damage to neighbours if the basement walling is formed by using classical underpinning techniques.

The underpins will be formed with pumping out of standing water from approximately 3.6 metre depth below. It will be suggested to the main Contractor that injecting the lenses of sand or heavily sandy clay with grout will also help to reduce

the inflow of water as this will form a concrete shield to the perimeter. Also, the excavation of the internal block of clay soil can be carried out piecemeal so that areas of prepared ground can be concrete blinded to seal the inflow of water from below. It should be noted that the soil sampling has taken place after 6 months of very heavy rain and the ground water levels are exceptionally high. With summer approaching, these levels will drop quite significantly and trees will take up a great deal of ground water at the end of the garden.

Further temporary works that should be considered are the use of poling boards or trench sheeting to help retain soil before underpins are formed. Secondly, we would advise the use of " stand alone " well points around the site to remove water from wells, lower the local ground water table locally at this site and pump it further up the hill so it finds its way into the soil at the end of the garden and drains into the neighbour's gardens so not reducing the local water table away from the site.
Thirdly, we would recommend consideration of the use of sheet piling using a small back-actor drill. The soil survey indicates the material to 5 metres is easily penetrated and pushing in jointed sheeting material could be feasible to close off the water bound sand lenses that fall towards the house. This would reduce ingress but not stop it completely.

1.6 This report does not include any information on the remaining areas of the property and concentrates solely on the suitability of the proposed basement redevelopment works.

1.7 Under Appendix A, we attach the soil survey for this property whilst, under Appendix B, we have included the sketch drawings showing the locations of boreholes and a cross section appraisal indicating the variety of material.

2.0 Observations.

2.1 Based on the information given in appendix A, there will be no difficulty in preparing a suitable method statement for the planned works when a selected Contractor has chosen. The formation of the basement should be carried out on traditional lines i.e. forming underpins to give a box down to below basement level, casting the basement slab whilst bracing the box before the sides and base as well as the newly formed suspended ground floor is finalised.

2.2 All this will allow the material to the outside to be kept in location and not allowed to move. This will allow the boundary walls / fences and the neighbour's sub structure construction to remain as is and not suffer any untoward damage.

2.3 The soil across the site appears to be, generally, sandy silty clay but moist and wet in many places because of discrete lens of silt and sand. The inflow of water from the two boreholes appeared to confirm that we have ingress to 31 litres per hour which can be accommodated easily by pumping.

2.4 The selected Contractor after tendering, will remove spoil from site via the front where we have a large garden easily turned into a temporary storage area for spoil, materials and offices etc. Pumping can also take place here as it would appear that the sand lenses follow the contours of the ground partially and we will hit the sand lenses at the front of the house and not at the back.

2.5 Once the basement shell has been constructed, the Contractor will complete the shell of the block and waterproof it, employing a cavity drain, as given on the drawings and to the Structural Engineer's requirements. The box will be fitted out and finishes completed.

2.6 There will be a requirement for a new plant room and materials for this will be transferred into the new basement so that the waterproofing of the basement can proceed using our recommendation of Delta Membrane and two sumps to remove arisings in the basement.

2.7 At the same time as the above works are carried out from the inside and all arisings taken out from the front of the block to grab lorries, works will also be advanced from the inside to the ground floor and the superstructure.

2.8 If it is found that, at any time, water ingresses into this site dig becomes difficult to manage or excessive, then the

Contractor can seal the inflow areas using concrete grout injections as mentioned above, casting dry lean concrete behind any trench sheets or poling boards, using more and stronger water pumps or any combination of these or any other method he would like to propose for consideration such as ground freezing, piling, matting injections and such new technologies as are available within budget etc.

3.0 Conclusions.

3.1 Appropriate temporary works must be carried out to prevent any foreseeable structural damage to the permanent works. Slips and movement of walling, foundations, slabs and roofs must be curtailed and reduced to a minimum. There will be cases where removal of loading, overburden, release of side pressure and changes to the existing distribution may cause a release of stress (i.e. clay heave) but this has to be managed to ensure limitation of damages.
The temporary works indicated here appear to be satisfactory to ensure such limitation but the opening up of the below ground zone may cause some reworking of the details depending on the uncovered situation. Sampling, given above, is only as accurate as the immediate locality.

3.2 The scheme suggested above where works start at the front and work backwards towards the rear is easily the favoured way of working by most Contractors. However, each Contractor will decide his method and prepare a suitable Statement for Basement Construction, House redevelopment and Traffic Movement study.

3.3 We feel that there is nothing critical or difficult in the redevelopment and it should be favourably considered by the Local Authority planning officers and their advisors. The works will be within the existing site boundaries and within the clay strata. Using acceptable temporary works and the party wall awards still to be sorted out, must give all involved comfort that the works will not overlook any critical item.

For and on behalf of

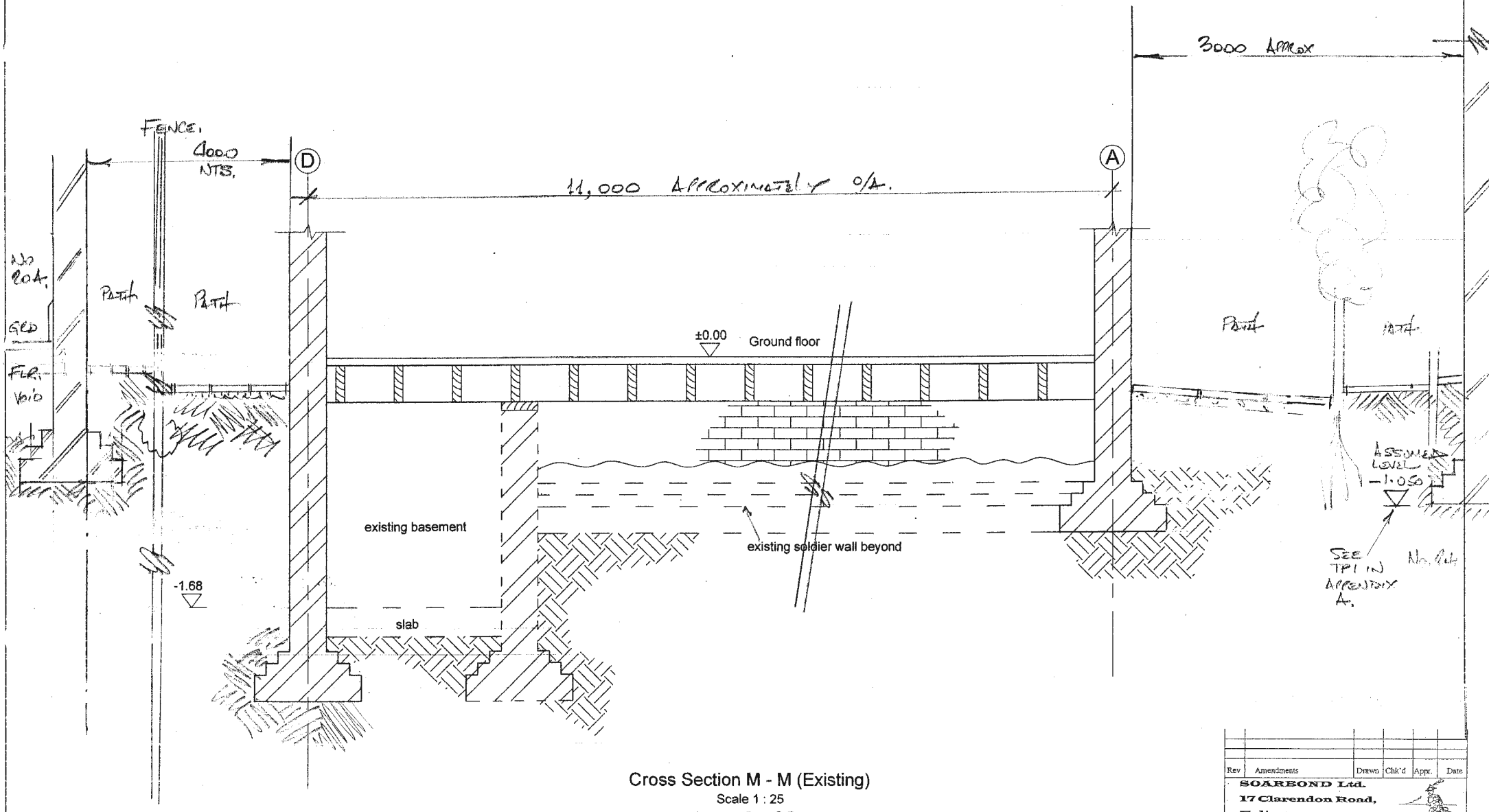
Soarbond Ltd.

WKJ Zablocki B.Sc. C. Eng. MICE
Director.

Appendix E

Typical cross sections through basement works.

APPENDIX E (1)



Cross Section M - M (Existing)

Scale 1 : 25

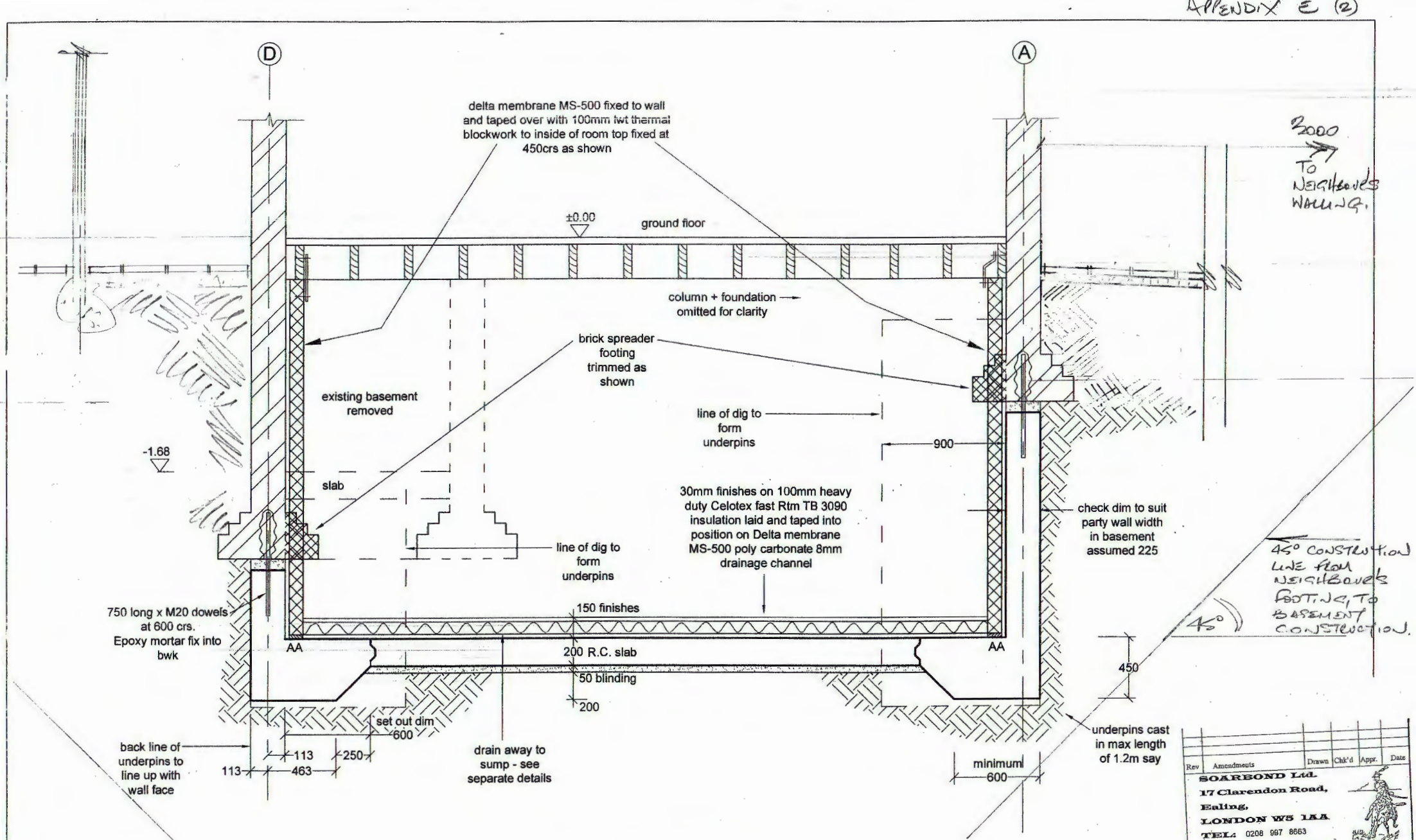
NUMBER 22

Rev	Amendments	Drawn	Chk'd	Appr.	Date

SOARBOND Ltd.
17 Clarendon Road,
Ealing,
LONDON W5 1AA
TEL: 0208 997 8663
E Mail : soarbond@yahoo.co.uk

Job Title.	22 FERNCROFT AVE., HAMPSTEAD, NW3 TP1 on 10 June
Drawing Title.	Cross Section - Existing.
Client.	MR. & MRS. TOMS
Scale 1:25	Date JAN 2014 Drawn By: WL
Chk'd	Date Approved:
Job No. 1250	Drg. No. 10 Rev.

APPENDIX E (2)



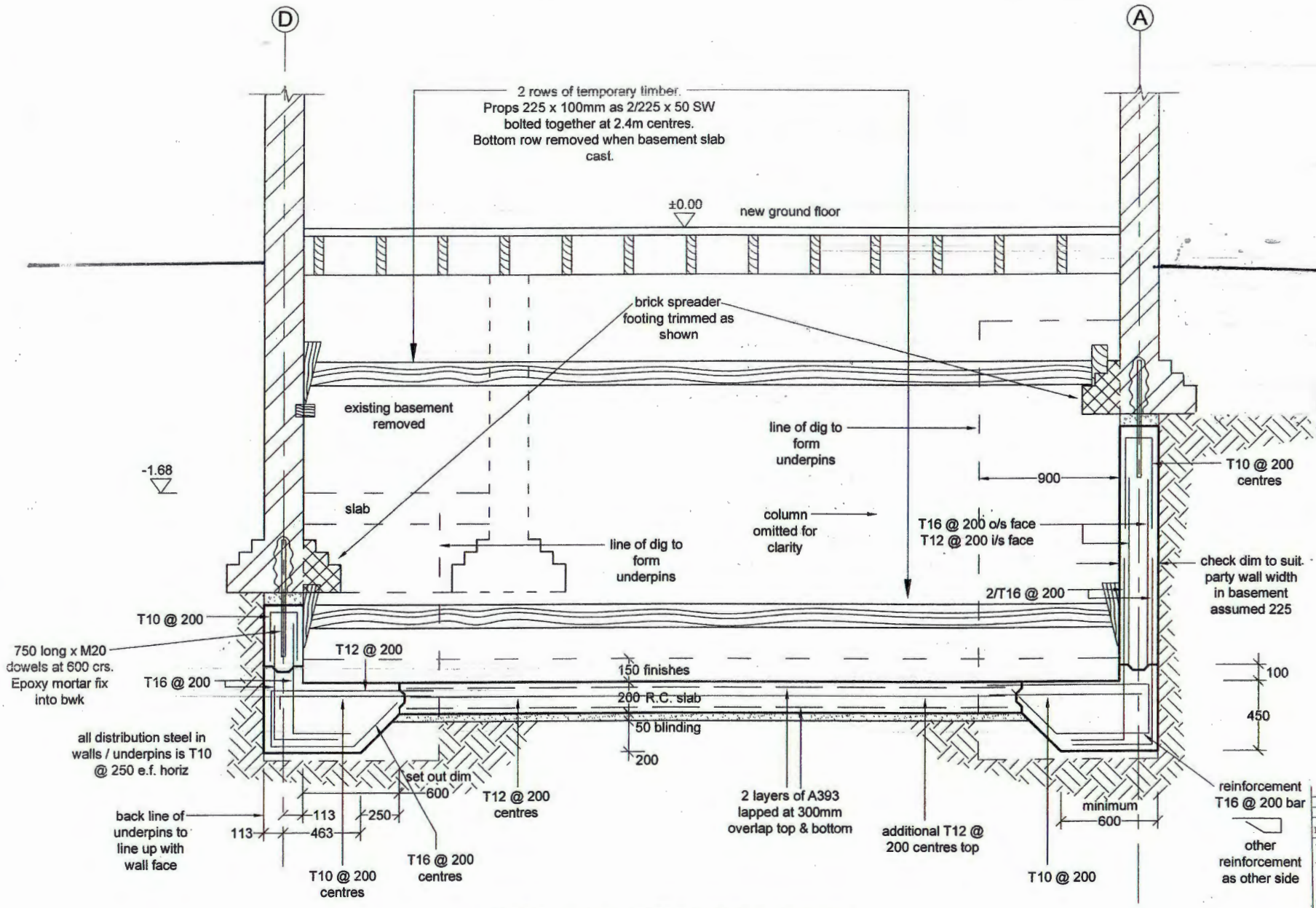
Cross Section M - M (Proposed) G.A.
Internal Basement Finishes
Scale 1 : 25

45° CONSTRUCTION LINE FROM NEIGHBOUR'S FOOTING (1200 DEEP) AT 20A.

Rev	Amendments	Drawn	Chk'd	Appr.	Date

SOARBOND Ltd.
17 Clarendon Road,
Ealing,
LONDON W5 1AA
TEL: 0208 997 8663
E Mail : soarbond@yahoo.co.uk

Job Title	22 FERNCROFT AVE. HAMPSTEAD NW3
Drawing Title	CROSS SECTION MM "HABITABLE SPACE"
Client	MR. & MRS. TORNS
Scale	1:25
Date	JAN 2014
Drawn By	WZ
Chk'd	
Date	
Approved:	
Job No.	1250
Drg. No.	11
Rev.	

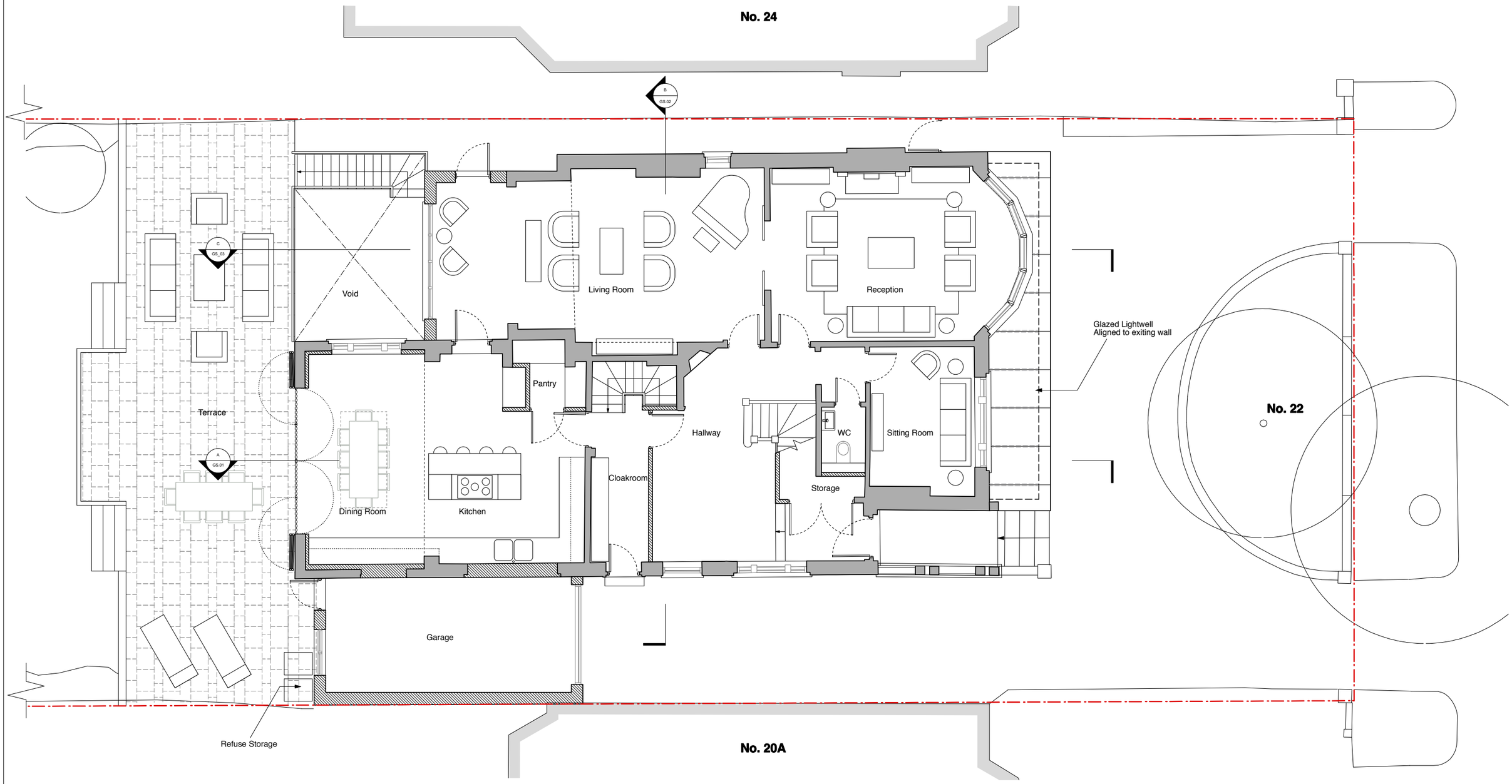


Wall Propping and Slab / Wall Reinforcement
Details Given for
Cross Section M - M (Proposed) G.A.
Scale 1 : 25

Rev	Amendments	Drawn	Chk'd	Appr.	Date

SOARBOND Ltd.
17 Clarendon Road,
Ealing,
LONDON W5 1AA
TEL: 0208 997 8663
E Mail : soarbond@yahoo.co.uk

Job Title.	22 FERNCROFT AVE., HAMPSTEAD NW3.
Drawing Title.	TEMPORARY PROPPING AND BOXT REINFORCEMT
Client.	MR & MRS TORNS.
Scale 1:25	Date JAN 2014 Drawn By : WZ
Chk'd	Date Approved:
Job No. 1250	Drg. No. S12. Rev.



01 GA.00 **Proposed Ground Floor Plan**

1:100 @ A3

0 2 5m

N

Revisions		
A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

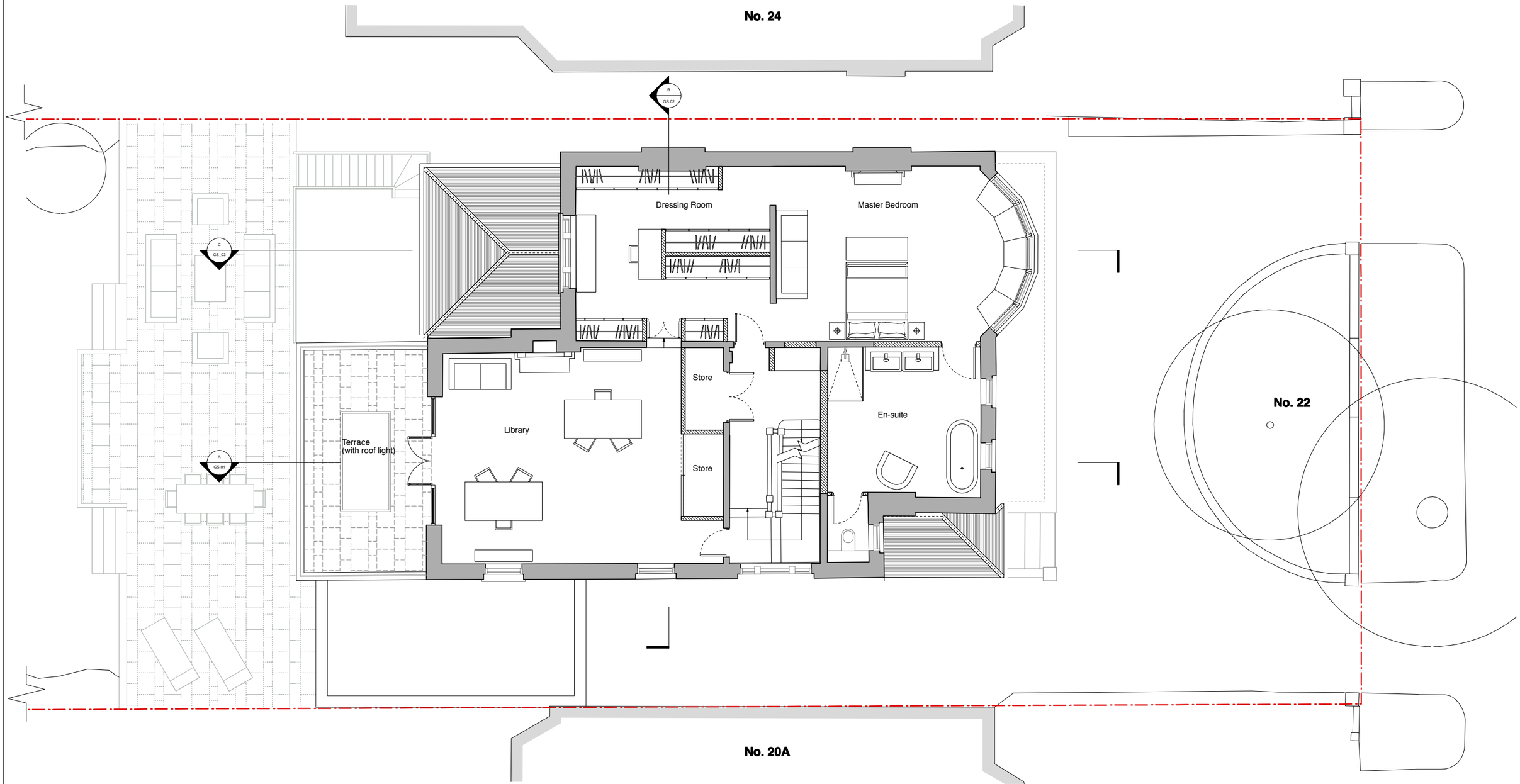
Drawing Title
Proposed Ground Floor Plan

Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0282
www.21starchitecture.com

Status	Drawn	Checked
Information	CL	RD

Scale	Date
1:50 @ A1, 1:100 @ A3	Dec 2013

Drwg. No.	Revision
174_GA_00	A



01 GA.01 **Proposed First Floor Plan**

1:100 @ A3

0 2 5m

N

Revisions		
A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

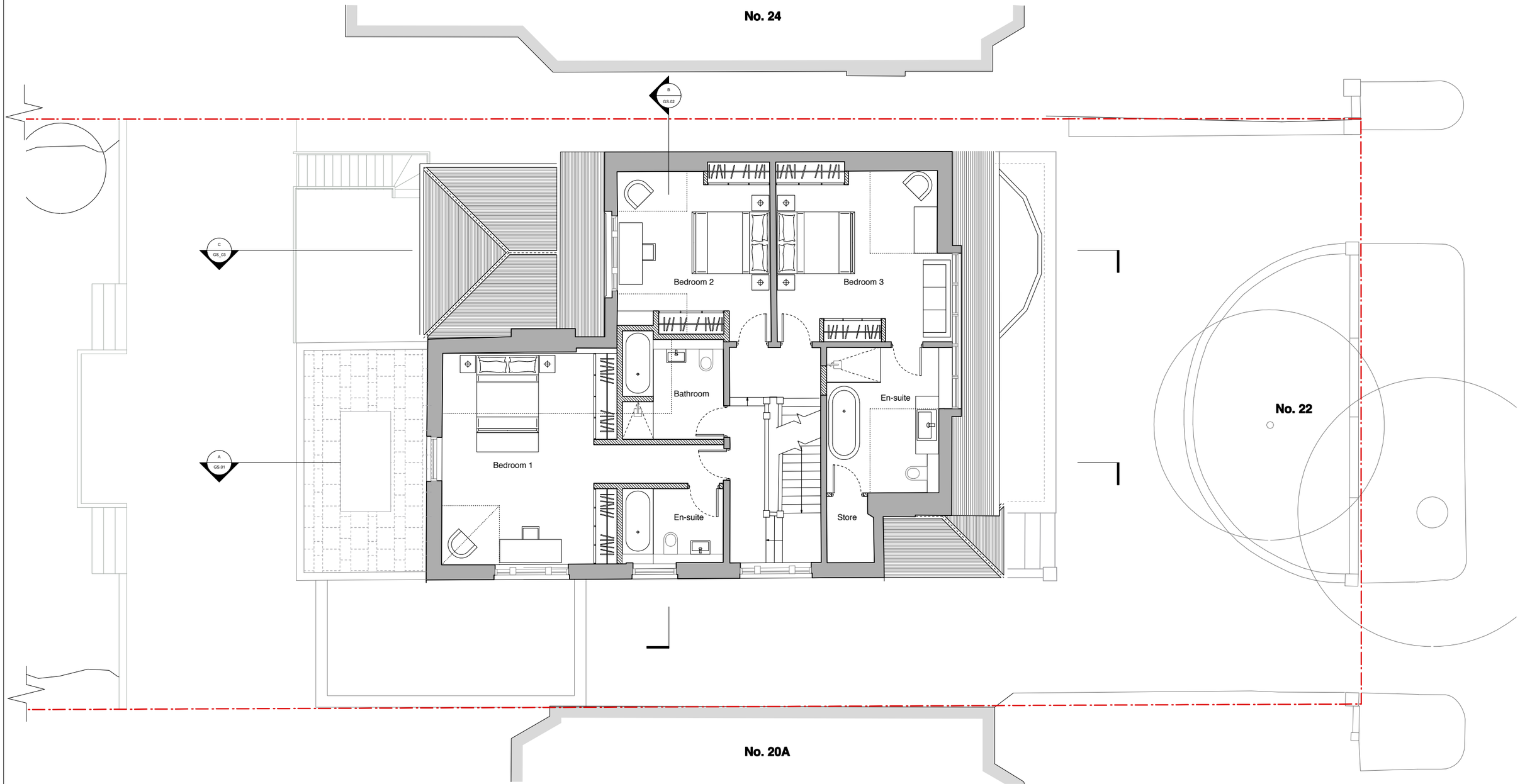
Drawing Title
Proposed First Floor Plan

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0282
www.21starchitecture.com

Status	Drawn	Checked
Information	CL	RD

Scale	Date
1:50 @ A1, 1:100 @ A3	Dec 2013

Drwg. No.	Revision
174_GA_01	A



01 GA.02 **Proposed Second Floor Plan**

1:100 @ A3

0 2 5m

N

Revisions		
A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

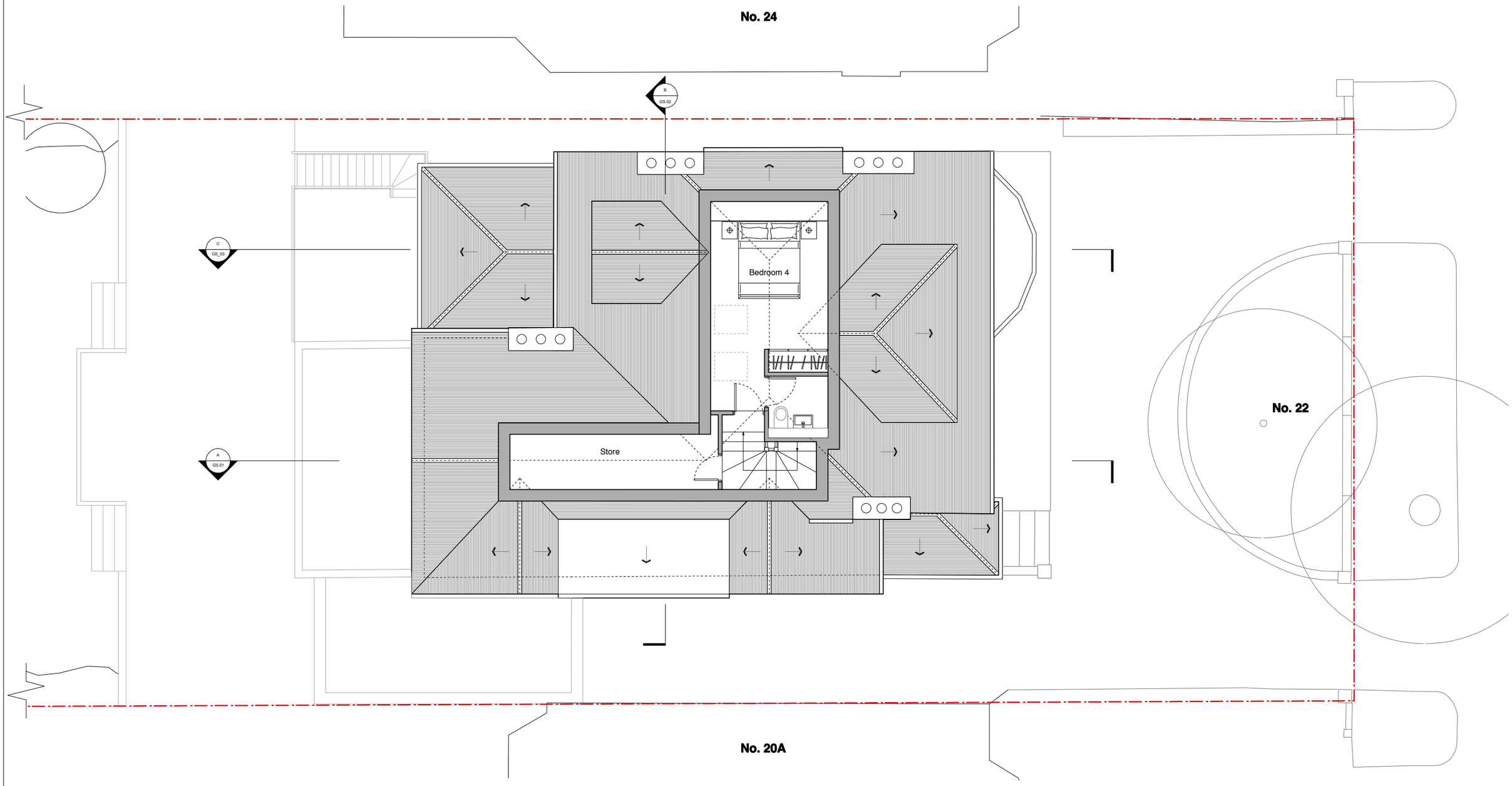
Drawing Title
Proposed Second Floor Plan

Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0282
www.21starchitecture.com

Status	Drawn	Checked
Information	CL	RD

Scale	Date
1:50 @ A1, 1:100 @ A3	Dec 2013

Drwg. No.	Revision
174_GA_02	A



01 GA.03 **Proposed Third Floor Plan**

1:100 @ A3

0 2 5m

N

Revisions

A	20.03.2014	Update addressing planning concerns

Client: --

Project: 22 Ferncroft Avenue, London, NW3 7PE

Drawing Title: Proposed Third Floor Plan

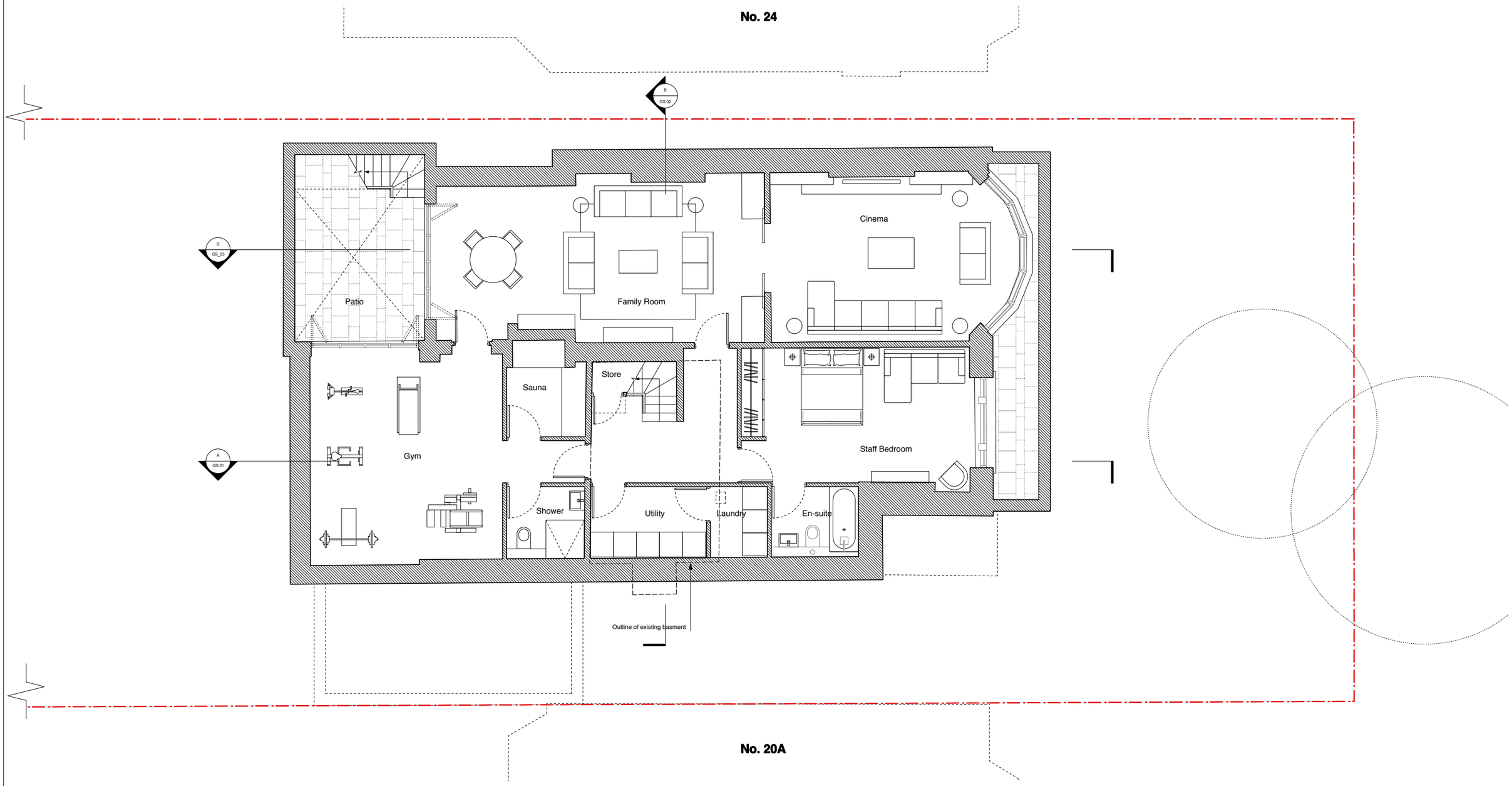
21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7962 0252
www.21starchitecture.com

Status: Information | Drawn: CL | Checked: RD

Scale: 1:50 @ A1, 1:100 @ A3 | Date: Dec 2013

Drwg. No.: 174_GA_03 | Revision: A

No. 24



No. 20A

01 GA.LG **Proposed Lower Ground Floor Plan**
1:100 @ A3

0 2 5m

N

Revisions

A	20.03.2014	Update addressing planning concerns

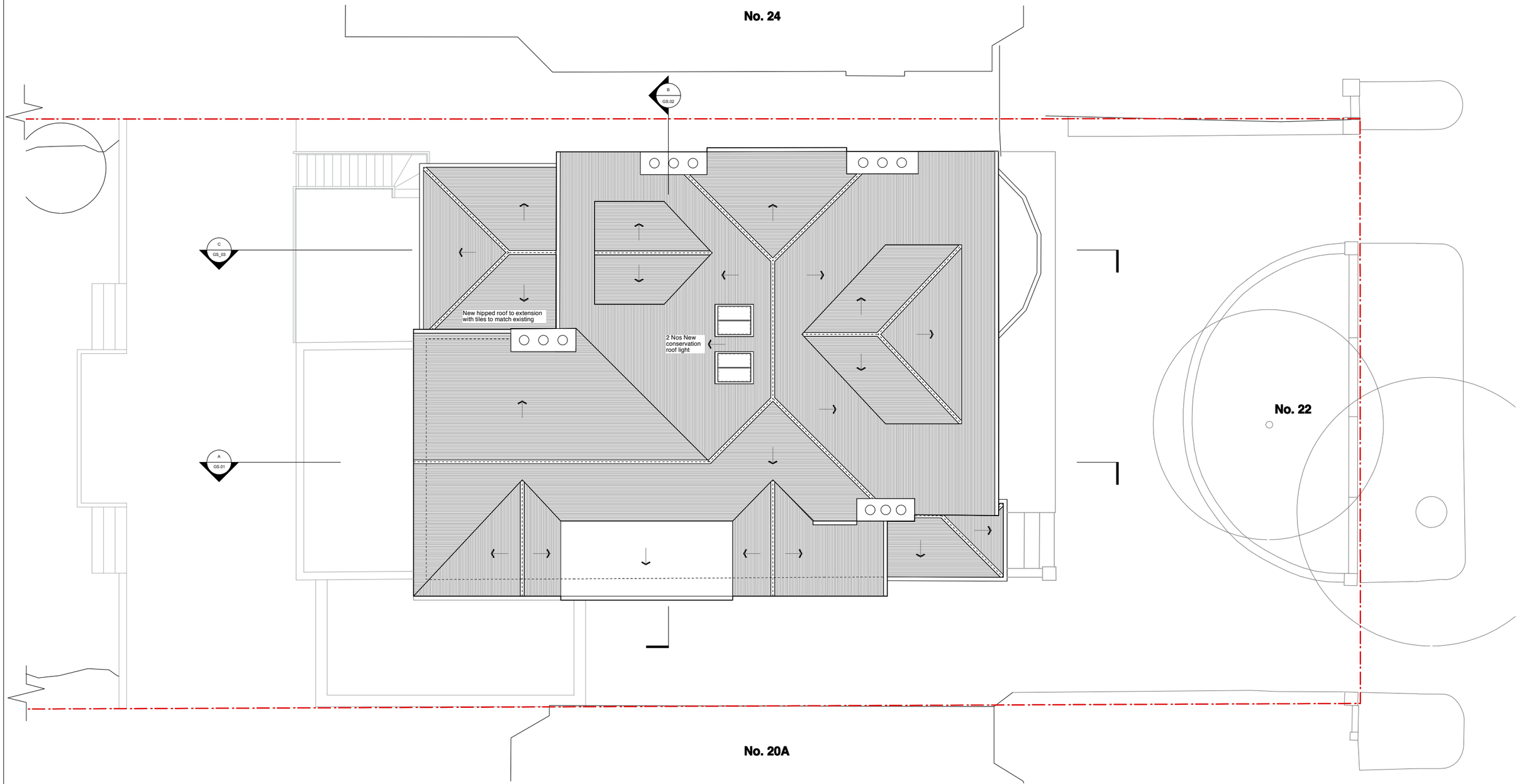
Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Lower Ground Floor Plan

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0282
www.21starchitecture.com

Status: Information
Drawn: CL
Checked: RD
Scale: 1:50 @ A1, 1:100 @ A3
Date: Dec 2013
Drwg. No.: 174_GA_LG
Revision: A



01 GA.RF **Proposed Roof Plan**
1:100 @ A3

0 2 5m

N

Revisions		
A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Roof Plan

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0252
www.21starchitecture.com

Status	Drawn	Checked
Information	CL	RD

Scale	Date
1:50 @ A1, 1:100 @ A3	Dec 2013

Drwg. No.	Revision
174_GA_RF	A

01 GE.01 **Proposed South West (Front) Elevation**

1:100

02 GE.01 **Proposed North East (Rear) Elevation**

1:100

Revisions

A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Elevations
South West (Front) & North East (Rear)

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7962 0262
www.21starchitecture.com

Status: Information
Drawn: TG
Checked: RD
Scale: 1:50 @ A1, 1:100 @ A3
Date: Dec 2013
Drwg. No.: 174_GE_01
Revision: A

01 GE_02 **Proposed North West (Side) Elevation**

1:100

Revisions

A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Elevations
South West (Side)

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0252
www.21starchitecture.com

Status: Information
Drawn: CL
Checked: RD
Scale: 1:50 @ A1, 1:100 @ A3
Date: Dec 2013
Drwg. No.: 174_GE_02
Revision: A

01 GE_03 **Proposed South East (Side) Elevation**

1:100

Revisions

A	20.03.2014	Update addressing planning concerns

Client: --

Project: 22 Ferncroft Avenue, London, NW3 7PE

Drawing Title: Proposed Elevations South East (Side)

21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7062 0262
www.21starchitecture.com

Status: Information | Drawn: CL | Checked: RD

Scale: 1:50 @ A1, 1:100 @ A3 | Date: Dec 2013

Drwg. No.: 174_GE_03 | Revision: A

01 GS.01 **Proposed Section A**

1:100

Revisions		
A	20.03.2014	Update addressing planning concerns

Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Section A

Twenty First Architecture Ltd,
314 Gosnell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0252
www.21starchitecture.com

Status	Drawn	Checked
Information	CL	RD

Scale	Date
1:50 @ A1, 1:100 @ A3	Dec 2013

Drwg. No.	Revision
174_GS_01	A

01 GS.02 **Proposed Section B**

1:100

Revisions

A	20.03.2014	Update addressing planning concerns

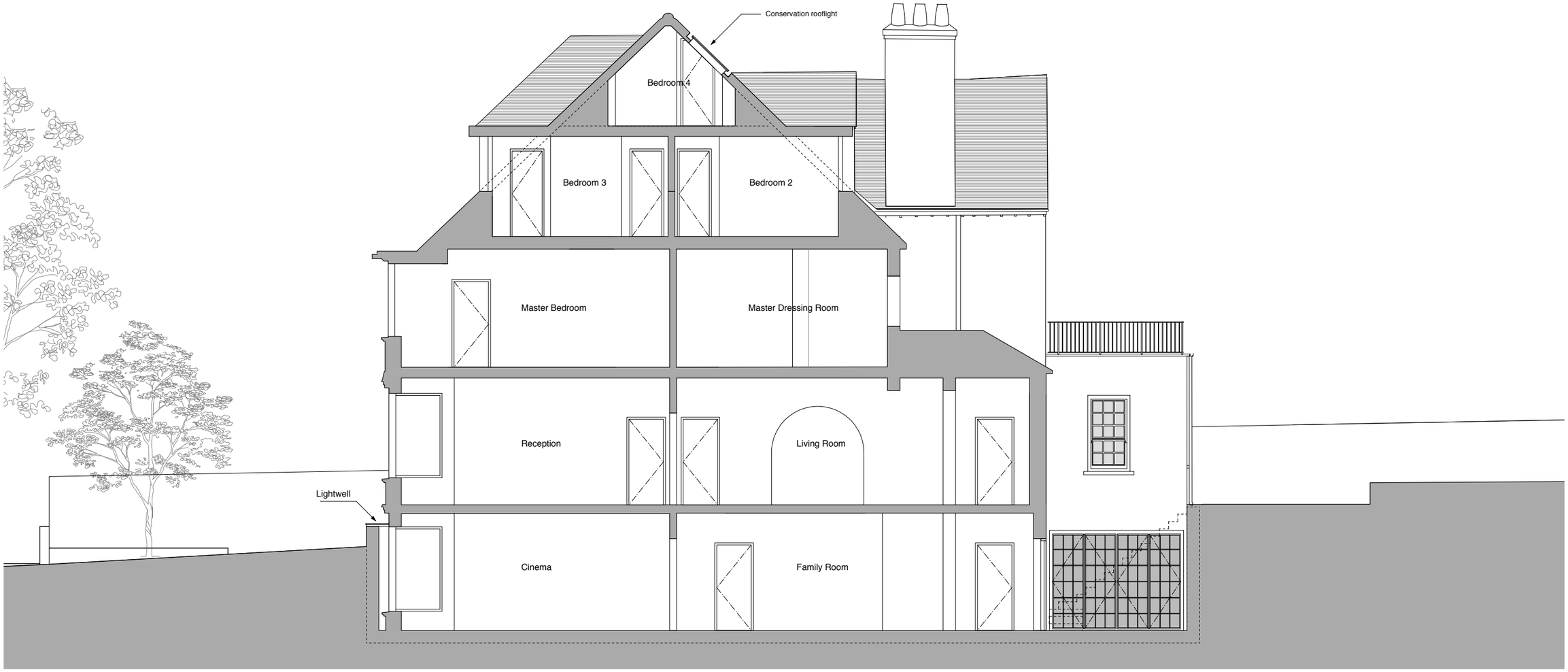
Client
--

Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Section B

Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7962 0262
www.21starchitecture.com

Status: Information
Drawn: CL
Checked: RD
Scale: 1:50 @ A1, 1:100 @ A3
Date: Dec 2013
Drwg. No.: 174_GS_02
Revision: A



01 GS.03 **Proposed Section C**

1:100

Revisions

A	20.03.2014	Update addressing planning concerns

Client
--

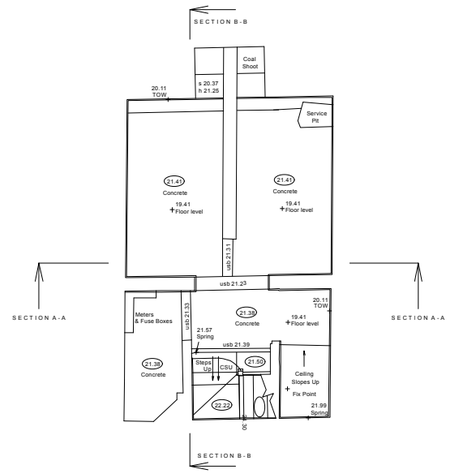
Project
22 Ferncroft Avenue
London, NW3 7PE

Drawing Title
Proposed Section C

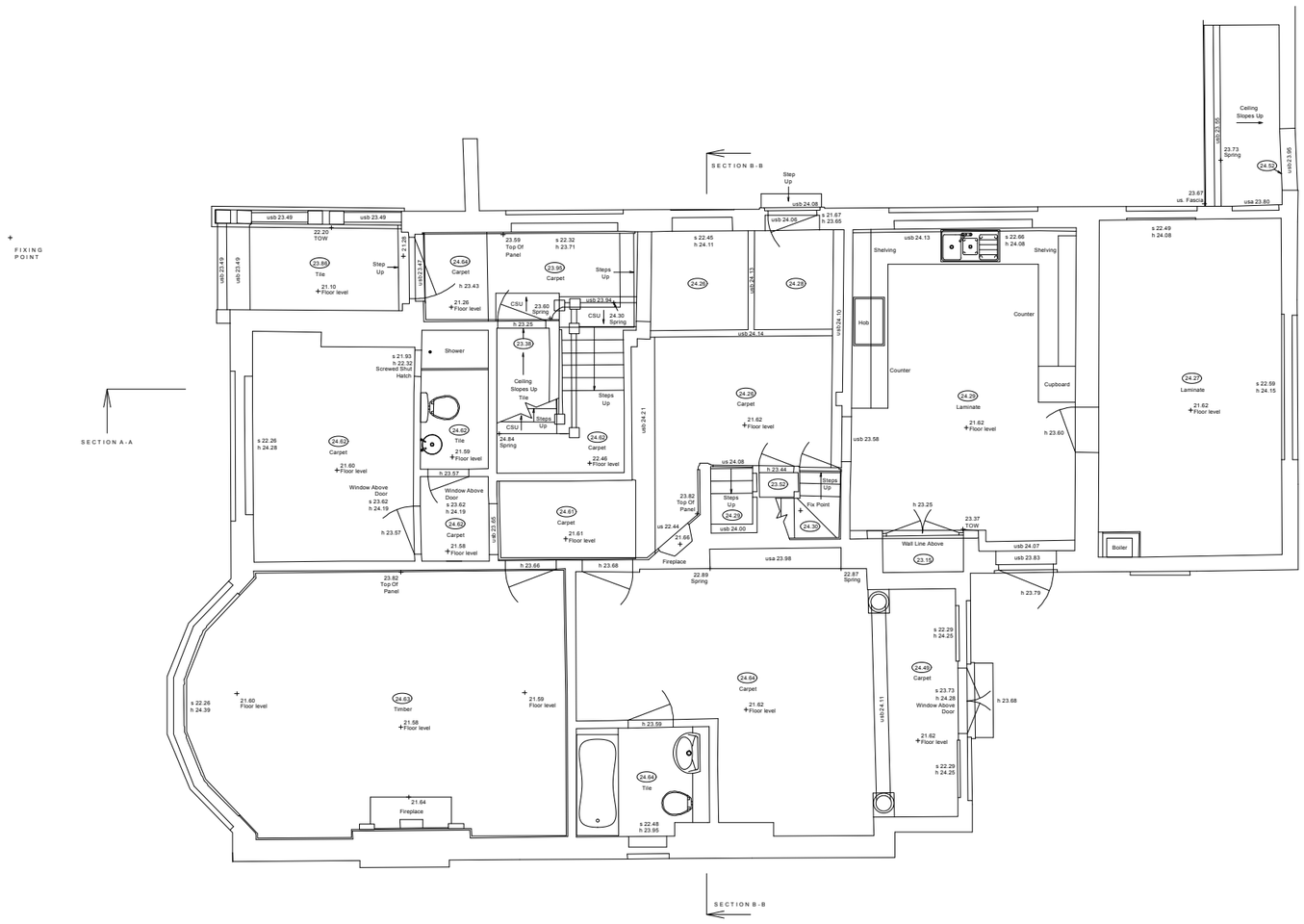
21st Architecture Ltd
Twenty First Architecture Ltd,
314 Goswell Road,
London,
EC1V 7AF
Tel: +44(0)20 7952 0282
www.21starchitecture.com

Status: Information
Drawn: CL
Checked: RD
Scale: 1:50 @ A1, 1:100 @ A3
Date: Dec 2013
Drwg. No.: 174_GS_03
Revision: A

BASEMENT



GROUND FLOOR



NOTES

1 LEVELS ARE RELATED TO SITE SURVEY. SEE KND SURVEYS' DRAWING "K21 13/T".

2 SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:50 SCALE DRAWING.

ABBREVIATION LIST

AC	AIR CONDITIONING VENTS OR EQUIPMENT
BSU	BEAM SLOPES UP
CSU	CEILING SLOPES UP
DP	DOUBLE PLUG
ELS	EMERGENCY LIGHT SWITCH
EP	ELECTRIC POINT
ESM	ELECTRIC SWITCH MACHINE
FA	FIRE ALARM
FL	FLOOR LEVEL
FS	FUSED ELECTRIC SWITCH
JB	JUNCTION BOX
L	LIGHT
LCB	LIFT CALL BUTTON
LS	LIGHT SWITCH
SP	SINGLE PLUG
TOC	TOP OF COUNTER
TOW	TOP OF WALL
WL	WALL LIGHT

WHERE THESE ARE FOLLOWED BY A MEASUREMENT THIS IS THE HEIGHT MEASURED FROM THE FLOOR.

GENERAL

AC	AIR CONDITIONING VENTS OR EQUIPMENT
ER	EARTHING ROD
GU	GULLY
IC	INSPECTION COVER
MH	MANHOLE
ST	STAUNCHION
SVP	SOIL AND VENT PIPE

s 1.00	SILL LEVEL
h 1.00	HEAD LEVEL
usb 1.00	LEVEL OF UNDERSIDE OF BEAM
usd 1.00	LEVEL OF UNDERSIDE OF DUCTING
usp 1.00	LEVEL OF UNDERSIDE OF PIPE
us 1.00	UNDERSIDE LEVEL
(20.00)	CEILING LEVEL
[20.00]	FALSE CEILING LEVEL

NO.	DATE	DETAILS

REVISIONS

KND SURVEYS LTD
74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
HP15 6UG
Tel: 01494 718453
Fax: 01494 717576
e-mail: enquiry@kndsurveys.com

CLIENT

MR ROGER THORNS
101 WEST HEATH ROAD
LONDON
NW3 7TN

JOB TITLE

22 FERNCROFT AVENUE
HAMPSTEAD
ONDON
NW3 7PH

DRAWING TITLE

FLOOR PLANS

SCALE BAR
0m 5m

DRAWING No.	DRAWN BY	DATE
K 21 13 / B-G	JD	27 NOV 2013
SURVEYED BY		SCALE
JD		1:50

NORTH-EAST ELEVATION

20.000 Metres

SOUTH-EAST ELEVATION

20.000 Metres

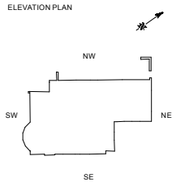
0m 5m

NOTES

1 LEVELS ARE RELATED TO SITE SURVEY. SEE KND SURVEYS' DRAWING "K21 13/1".

2 SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:50 SCALE DRAWING.

ELEVATION PLAN



NO.	DATE	DETAILS

REVISIONS

KND SURVEYS LTD
74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
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Tel: 01494 718453
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CLIENT

MR ROGER THORNS
101 WEST HEATH ROAD
LONDON
NW3 7TN

JOB TITLE

22 FERNCROFT AVENUE
HAMPSTEAD
ONDON
NW3 7PH

DRAWING TITLE

NORTH-EAST & SOUTH-EAST ELEVATIONS

DRAWING No.	DRAWN BY	DATE
K21 13/E2	KL	27 NOV 2013
SURVEYED BY		SCALE
KL		1:50

SOUTH-WEST ELEVATION

20.000 Metres

NORTH-WEST ELEVATION

20.000 Metres

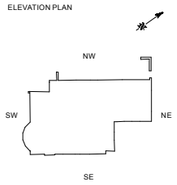
0m 5m

NOTES

1 LEVELS ARE RELATED TO SITE SURVEY. SEE KND SURVEYS' DRAWING "K21 13/T".

2 SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:50 SCALE DRAWING.

ELEVATION PLAN



NO.	DATE	DETAILS

REVISIONS

KND SURVEYS LTD
74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
HP15 6UG
Tel: 01494 718453
Fax: 01494 717576
e-mail: enquiry@kndsurveys.com

CLIENT

MR ROGER THORNS
101 WEST HEATH ROAD
LONDON
NW3 7TN

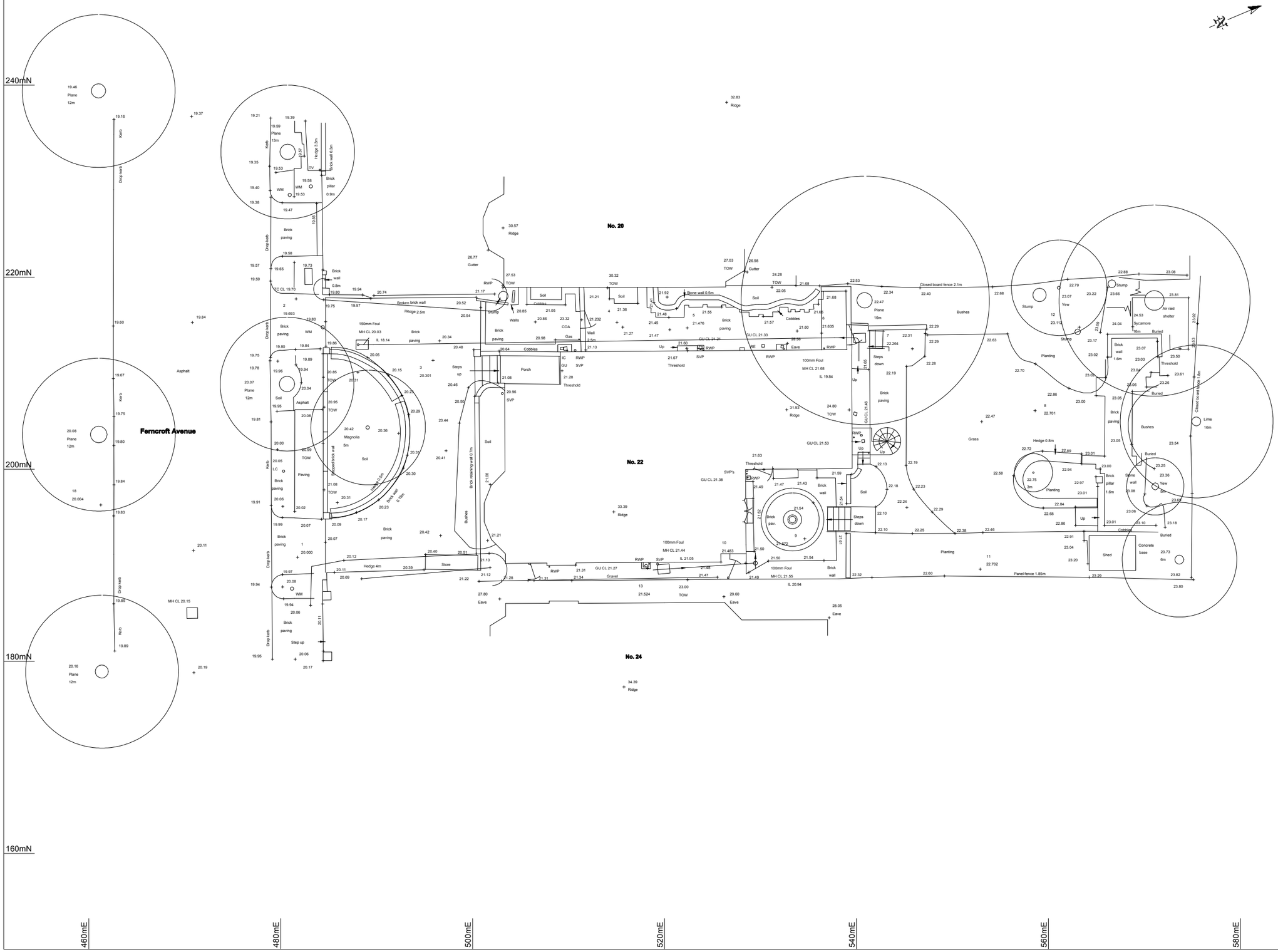
JOB TITLE

22 FERNCROFT AVENUE
HAMPSTEAD
ONDON
NW3 7PH

DRAWING TITLE

NORTH-WEST & SOUTH-WEST ELEVATIONS

DRAWING No.	DRAWN BY	DATE
K21 13/E1	PSW	27 NOV 2013
SURVEYED BY PSW		SCALE 1:50



NOTES

1. LEVELS ARE RELATED TO STATION ONE. LOCAL LEVEL GIVEN AS 20.00 METERS.
2. GRID IS SET TO ARBITRARY NORTH INDICATIVE NORTH SHOWN BY ARROW.
3. GIRTHS, SPREADS, HEIGHTS AND SPECIES OF TREES ARE INDICATIVE ONLY.
4. SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:100 SCALE DRAWING.
5. DETAILS IN ADJACENT PROPERTIES ARE APPROXIMATE WHERE WE HAVE NO ACCESS.
6. LEVELS SHOWN ON KERB LINES ARE ROAD (CHANNEL) LEVELS.

ABBREVIATION LIST

AV	AIR VALVE
B	BOLLARD
CL	COVER LEVEL
DK	DROP KERB
DPC	DAMP PROOF COURSING
ECB	ELECTRIC CABLE CABINET
ECP	ELECTRIC CABLE PIT
EP	ELECTICITY POLE
ER	EARTH ROD
FAI	FRESH AIR INLET
FH	FIRE HYDRANT
GU	GULLY
GC	GAS COCK
IL	INVERT LEVEL
LC	LAMP COLUMN
M	SERVICE MARKER
MH	MANHOLE COVER
OHC	OVERHEAD CABLES
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SC	STOP COCK
SV	STOP VALVE
SVP	SOIL AND VENT PIPE
TBM	TEMPORARY BENCH MARK
TCB	TELEPHONE CABLE CABINET
TC	TELEPHONE CABLE PIT
TP	TELEPHONE POLE
TOS	TOP OF SILT
TOW	TOP OF WALL
TV	CABLE T. V.
UTL	UNABLE TO LIFT
VP	VENT PIPE
WL	WATER LEVEL
WM	WATER METER
WO	WASH OUT

STATION CO-ORDINATES

NO.	EASTING	NORTHING	LEVEL
1	500.000	200.000	20.000
2	499.922	213.456	19.693
3	507.055	210.254	20.301
4	516.634	212.235	21.232
5	520.296	211.940	21.476
6	527.297	211.669	21.635
7	532.031	210.853	22.264
8	538.417	207.635	22.701
9	526.417	200.962	21.572
10	523.345	199.898	21.483
11	535.559	199.379	22.702
12	540.719	211.978	23.112
13	518.235	199.431	21.524
18	489.743	202.728	20.004

2 122.11 SURVEY STATION

STATIONS IN HARD SURFACES ARE CROSS HEAD GALVANISED BOLTS.

STATIONS IN SOFT GROUND ARE PEGS AT GROUND LEVEL WITH CROSS HEAD GALVANIZED SCREWS.

NO.	DATE	DETAILS

REVISIONS

KND SURVEYS LTD

74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
HP15 6UG

Tel: 01494 718453
Fax: 01494 717576
e-mail: enquiry@kndsurveys.com

CLIENT

MR ROGER THORNS
101 WEST HEATH ROAD
LONDON
NW3 7TN

JOB TITLE

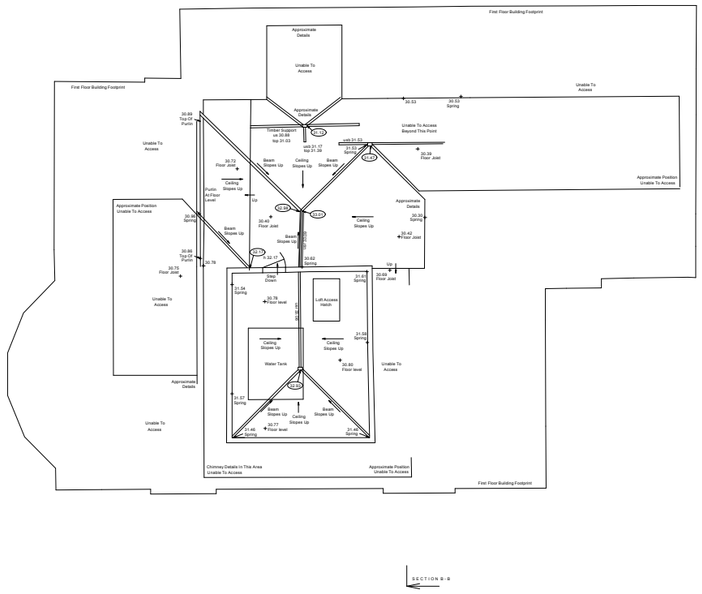
22 FERNCROFT AVENUE
HAMPSTEAD
ONDON
NW3 7PH

DRAWING TITLE

SITE SURVEY

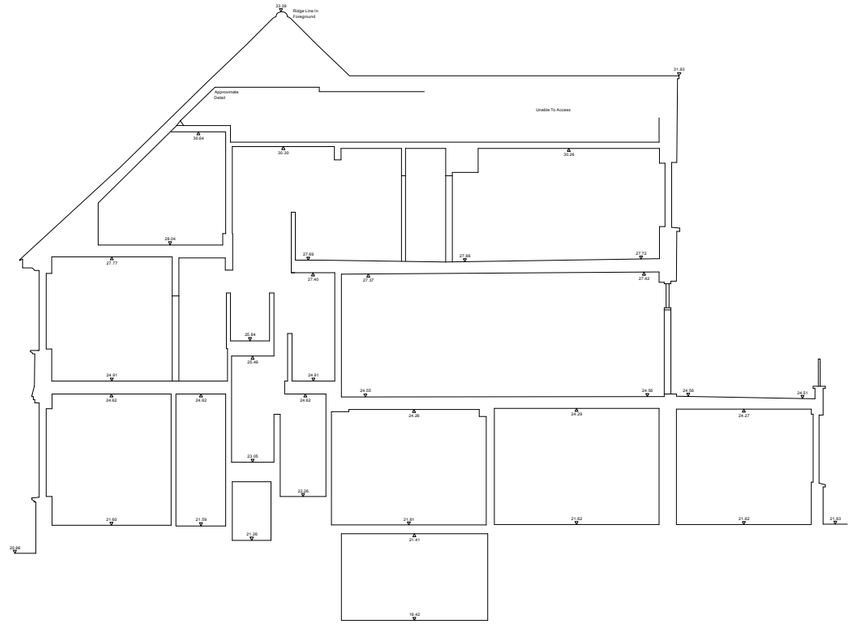
DRAWING No.	DRAWN BY	DATE
K21 13 T	AJF / ACG	27 NOV 2013
SURVEYED BY		SCALE
AJF / ACG		1:200

LOFT PLAN



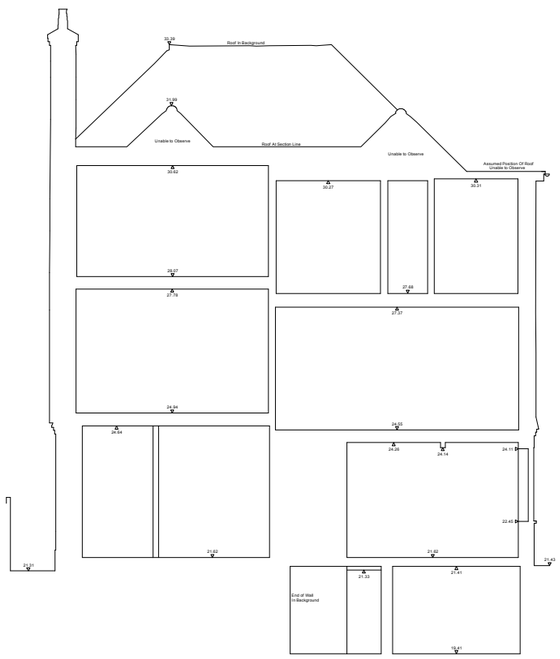
20.000 Metres

SECTION A-A



20.000 Metres

SECTION B-B



20.000 Metres

NOTES

1 LEVELS ARE RELATED TO SITE SURVEY. SEE KND SURVEYS' DRAWING "K21 13/T".

2 SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:50 SCALE DRAWING.

NO.	DATE	DETAILS
1	19.12.13	Loft Details Added

REVISIONS

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CLIENT

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JOB TITLE

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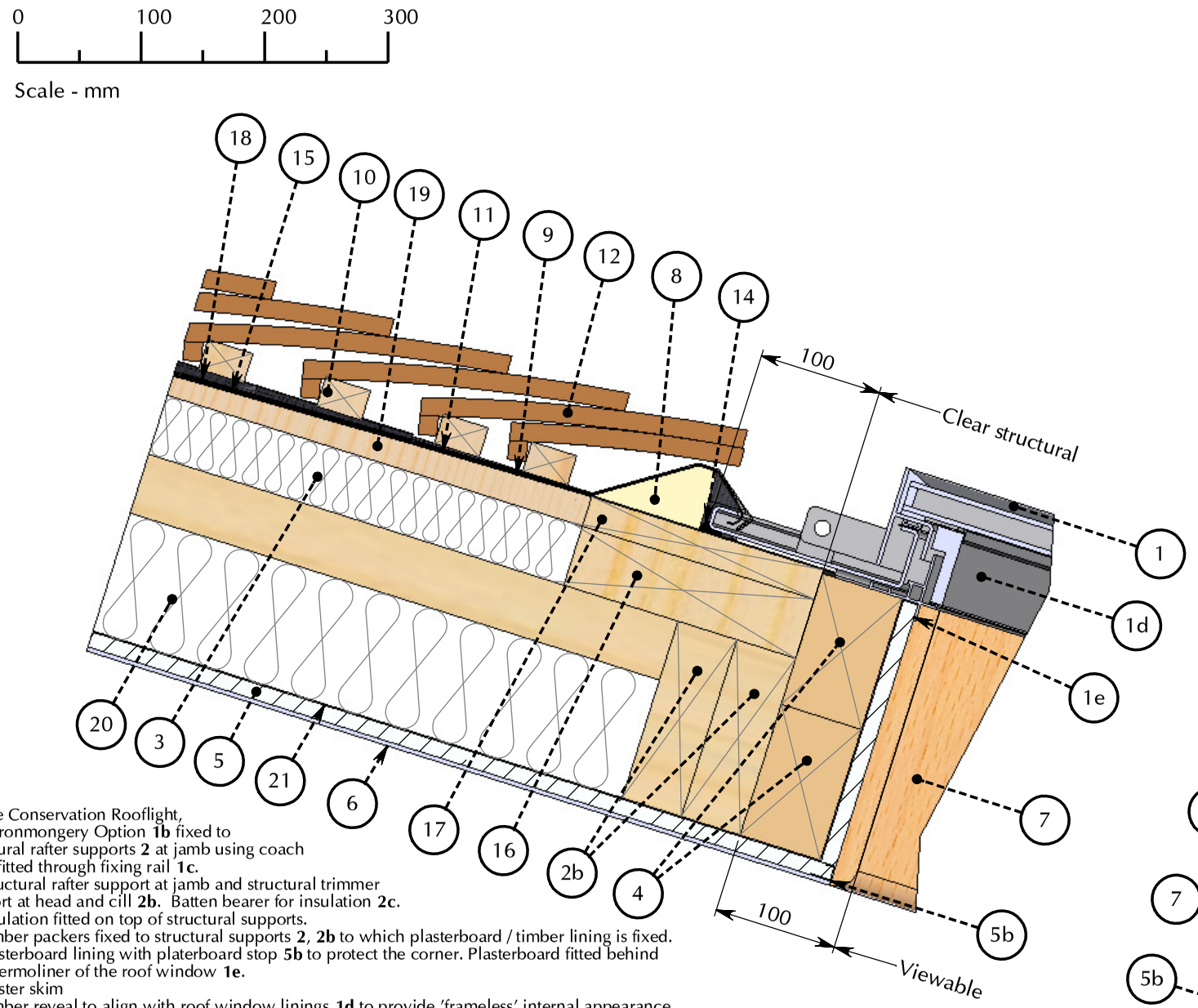
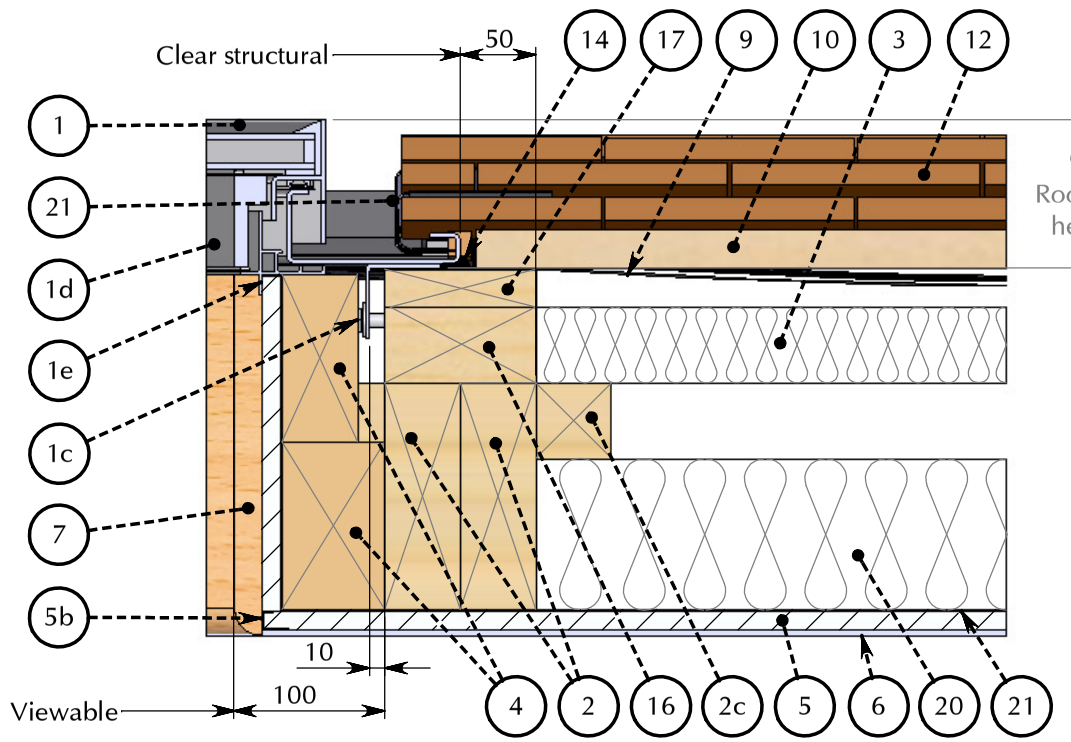
DRAWING TITLE

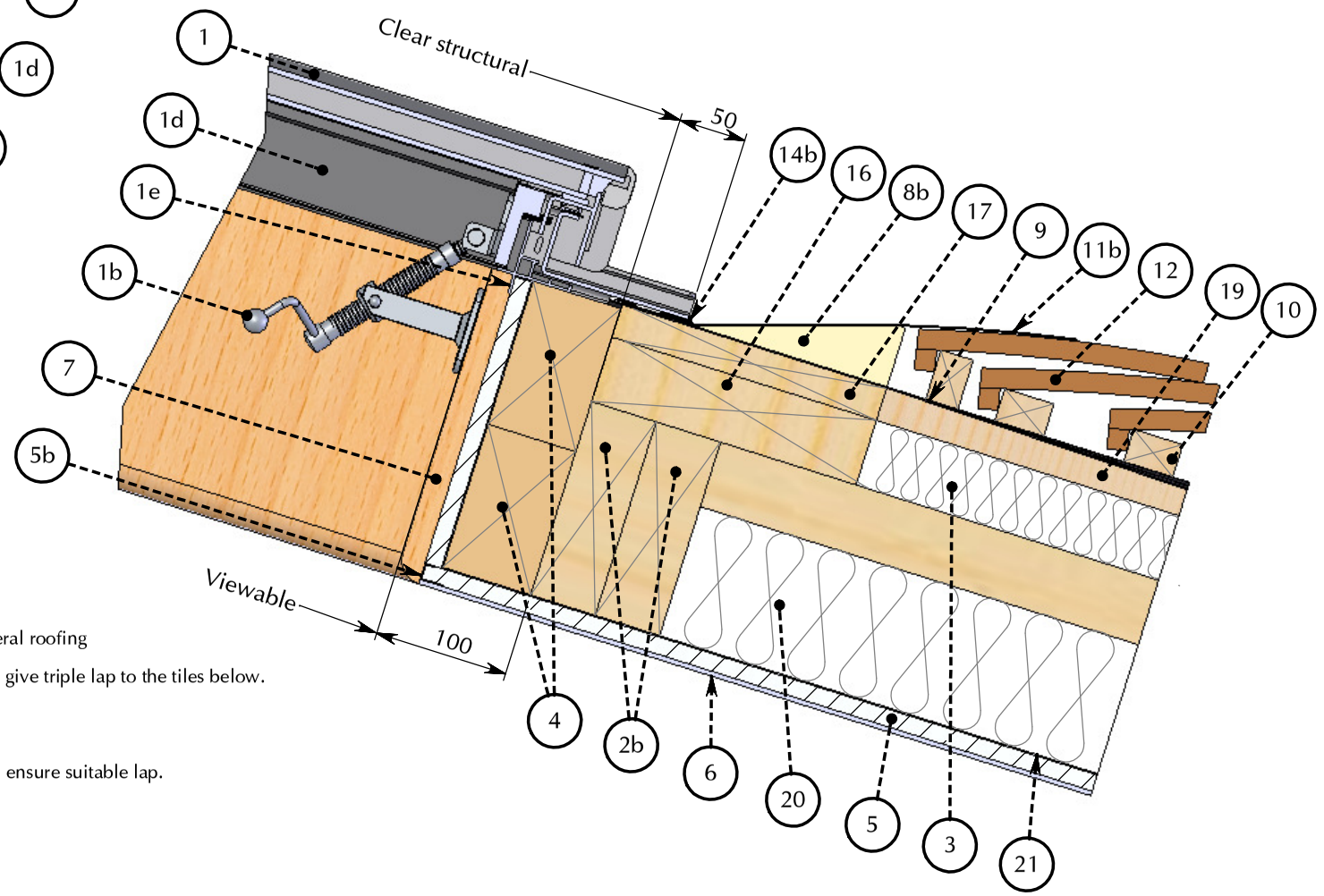
LOFT PLAN / SECTIONS

DRAWING No.	DRAWN BY	DATE
K21 13 B r1	JD / JJF	27 NOV 2013
SURVEYED BY		SCALE

0m 5m







Key:

1. The Conservation Rooflight, with Ironmongery Option **1b** fixed to structural rafter supports **2** at jamb using coach bolts fitted through fixing rail **1c**.
2. Structural rafter support at jamb and structural trimmer support at head and cill **2b**. Batten bearer for insulation **2c**.
3. Insulation fitted on top of structural supports.
4. Timber packers fixed to structural supports **2**, **2b** to which plasterboard / timber lining is fixed.
5. Plasterboard lining with platerboard stop **5b** to protect the corner. Plasterboard fitted behind the thermoliner of the roof window **1e**.
6. Plaster skim
7. Timber reveal to align with roof window linings **1d** to provide 'frameless' internal appearance. Rooflight linings **1d MUST BE PAINTED** with a timber finishing paint once the rooflight is installed to ensure the longevity of this component. If the linings **1d** have been factory painted, they do not require an additional paint finish. Please refer to label attached to roof window frame.
8. Head hardwood tilting fillet.
8b. Cill hardwood tilting fillet - to provide minimum 5 degree fall for shedding rain water.
9 & 18. Line of general roofing membrane.
10. Softwood battens.
11. Code 3 (consider using code 4 and clipping down roof tiles in severer exposures) lead flashing at head. Carry flashing up the roof and lap **UNDER** general roofing membrane **9**, **18** and **UNDER** head membrane **15**.
11b. Code 4 (consider clipping flashing and roof tiles down in severer exposures) lead flashing at cill over tilting fillet **7b**. Make the flashing long enough to give triple lap to the tiles below.
12. Roofing tiles.
13. Jamb flashing - lead soakers as shown (or mortar bed).
14. Perimeter silicone seal. Seal perimeter of rooflight **1 JUST PRIOR TO** installation of the rooflight using a thick continuous bead of low modulus neutral cure silicone sealant. Ensure sealant to cill **14b** is located in a position where it will be covered by the cill flange of the rooflight.
15. Roofing membrane to rooflight head. Dress **UNDER** general roofing membrane **18**, **UNDER** lead flashing **11** and **OVER** general roofing membrane **8** to ensure suitable lap.
16 & 17. Timber packers fixed to top of structural support (same height as counter battens + top insulation).
19. Counter batten.
20. Insulation fitted between structural supports.
21. Vapour barrier.

Please Note:

These sectional details are provided as an installation suggestion. Due to the differing nature of installations we strongly advise you to consult your rooflight installer to verify fitness for purpose. This drawing does not constitute a structural proposal. Sufficiency of structural supports to be checked by rooflight purchaser's structural consultant.

TITLE :

Conservation Rooflight®

> A Roof window range suitable for pitched roofs between 17.5 ° and 65 °.
> Detail applicable ONLY to rooflight models with integral casement timber linings

Warm Roof | Clay Tile | Lead Soakers 'On the rafter' installation detail

DWG NO. :	CR_WRCS_LS_C	**SHEET NO. :**	1 OF 1
SCALE :	1:5 @ A3	**DATE :**	26/06/2013

This is a suggested installation detail which may not be exactly applicable to all situations and constructions. It is not a detailed or constructional proposal. Installers and designers are advised to check their own details for compliance with all currently applicable Local Authority by-laws, Acts of Parliament and British / ISO standards.

REVISION: C

9MM WBP PLY PACKER REMOVED TO INSERT P PLASTERBOARD BEHIND THE THERMOLINER

DB: EH CB: PD

the Rooflight Company
The Professionals' Choice

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