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30 Princess Road, NW1 8JS

Basement Impact Assessment

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1. Introduction

It is proposed to construct a single storey basement beneath the existing residential dwelling on 30 Princess Road. Ecos Maclean has been instructed to carry out a Basement Impact Assessment (BIA) to assess the potential impact on surrounding structures and hydrological features.

Camden Planning Guidance CPG4 Basements & Lightwells [1] requires that the impact of any new basement development in the borough be assessed according to the following 5 stages:

1. Screening
2. Scoping
3. Site investigation
4. Impact assessment
5. Review and decision making

This report is intended to address the screening, scoping and impact assessment processes set out in CPG4 and the Camden geological, hydrogeological, and hydrological study (CGHHS) [2]. The screening process identifies key issues relating to land stability, hydrogeology and hydrology to be considered as part of any proposed basement development. A site investigation has already been carried out at the site and is used to establish a conceptual site model.

This report also provides an assessment of geotechnical impacts on adjacent structures and the surrounding area based on available site investigation data and the presented structural designs. This includes design checks of proposed gravity retaining walls underpinning existing structure, displacement calculations of retaining walls and a damage assessment to predict the impact on adjacent properties.

The proposed basement will extend approximately three metres below the existing property ground floor level. In preparing this BIA a thorough review of published and unpublished sources of information on Geology, Hydrogeology, Hydrology and Flood Risk has been undertaken.

2. Site Context

2.1 Site Location

The site is located at 30 Princess Road, NW1 8JS, to the east of Primrose Hill in the London Borough of Camden. The Grid Reference for the centre of the site is approximately 528275E, 183859N. The site location is shown in figure 1.

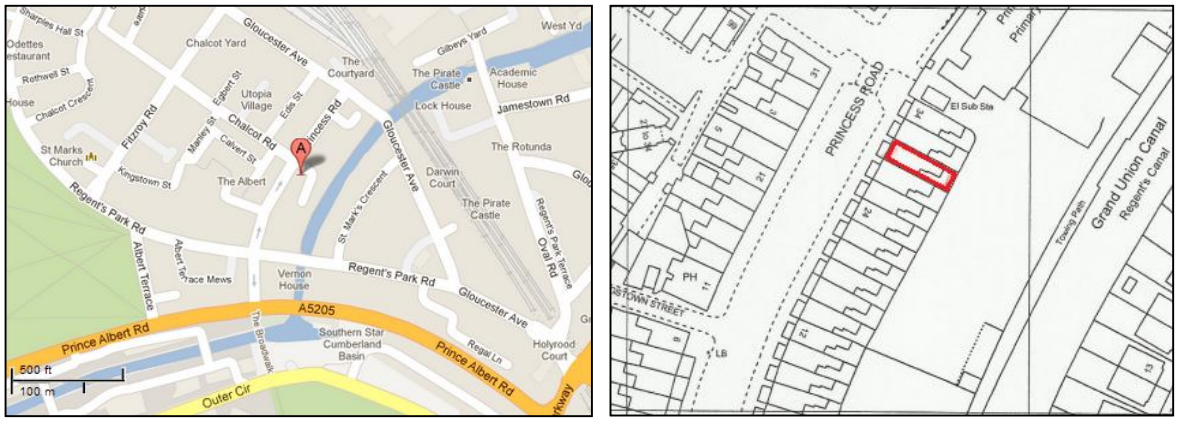


Figure 1: Site location plan

2.2 Site Layout

The site comprises No. 30 Princess Road and is currently occupied by a four storey rectangular house with a single storey rear extension and three story rear cabinet extension. The plan and elevations of the house have not been modified since construction.

2.3 Proposed Development

The single storey rear extension is to be demolished and rebuilt to the same height and projection into the rear garden as the original structure, but spanning the entire width of the site along with internal remodelling. In addition, a single storey basement is proposed projecting from the rear wall of the existing house into the garden to the same distance as the rear extension above and spanning across the entire building footprint giving a total area of 5 x 5.5m. The existing foundations and party walls are to be underpinned, with the underpins acting as gravity retaining walls in the temporary condition and propped retaining walls in the permanent condition. A single level temporary propping system is to be utilised in the temporary condition prior to construction of the basement slab, with the walls supported in the permanent condition by the basement and ground floor slabs. Development plans and elevations, showing the site with existing and proposed condition, are included in Appendix A. The structural details of the underpinning and typical retaining wall details are provided in Appendix D.

2.4 Site History

Maps of the site dating back to 1875 were obtained and are shown in figure 2. The site has been part of a residential setting since 1875 with the surrounding buildings and roads of Princess Terrace (now Princess Road) along with Chalcott Road and the Regents Canal in their current locations. The general arrangement of the residential dwellings around Princess Road has not changed.

Figure 2: Princess Road residential setting 1875

2.5 Topography

The sites lies at an elevation of approximately 37mOD, sloping gently from west to east and covers an area of 0.01ha. Locally the highest point is Primrose Hill, 650m west of the site at an elevation of 84mOD, sloping in a easterly direction towards the Regents Canal. The Regents Canal is approximately 50m south east of the site at a level of around 30mOD. Around Primrose Hill the slope locally can be as much as 1:5 (20%), although locally around the site the slope is much more gradual at about 1:70 (1.4%).

2.6 Published Geology

The British Geological Survey (BGS) of the area indicates the site to be underlain by London Clay Formation. The London Clay Formation is an over consolidated firm to very stiff, becoming hard with depth, fissured, brown to grey silty clay of low to very high plasticity.

2.7 Unpublished Geology

A number of borehole records exist within 200m of the site boundary. The references of these boreholes and distances from the site are summarised below in Table 1.

Borehole	Ref. Distance from site	Direction	Ground level
TQ28SE1216	10m	North-West	37mOD
TQ28SE1215	100m	North-North-East	35mOD
TQ28SE1217	100m	South-South-West	37mOD
TQ28SE637	150m	West-South-West	35mOD

Table 1: Royal Geological Survey boreholes in the local area

The ground conditions from TQ28SE1216 are summarised below in Table 2:

Stratum	Depth (m)	Level (mOD)
MADE GROUND Clayey ash and brick fragments	0.0	37.0
SILTY CLAY Firm to Stiff Brown Clay	3.3	33.7
FISSURED SILTY CLAY Stiff to Very Stiff Brown Clay	8.5	28.5
FISSURED SILTY CLAY Very Stiff Brown Clay	11.5	25.5
END	15	22.0

Table 2: Results of Borehole investigation TQ28SE1216

All borehole investigations identify the presence of London Clay Formation around the site, the geological properties of which have been widely studied and are well known [2]. Further borehole investigations are therefore deemed unnecessary.

2.8 Hydrogeology

The Environment Agency (EA) has classified the site location as unproductive strata. The BGS borehole records confirm the absence of groundwater to a depth of 15m below ground level.

The site is not within a groundwater source protection zone.

2.9 Hydrology

The site is not located close to any rivers or drainage channels serving the borough of Camden. The Regents Canal is approximately 50m south east of the site at a level of around 30mOD

2.10 Flood risk

With reference to the Environment Agency website [3], Princess Road is not within a flood risk zone. However, with reference to Fig 15 Flood Map of the Camden geological, hydrogeological and hydrological study report (CGHH) [4] Princess Road was subjected to flooding in 1975, but not in the flood event of 2002.

3. SCREENING

3.1 Subterranean (ground water) flow screening - Fig 1 [1]

	Question	Response	Justification	Reference
1a	**Is the site located directly above an aquifer?**	No	The site is located on unproductive strata as defined by the Environment Agency with low permeability that has negligible significance for water supply or river base flow.	Fig. 8 CGHH
1b	**Will the proposed development extend beneath the water table surface?**	No	Given that no water was found by the BGS while drilling a 15m deep borehole and the nature of the soil discovered (London clay) the basement development will not extend below the level of the water table even when considering seasonal changes in the level of the water table.	BGS Borehole TQ28SE1216
2	**Is the site within 100m of a watercourse, well (used/disused) or potential spring line?**	No		Fig. 8, 11 and 12 CGHH [5] [6]
3	**Is this site within the catchment of the pond chains on Hampstead Heath**	No		Fig. 14 CGHH
4	**Will the proposed development change the proportion of hard surfaced/paved areas?**	No		Appendix A
5	**As part of the site drainage, will more surface water than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?**	No		Appendix A
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 springline.**	Yes	Regents Canal is approx. 50m from the proposed development site.	Fig. 11 and 12 CGHH

Table 3: Subterranean Ground Water flow Screening

3.2 Slope stability screening - Fig 2 [1]

	Question	Response	Justification	Reference
1	**Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)**	No	The slope of land around the site is minimal and much lower than 7°.	Site survey Fig. 16 CGHH [7]
2	**Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°?**	No	The slopes at the property boundary will be unaffected by the development.	Appendix A
3	**Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?**	No	All neighbouring land has a slope less than 7°. Any differences in the height of adjacent land is retained using walls that will be unaffected by the development.	Site survey Fig. 16 CGHH [7]
4	**Is the site within a wider hillside setting in which the general slope is greater than 7°?**	No	The local setting around the site is generally very flat with Primrose Hill lying to the North West a significant distance from the site.	Site survey Fig. 16 CGHH [7]
5	**Is the London Clay the shallowest strata at the site?**	Yes		Fig. 2 CGHH
6	**Question 6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?**	No		Appendix A BS 5837 (2012) Cl. 4.6
7	**Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?**	No	There is no evidence to suggest any history of shrink-swell subsidence	Site survey
8	**Is the site within 100m of a watercourse or a potential spring line?**	No		Fig. 8, 11 and 12 CGHH [5] [6]
9	**Is the site within an area of previously worked ground?**	No		[8]
10	**Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?**	No	The site is situated on unproductive strata with low permeability that has a negligible significance for water supply or river base flow	Fig. 8 CGHH

11	**Is the site within 50m of the Hampstead Heath ponds?**	No		Fig. 2 CGHH
12	**Is the site within 5m of a highway or pedestrian right of way?**	No		Site survey [7]
13	**Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?**	Yes		Appendix A
14	**Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?**	No		Site survey [7]

Table 4: Slope Stability Screening

3.3 Surface flow and flooding screening - Fig 3 [1]

	Question	Response	Justification	Reference
1	**Is the site within the catchment of the pond chains on Hampstead Heath?**	No		Fig. 14 CGHH
2	**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	Site drainage will be channelled along the existing routes.	Appendix A
3	**Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?**	No	The lower ground floor extension will occupy a larger area of the garden. A small proportion of hard surfaced garden will be replaced by a flat roof that will channel surface water along the same route used currently.	Appendix A
4	**Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?**	No		Appendix A
5	**Question 5: Will the proposed basement result in changes to the quality of surface water being received by adjacent**	No		Appendix A

	properties or downstream watercourses?			
6	**Question 6: Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?**	Yes	Princess Road was flooded in 1975 after a heavy downpour and lies within 50m of the Regent's Canal.	Fig. 14 CGHH

Table 5: Surface Flow and Flooding Screening

4. SCOPING

4.1 Introduction

This section of the report covers the scoping process of the BIA, which is used to identify potential impacts of the proposed scheme on the groundwater, slope stability and surface water flow identified as risks in the screening stage. The scoping stage also informs the scope of any necessary site investigations and is used to establish a Conceptual Site Model (CSM).

4.2 Groundwater

The site lies approximately 50m from the Regent's canal, the mean level of which is similar to the lowest point of the proposed basement. The potential impact is that seepage of water from the Regent's canal will drain into the proposed basement development.

Four Royal Geological Survey borehole investigations of the London Clay Formation around Princess Road found no presence of ground water down to a depth of 15m. It is therefore assumed that there will be no ground water present at the new depth of the proposed basement development even when taking into account seasonal variations in the water table.

4.3 Slope Stability

The shallowest strata at the site is London Clay which is known to be a heavily over consolidated clay formation and is therefore subject to changes in volume when excavating. London Clay is also known to expand and contract with changing levels of water. The potential impact of excavating in London Clay is the possibility of volume changes causing movement and cracking of existing

structures. Furthermore, if the underpinning is not correctly detailed, future soil movements due to the changing water content could also cause movement of the new and/or existing structures. Correct detailing and construction practices must be ensured to reduce the potential impact of excavating in London Clay.

The construction of a new basement at the site will cause differences in the relative heights of foundations between adjacent properties. Foundations of different depths could move by different amounts when subjected to volume changes in the surrounding soil. The settlement and deflection of foundations can be estimated by calculation, ensuring that any movement does not have a significant impact on surrounding structures.

4.4 Surface Water Flow and Flooding

It was found in the screening stage that Princess Road was flooded in 1975 as a result of the largest daily total of rainfall ever recorded in the London area overloading the combined drains and causing flooding. The events in 2002 were again as a result of extremely heavy rainfall. Extreme weather events are becoming increasingly common and the risks posed by them should be considered in future developments. The Regents Canal is considered to pose a low risk of flooding as it does not form part of the natural drainage system of surface water in the area.

4.5 Consultation with local residents

A letter has been sent to local residents in order to inform them of the proposed development at Princess Road. A dialog has been opened with neighbours to agree on a suitable construction management plan that will ensure minimal impact on local residents and to address any comments or concerns. A copy of the letter sent to residents is included in Appendix B

4.4 Conceptual Site model

A conceptual site model before and after the proposed development has been constructed based on a thorough investigation of the site and the surrounding area, in accordance with the recommendations of the Camden geological, hydrogeological, and hydrological study and are presented in Appendix C. The main findings are summarised in sections 4.5.1 and 4.5.2 below.

The site is located in the London Borough of Camden on Princess Road. Princess road is situated above 3.3m of Made Ground and the lower ground floor level of the site sits above 0.5m of Made Ground. Below the main ground is the London Clay Formation approximately 30m thick [4], designated by the Environment Agency as unproductive strata in terms of ground water flow. The water table lies at least 15m below the current level of the site.

Hard surfacing is the predominant surface covering in the local area apart from a few gardens and Primrose Hill, located 650m to the north-west of the site. The majority of rainfall incident on the surrounding area will run-off into local guttering and drainage system surrounding the site, with a proportion evaporating, a small proportion retained in the soil and root layer, and a small proportion being absorbed by the London Clay. There are no perennial streams within several hundred metres of the property but the Regent's canal lies some 50m to the south-east of the site. The Regent's canal does not contribute to the catchment of rainwater in the local area and does not contribute to subterranean water flow.

30 Princess Road forms part of a row of terraced houses with a school playground to the rear of the property. Currently there are no existing basement developments on Princess Road.

4.5.1 Existing

With the reference to Figure C.1

1. Relatively thick Made Ground deposits on Princess Road (max. 3.3m), with thin deposits of Made Ground below the lower ground floor level (max. 0.5m). Below the Made Ground lies the London Clay Formation (approx. 30m).

2. Party wall with No. 32 Princess Road and proximity to No. 34 Princess Road and the local school.

3. Regents Canal situated 50m east south east of the site.

4. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.

4.5.2 Proposed

With the reference to Figure C.2

1. Made Ground is mostly removed from site.

2. New basement occupies the footprint of the proposed lower ground floor extension

3. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.

5. Site Investigations

5.1 Introduction

A site specific investigation has been undertaken at the site. As such this report will assess the suitability of the existing site investigation data to inform the impact assessment (Stage 4). A single intrusive investigation has been undertaken on site and is summarised below.

5.2 Review of existing site investigation information

A trial pit was dug under the existing external masonry wall to the bottom of the foundation which was found at a depth of approximately 0.6m below ground level. The external masonry walls were found to be 1.5 bricks in width (approx. 325mm) extending symmetrically in progressive corbels of 100mm for the last three courses to 3 bricks in width (approx. 665mm) at the bottom of the foundation. The masonry walls were found to be bearing on Made Ground consisting of brick fragments and gravel.

5.3 Geotechnical Parameters

It is not considered necessary to carry out a new borehole investigation given the extensive BGS borehole records available within close proximity of the site. Geotechnical design parameters for the ground conditions encountered are given in Table 3. The values have been derived based on the soil descriptions from local BGS boreholes records, including the number of impacts required to bore a given depth. Reference has also been made to published data on London Clay to confirm the assumptions made below [2].

Stratum	Level (mOD)	Unit Weight (kN/m^3)	ϕ' (°)	c' (kN/m^2)	Bearing Pressure (kN/m^2)
Made Ground	37.0	18	28	0	-
London Clay	33.7	20	25	10	75

Table 6: Soil Properties

The above values are considered to be moderately conservative and are unfactored (Serviceability Limit State) parameters.

6. Subterranean (Groundwater) Flow

The site is located above London Clay which presents an almost complete barrier to groundwater. The development will have a negligible impact on the groundwater flow as the site is identified as being unproductive strata. Royal Geological Survey boreholes in the local area indicate that the water table is at least 15m below the level of Princess Road.

The Regent's canal does not form part of the natural drainage systems in the local area and the levels are carefully maintained through the controlled inflow of water. The canal is lined with impermeable clay to avoid the excessive loss of water into the surrounding ground. Given the proximity of the canal to the site and the known ground conditions, the new depth of the proposed basement will have a negligible effect on any groundwater flow from the canal.

It is concluded that the proposed development will have no detrimental effects on the subterranean water flow and risk mitigation measures are not required.

7. Slope (Land Stability) Assessment

7.1 Introduction

This section addresses outstanding issues raised by the screening process regarding land stability (see Section 3.2). The basement is to be constructed using underpinning techniques constructed in a 1, 2, 3, 4, 5 sequence in bays of maximum 1.2m length, Appendix D. The underpins will be constructed in a single lift forming propped gravity retaining walls in the temporary condition to resist sliding, overturning and excessive bearing pressures. The underpins will be constructed in trenches with a central soil mass retained to provide support for temporary props and formwork. The underpins will be supported in the permanent condition by the lower ground floor and basement slabs.

Structural details and typical construction sequences are provided in Appendix D.

7.2 Adjacent Structures

The proposed extension at No. 30 Princess Road will share a party wall with No. 28 Princess Road to the north east of the site and No. 32 Princess Road to the south west. From available photographs and site investigations it appears that the external form including foundations of No. 28 and 32 Princes Road have not been modified since construction.

7.3 Ground movements arising from basement excavation

During excavation, the soils at formation level will be subject to stress relief as some 3m to 4m of overburden are removed. Due to the over consolidated nature of the London Clay formation; the soils are likely to be classified as medium shrinkabilty with a moderate plasticity index and therefore could be subjected to significant volume change over time on unloading. To mitigate the risk of volume change, any unsupported face may not be left exposed for more than 12 hours and if the pin is not cast within this time the face must be propped or backfilled. Formwork for the inner wall face will be propped against the rear of the trench and the retaining face will be cast directly against the soil. It is important that the walls are not cast against permanent formwork as the potential for unfilled voids may result in excessive settlement of the retained soil beyond. Each pin will be cured for a minimum period of 48 hours before work commences on a directly adjacent section.

Monitoring of Existing Building work and structures will be carried out by visually inspecting adjacent buildings and structures for signs of movement, cracking or other indications of distress. Inspections will be carried out on a daily basis and before & after significant groundwork commencing at start of excavation and continuing until the end of the contract.

Given that the soils are predicted to behave as drained materials, any minor heave movements in the form of elastic recovery that may occur will be removed during levelling for casting of the basement slab. No long term heave is predicted.

7.4 Underpin Walls – Global Stability

6.4.1 General

Ecos Maclean have completed propped gravity wall designs to underpin the rear elevation of the existing property and along the boundaries with No. 28 and 32 Princess road to ensure the walls are stable in sliding, overturning and ground bearing in both the permanent and temporary condition. To the rear of the proposed development a reinforced Stepoc retaining wall has been designed where the vertical load from structure above does not apply significant stabilising compressive loads. It should be noted, calculations were completed using a partial safety factor method following the combinations outlined in design approach 1 in accordance with EC7, as below:

- Factor of Safety for angle of shearing resistance (tan ϕ') = 1.25
- Factor of Safety for effective cohesion (c') = 1.25
- Factor of Safety for undrained shear strength (c_u) = 1.4

Geological parameters were assumed in accordance with Section 4.4. It should be noted that, in all calculations, the loading and material properties have been multiplied by the appropriate factor of safety and as such a factor of safety of 1.0 represents a safe design. In the permanent condition the underpins will be propped at the top and bottom by the lower ground floor slab and basement slab respectively, providing support against overturning and sliding. The results revealed the walls are stable in the permanent condition, but prone to overturning and sliding failure in the temporary condition primarily due to the absence of the prop loads from the floor slabs. Temporary prop loads at appropriate heights have been calculated based on the results of the retaining wall design to resist these failure modes.

6.4.2 Analysis

A design check using Rankine's earth pressure theory was used to establish prop loading and ensure global stability in the temporary condition, the props at the top of the underpin is required to support 24.4 kN/m, while the props at the bottom are required to support 48.9 kN/m.

The results indicate with the additional prop loads the walls are stable against sliding and overturning in the temporary condition. Additionally, given that a soil mass will remain in the centre of the basement excavation, with underpins excavated in shored bays, there will be additional resistance to sliding that will ensure short term stability. Calculations are provided in Appendix E.

7.5 Underpin Walls – Lateral Movements

The design of the basement uses the floor slab of the lower ground floor and basement to prop the underpinning in the permanent condition. This design ensures that the underpinning will be supported in order to minimise any lateral movement.

7.6 Underpin Walls – Vertical Movements

6.6.1 Soil Bearing Capacity

Theoretically an allowable bearing capacity of 150kPa is possible for the underpin bases in the permanent condition, taking into account the depth to groundwater (assumed to be absent), depth of overburden and lateral restraint provided by the basement slab, both of which will help to prevent shear planes developing beneath the underpin. The line loads from the walls are to be transferred to the soils at depth via the underpin bases.

6.6.2 Settlement

Settlements from the construction are likely to be negligible given the net loadings on the soil at basement floor level are not significantly increased compared to those already being exerted by the

existing structure. The additional loads that will be transferred will therefore not generate additional settlement above that which will have occurred historically in the soil under the weight of existing overburden. As such estimated settlements are negligible and even in the worst case do not exceed 5mm. On the basis of the above, damage associated with excessive settlements of the underpins is not considered to present a risk to adjacent structures.

7.7 Damage Category Assessment

Ground movements have been analysed based on the construction scheme as currently envisaged to provide indication as to the potential damage that may be caused to neighbouring structures and infrastructure.

The calculated ground movements have been used to assess potential 'damage categories' to the neighbouring properties. The methodology proposed by Burland and Wroth [9] and later supplemented by the work of Boscardin and Cording [10] has been used, as described in *CIRIA Special Publication 200* [11] and *CIRIA C580*.

Assumed damage categories are summarised in Table 4 below:

Category	Description
0 (Negligible)	Negligible – hairline cracks
1 (Very slight)	Fine cracks that can easily be treated during normal decoration (crack width <1mm)
2 (Slight)	Cracks easily filled, redecoration probably required. Some repointing may be required externally (crack width <5mm).
3 (Moderate)	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced (crack width 5 to 15mm or a number of cracks > 3mm).
4 (Severe)	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows (crack width 15mm to 25mm but also depends on number of cracks).
5 (Very Severe)	This requires a major repair involving partial or complete rebuilding (crack width usually >25mm but depends on number of cracks).

Table 7: Damage category and necessary remedial measure

Damage to adjacent structures is likely to be no worse than 'Category 1' comprising fine cracks that can be easily treated during normal decoration.

8. Surface Flow and Flooding

Princess road is outside the EA flood risk zone, but was subjected to surface water flooding in 1975 as a result of surcharge pressure on the drainage system causing drains to back up. Princess road was not subjected to flooding in 2002 following a very similar flood event. Since the 1975 and 2002 flood events the drainage in the borough has been upgraded with a holding tank and increased outflow capacity [10]. Princess Road is no longer in an area at risk from surface water flooding as a result of heavy rain [10].

The basement will be protected from water ingress by internal tanking and a drained cavity which are to be specified by the architect. Much of the surface run-off from the garden can be transmitted to the existing drainage by gravity. In addition the basement contains a shower, sink and toilet which will require its own foul drainage. Therefore a significant volume of foul and surface water must be pumped out of the basement into the existing drainage system. These flows will not be combined in the basement, so two separate pump sets are required. These will be housed in a 1m deep service trench excavated below the level of the basement raft. All drainage from the property will be fitted with non-return valves to stop the back flow of water in the event of surcharge pressure on the drainage system

9. Conclusions

The findings of this Basement Impact Assessment are informed by site investigation data already available for the site and structural drawings and calculations. On the basis of this information it is considered that the proposed development will not have a detrimental effect on groundwater or surface flooding in the vicinity of the site. The construction of the basement will generate ground movements due to a variety of causes, however, based on a calculated settlement it is considered that these movements can be controlled through appropriate construction techniques and control measures to limit building damage categories to no worse than ‘Category 1’ (very slight).

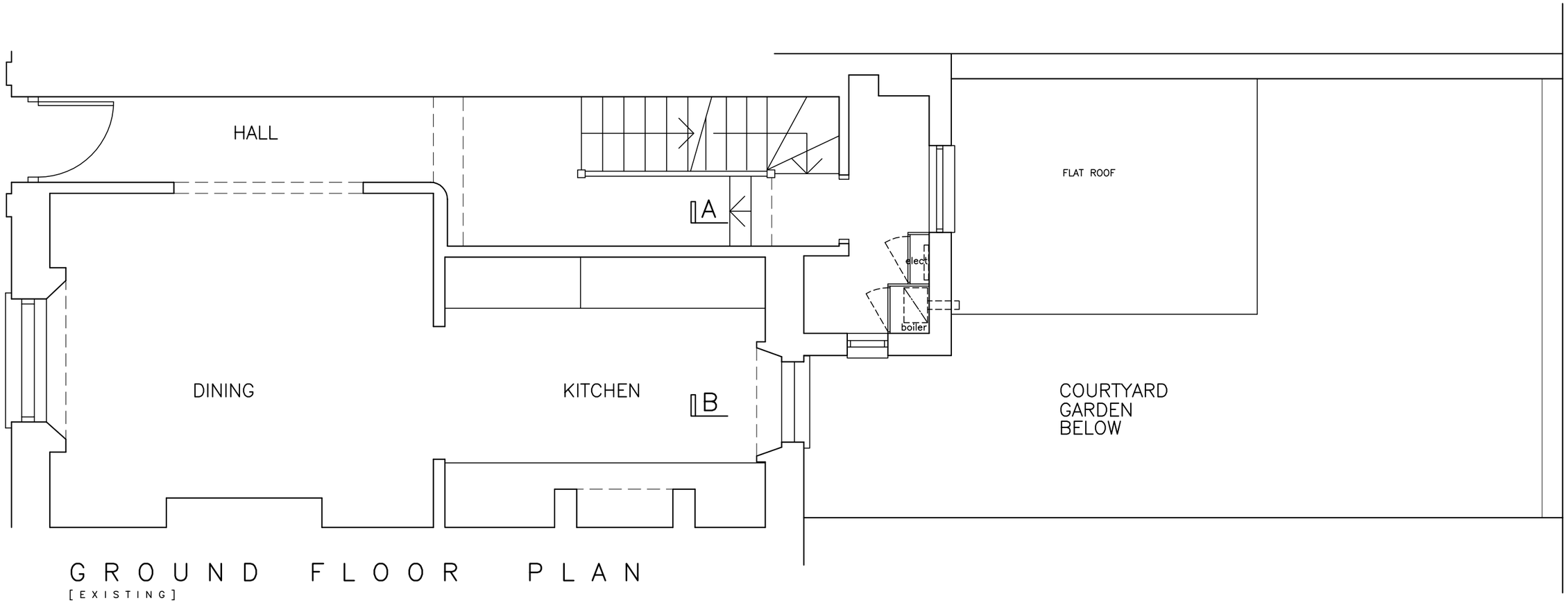
10. References

1. Camden Planning Guidance, CPG4, Basements and Lightwells, May 2011.
2. Advance Laboratory Characterisation of London Clay, Apollonia Gasparre, July 2005
3. Environment Agency, Risk of Flooding from Rivers and Sea, February 2013.
4. Ove Arup and Partners, Camden geological, hydrogeological, and hydrological study. Guidance for subterranean development, November 2010.
5. Environment Agency, Drinking Water Protected Areas, February 2013.
6. BGS Onshore Geoindex – Water Wells, February 2013.
7. Ordinance Survey Map – London Borough of Camden 1:2500
8. BGS Onshore Geoindex – Artificial Ground 1:50000, February 2013
9. Burland, J.B., and Wroth, C.P. (1974). *Settlement of buildings and associated damage*, State of the art review. Conf on Settlement of Structures, Cambridge, Pentech Press, London, pp611-654
10. Boscardin, M.D., and Cording, E.G., (1989). *Building response to excavation induced settlement*. J Geotech Eng, ASCE, 115 (1); pp 1-21.
11. Burland, Standing J.R., and Jardine F.M. (eds) (2001), *Building response to tunnelling, case studies from construction of the Jubilee Line Extension London*, CIRIA Special Publication 200.
12. Telephone conversation with Graham Jasper, London borough of Camden drainage department, February 2013.

Appendix A – Architects Existing and Proposed Plans Elevations

NOTES :

THIS DRAWING IS NOT TO BE SCALED FROM,
SPECIFIC DIMENSIONS SHOULD BE CHECKED ON SITE



GROUND FLOOR PLAN
[EXISTING]

htr = RADIATOR/ TOWEL RAIL POSITION
rad

= BEAM/ DOWN STAND/ CHANGE IN CEILING LEVEL OVER

~ SCALE ~
0 1 2 3 4 5 6 7 8 9 10
METRES

Project	30 PRINCESS ROAD LONDON NW1 8JL PROPOSED ALTERATIONS
Title	GROUND FLOOR PLAN AS EXISTING
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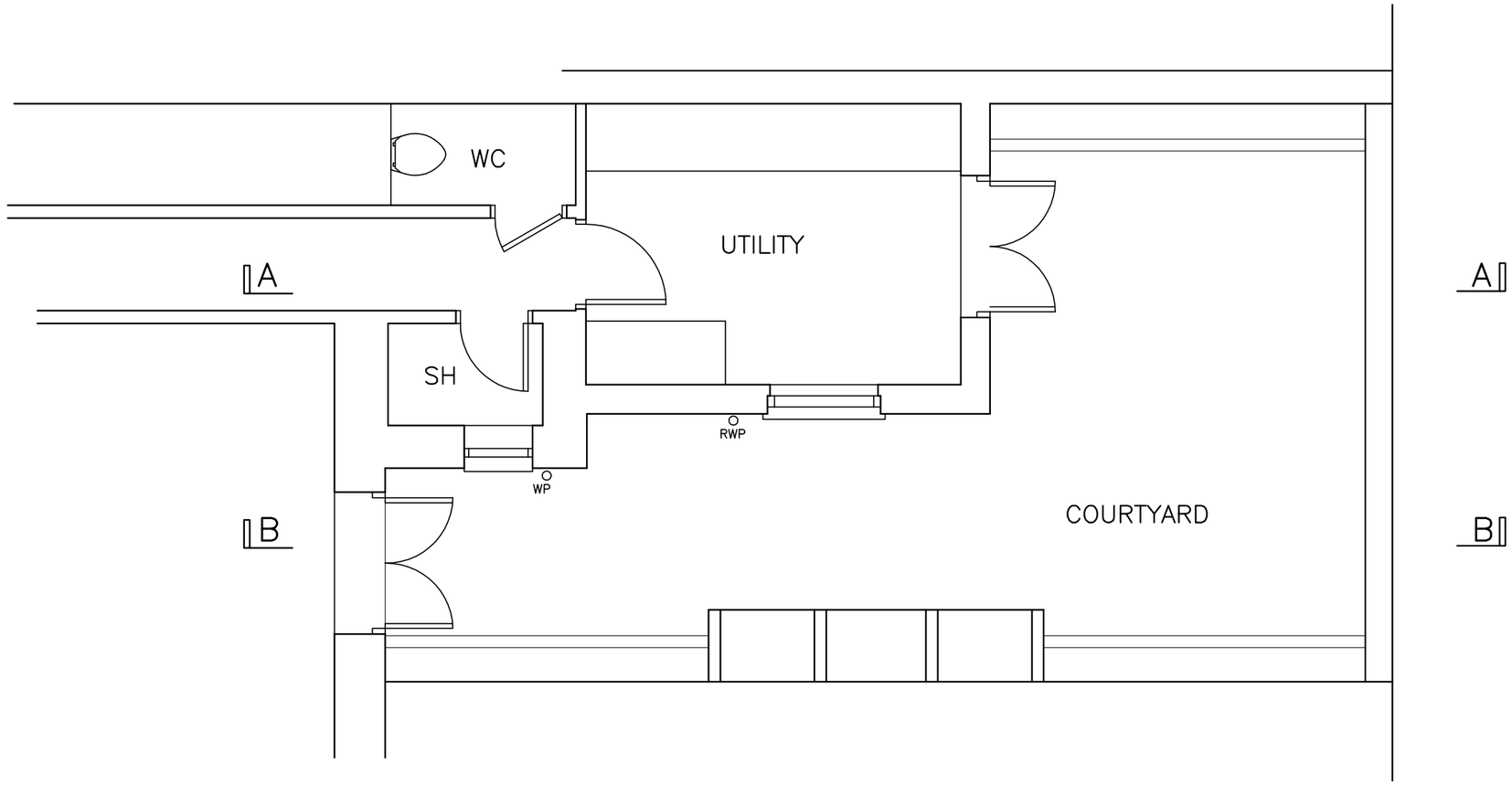
Drawn by SPB	Date 30/03/12
Job number 0718	Drawing No 01

NOTES :

THIS DRAWING IS NOT TO BE SCALED FROM,
SPECIFIC DIMENSIONS SHOULD BE CHECKED ON SITE



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[EXISTING]

~ SCALE ~

0 1 2 3 4 5 6 7 8 9 10

METRES

Project	30 PRINCESS ROAD LONDON NW1 8JL PROPOSED ALTERATIONS
Title	LOWER GROUND FLOOR PLAN AS EXISTING
CAD ref 0718–01	Scale 1:50 @ A3
Drawn by SPB	Date 30/03/12
Job number 0718	Drawing No 02

N O T E S :

THIS DRAWING IS NOT TO BE SCALED FROM,
SPECIFIC DIMENSIONS SHOULD BE CHECKED ON SITE

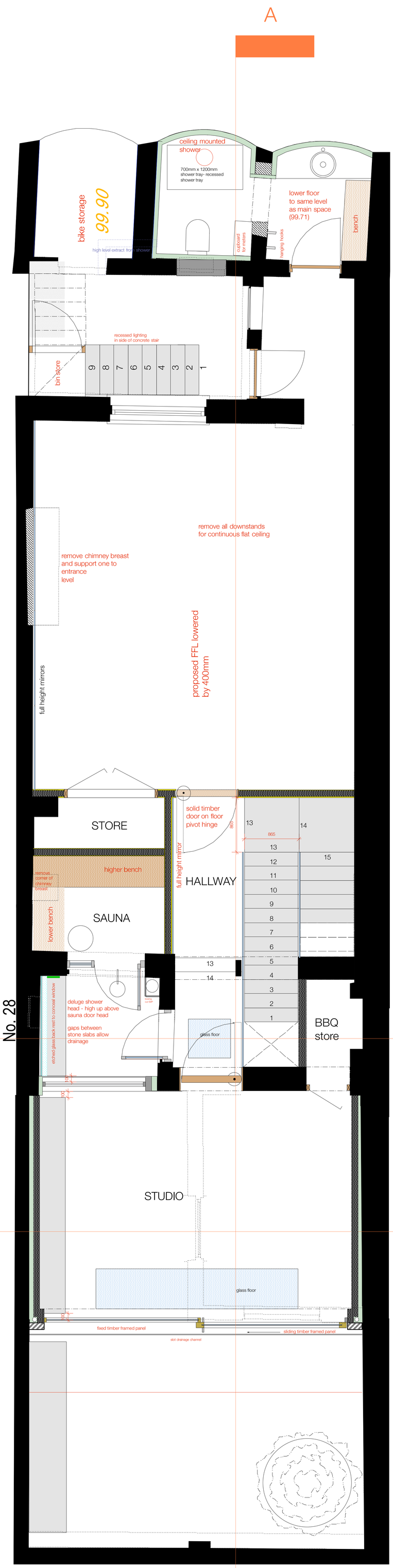
REAR ELEVATION
[EXISTING]

~ SCALE ~

0 1 2 3 4 5 6 7 8 9 10

METRES

Project	30 PRINCESS ROAD LONDON NW1 8JL PROPOSED ALTERATIONS
Title	REAR ELEVATION AS EXISTING
CAD ref 0718–01	Scale 1:50 @ A3
Drawn by SPB	Date 30/03/12
Job number 0718	Drawing No 05



A- 04.03.13 - revised layout for basement level to allow 300mm inset from existing house walls above

PROPOSAL

Annabel Brown Architect

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annabel@annabel-brown.com

17 High Street
Maldon
CM9 5PE

JOB TITLE: A12372 - 30 Princess Road NW1 8JL

CLIENT NAME: Stephen Beetham

DRAWING NO: A12372/DD01A

REVISION:

DRAWING TITLE: Proposed Basement

DATE: FEB 2013

SCALE: 1:20 @ A1

Appendix B – Consultation letter sent to local residents

32 Princess Road
London
NW1 8JL

6th March 2013

Dear

RE: 30 PRINCESS ROAD, NW1 8JL – PROPOSED BASEMENT WORKS AND NEW PLANNING APPLICATION

I have recently obtained planning consent for basement alterations, which include some excavation works to increase ceiling heights and a new single storey extension on the rear of the property which includes building over some of the rear courtyard.

I am shortly proposing to submit a new planning application that will excavate below the new lower ground extension to create a new basement level, incorporating a gym, utility room and WC. The new basement will begin at the rear wall of the house and project five metres into the garden, occupying the same area as the lower ground extension above. As part of the planning process, a supporting structure has been designed that will ensure that the structural stability of any neighbouring properties is unaffected. Further details can be found in the basement impact assessment which will be made available to you as part of the planning application.

If planning is granted for this additional floor space, the construction works will involve additional excavation. In collaboration with local residents, I will be developing a formal plan that will be used to manage the construction works and ensure that disruptions are kept to an absolute minimum. I am writing to reassure you that all works will be carried out in a competent manner within normal sensible working hours and importantly all excavations will be done by hand, thereby keeping noise and vibration to the minimum level possible.

If you have any concerns whatsoever, please feel free to speak to me directly at my home address.

Yours sincerely

STEPHEN BEETHAM

Appendix C – Conceptual Ground Model, Existing and Proposed

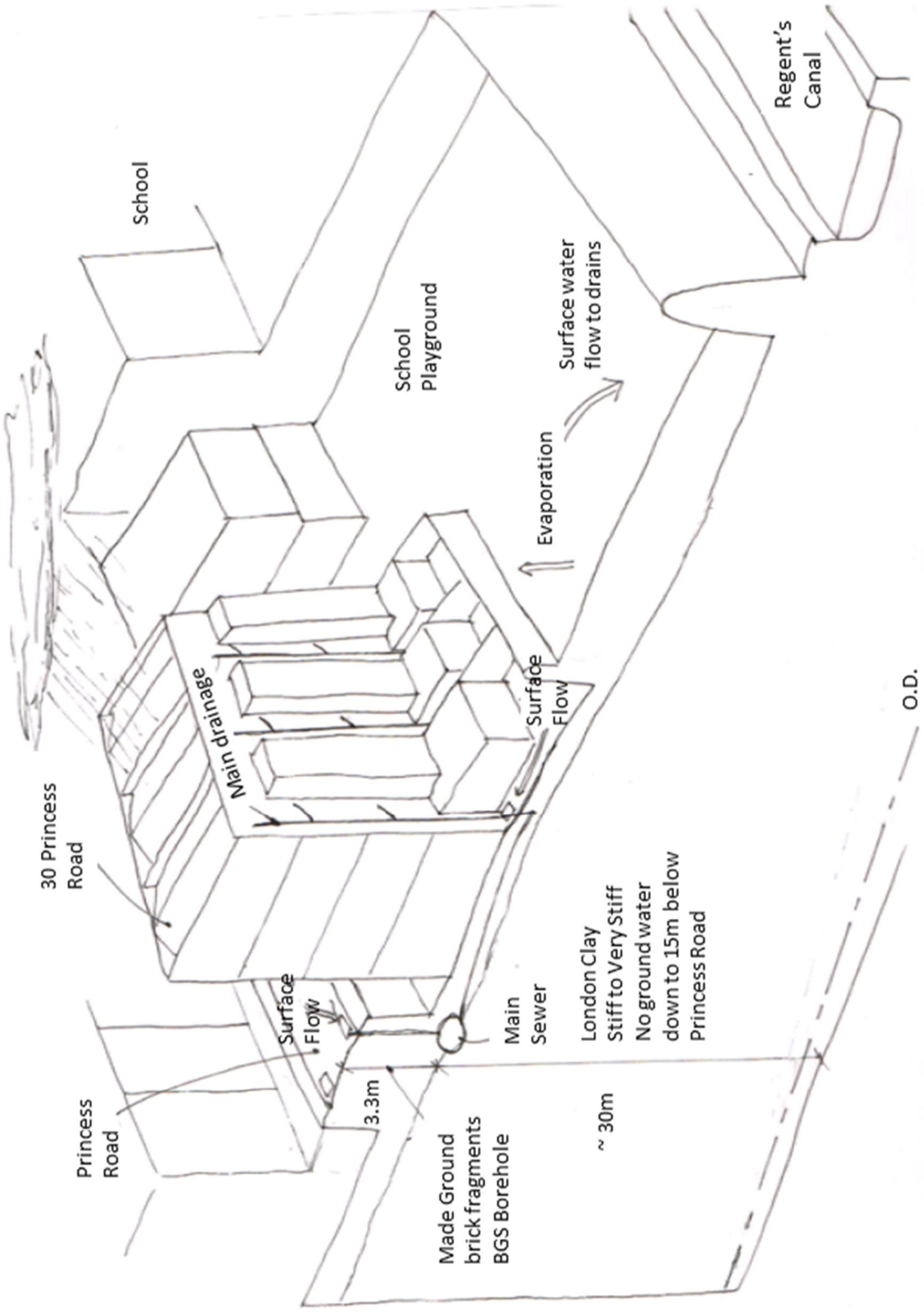


Figure C1: Existing Conceptual Site Model - 30 Princess Road

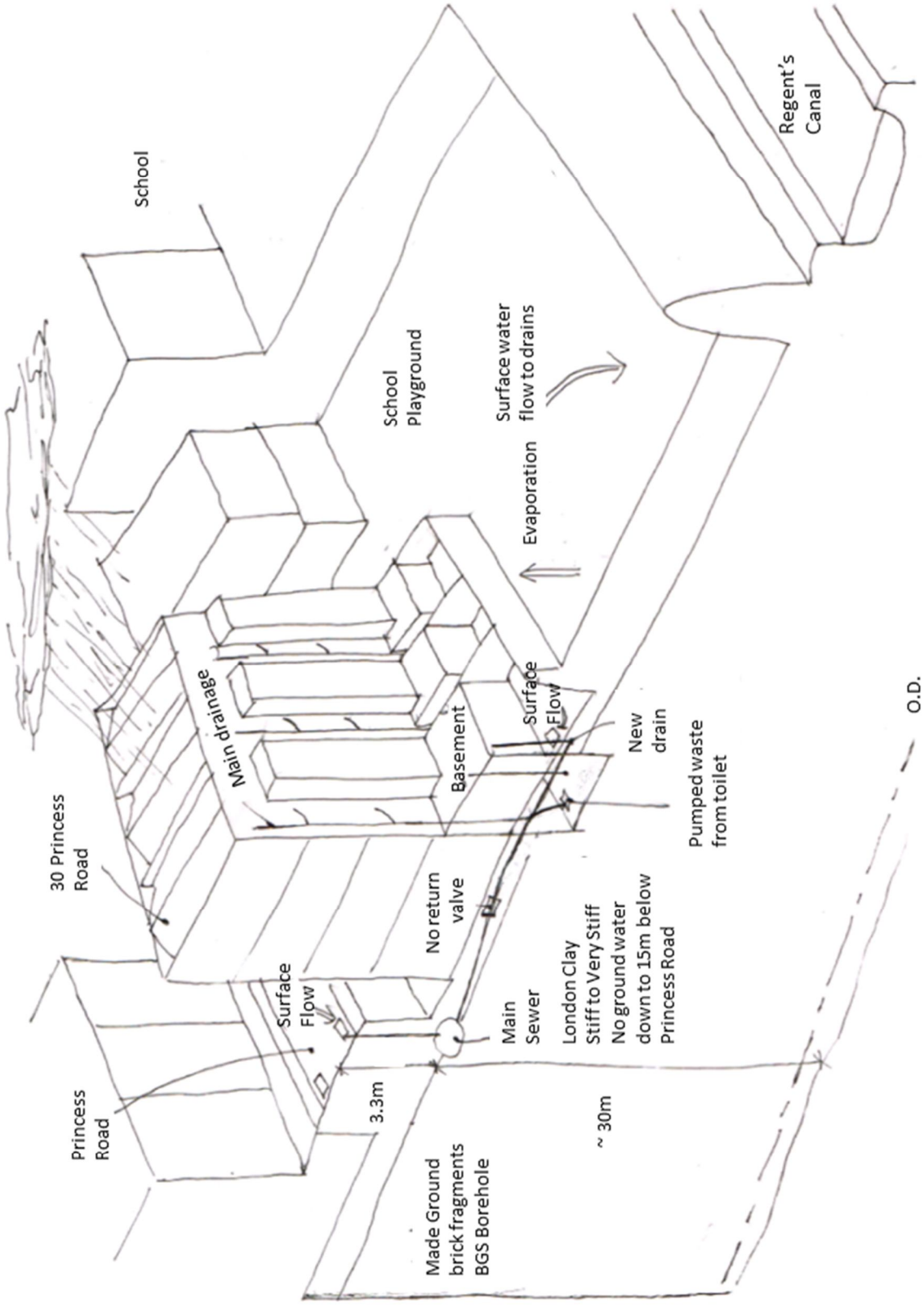
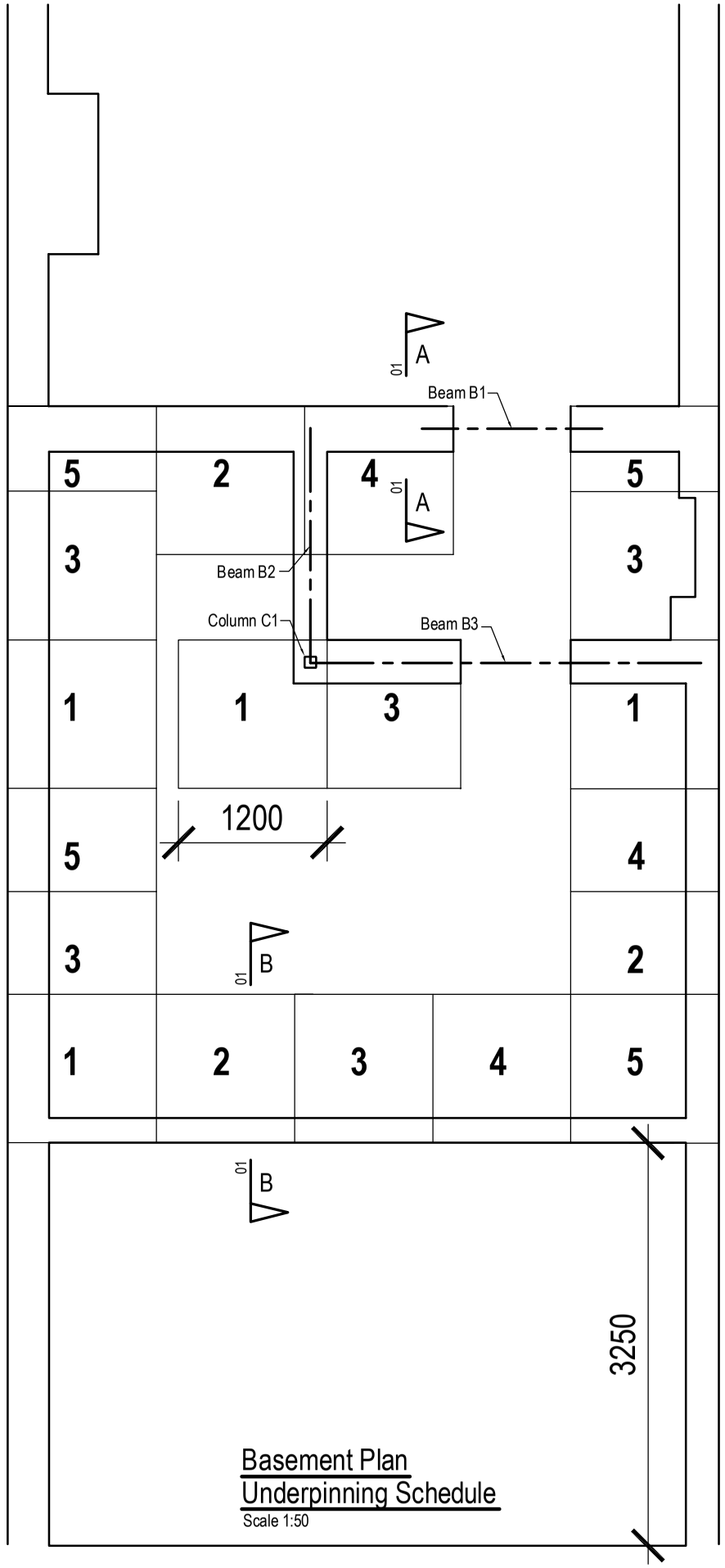
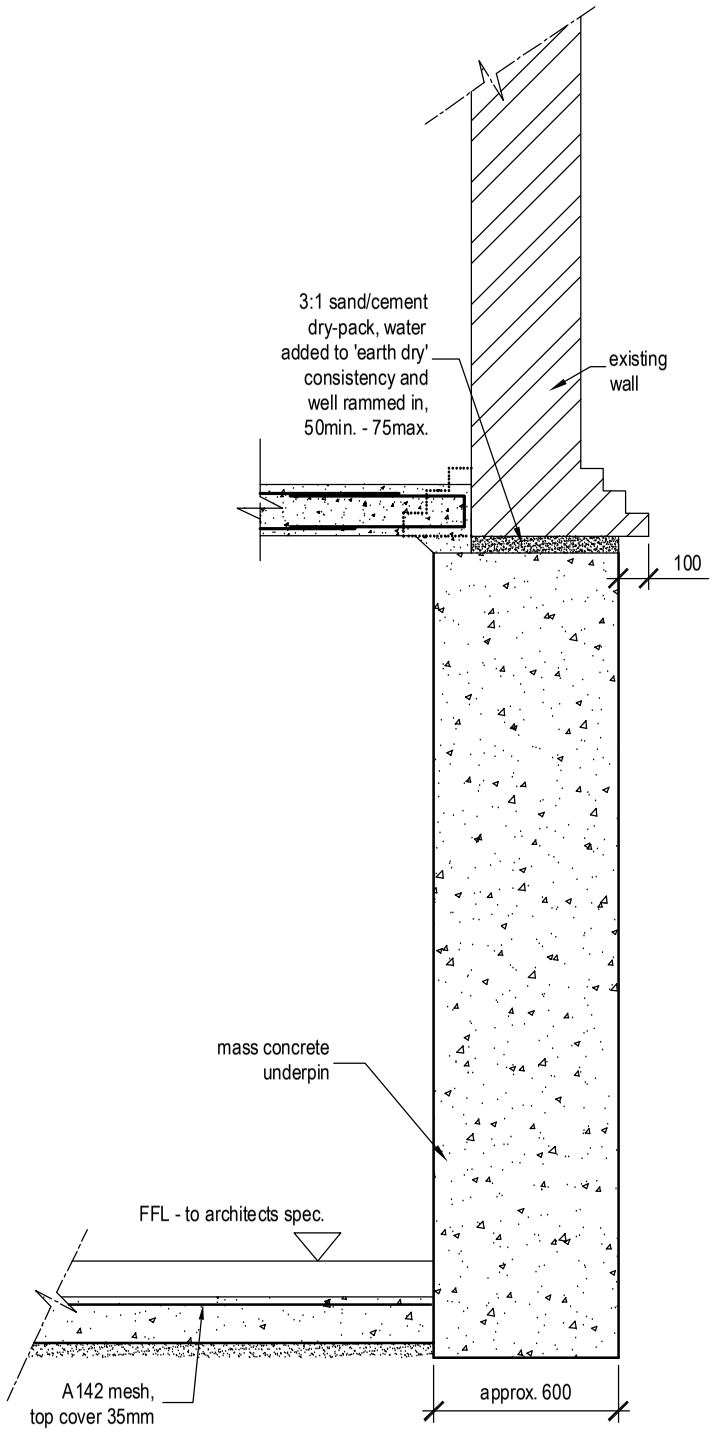


Figure C2: Proposed Conceptual Site Model - 30 Princess Road

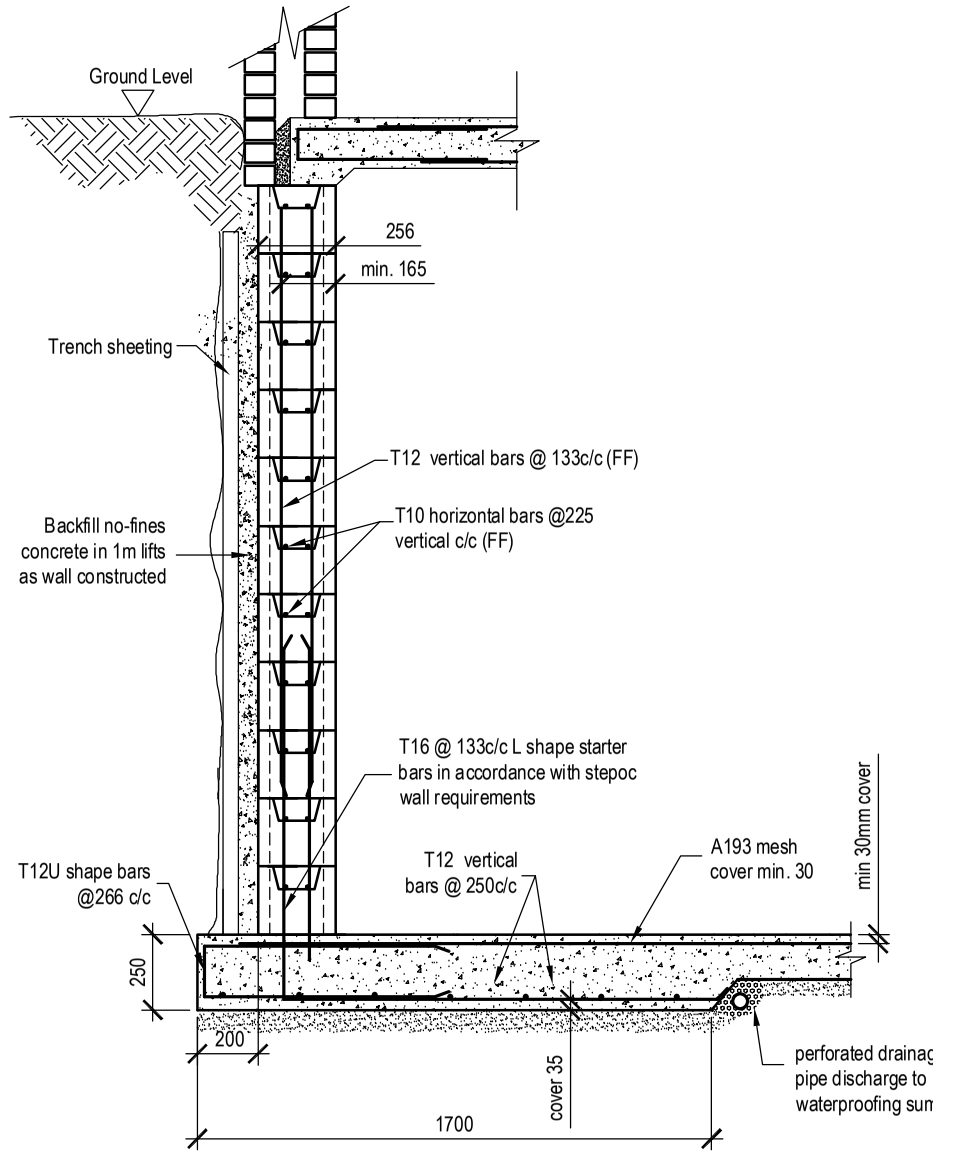
Appendix D – Underpinning Schedule and Details



Basement Plan
Underpinning Schedule
Scale 1:50



Underpinning Section
Section A - A
Scale 1:25



Retaining Wall
Section B - B
Scale 1:25

For Information Only

Ecos Maclean Ltd
Engineering - materials, energy, structure
8A Chamberlain Street ~ London NW1 8XB ~ Tel: 020 7722 7525 ~ Fax: 020 7722 9711
Web-site: www.nickmaclean.co.uk ~ e-mail: office@nickmaclean.co.uk

Client: Stephen Beetham

Project: 30 Princess Road

Title: Basement Plan with Sections

Revision	Date	Made by	Amendments
P01	06/03/13	JNW	First Issue

Date	Drawn by	Checked	
Mar 2013	JW		
Scales	**Job No.**	**Drawing No.**	**Revision**
A3	12051	01	P01

Appendix E – Structural Calculations

Nick Maclean
Civil & Structural Engineers

Job no.	Sheet no.	Rev.
12051	1	

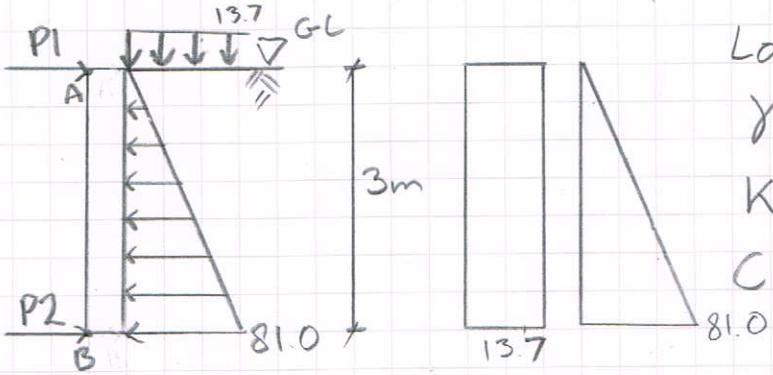
Member/Location: RETAINING WALL PROP LOADS

Job Title: 30 PRINCESS ROAD

Made by JNW Date 06/03/13 Chd. NM

Loading on Retaining Wall and Props

- Surcharge Load Slab = $25 \times 0.3 = 7.5\ kN/m^2$
  Partitions = $1.0\ kN/m^2$
- Imposed Load (Residential) = $1.5\ kN/m^2$
- ULS = $1.35(7.5+1.0) + 1.5(1.5) = 13.7\ kN/m^2$
- Overburden pressure = $\gamma h = 20 \times 3$
  $= 60\ kN/m^2$
- ULS = $1.35 \times 60 = 81.0 kN/m^2$



LONDON CLAY
$\gamma = 20\ kN/m^3$
$K_A = 0.4$
$C_u = 75\ kN/m^2$

Taking moments about B

$$0.4 \times \frac{81}{2} \times 3 \times 1 + 0.4 \times 13.7 \times 3 \times 1.5 = P1 \times 3$$

$P1 = 24.4\ kN/m$

$P2 = 48.9\ kN/m$