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1.0 Introduction

1.1 Proposed Development

This report is submitted in support of a planning application as prepared by Schneider Designers. pertaining to the property in accordance with the requirements of the London Borough of Camden. These requirements are set out within the Development Policy DP27 and the Camden Planning Guidance CPG4 – Basements and Lightwells

The report is to be read in conjunction with architectural drawings series APL, which form part of the planning application, together with structural drawings series 3791 appended to this report. The report should also be read in conjunction with the site specific Hydrogeological Assessment by Lustre Consulting, Drainage/Flood Risk Assessment by Lustre Consulting and Site Investigation Report by CET Structures Ltd.

This report deals specifically with the requirement under DP27 to maintain the structural stability of the building and neighbouring properties. In doing so this report reviews the constraints imposed by the existing structure, adjacent structures and surroundings and prevailing ground conditions to ascertain the most appropriate form of construction work to achieve the basement proposals indicated in the architectural drawings. Methods of working are selected on the basis of minimising the impact, both during the works and in the permanent condition, on the following aspects.

- The Existing Building
- Party walls and boundaries
- Adjacent structures

References to left and right are made viewing the property from the front.

1.2 Purpose of work

The existing building currently has accommodation at basement level over the rear half of the building. Due to the natural slope of the ground from the front towards the rear, the ground level at the front of the building is at ground floor level while the ground level at the rear of the building is only marginally above basement level. This means that there is a large differential in founding level between the front and the rear of the building. The front half of the building has suffered from a history of subsidence due to the large differential in founding level and insurance claims lodged on more than one occasion.

It is proposed therefore to construct a basement at the front half of the building akin to that which already exists at the rear half in order to create additional accommodation as well as to deal once and for all with the issue of subsidence at the front of the building.

1.3 Qualifications

This report has been prepared by Ian Drummond BSc(Eng) CEng MIStructE. Ian Drummond has been practicing as a consulting engineer in central London for the last 28 years and has extensive experience in subterranean developments. This report has been checked by Peter Lecheta MSc (Eng) who has practiced as a structural engineer involved in subterranean developments for the past 11 years.

1.4 References

Camden Development Policy DP27
Camden Planning Guidance CPG4
Camden Geological, Hydrogeological and Hydrological Study
CET Structures Ltd - Site Investigation Report
Lustre Consulting - Hydrogeological Review

1.5 Limitations of Report

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by IDCE Ltd

2.0 SCREENING

2.1 Structural Stability Screening Assessment

1. Does the proposed basement involve propping and re-support of the existing building	Yes
2. Does the proposed basement extend lower than the party fence structure to the right	Yes
3. Does the proposed basement extend lower than the building structure to the right	Yes
4. Does the proposed basement extend lower than the party fence structure to the left	Yes
5. Does the proposed basement extend lower than the building structure to the left	Yes
6. Does the proposed basement undermine the public highway?	Yes
7. Does the proposed basement undermine any structures in the rear garden?	No

2.2 Slope Stability Screening Assessment

1. Does the existing site include slopes, natural or manmade, greater than 7°?	Yes
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	Yes
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	No
5. Is the London Clay the shallowest strata at the site?	Yes
6. Is there a history of seasonal shrinkage-swell subsidence in the local area and/or evidence of such effects on the site.	Yes
7. Is the site within an area of previously worked ground?	No
8. Is the site within 5m of a highway or pedestrian right of way?	Yes
9. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.	Yes
10. Is the site over (or within the exclusive zone) of and tunnels eg railway lines?	Yes

3.0 Scoping and Site investigation

3.1 Existing Buildings and Surroundings

The building was originally constructed as one of a pair of large semi-detached town houses. It has subsequently been converted into flats, one at each floor level. At the front of the building the street and front garden is approximately at ground floor level with the front garden containing areas of planting and bin stores. Trees are growing in the pavement along the near side of Eldon Grove (north side) with most of them being lime trees. None of the trees are particularly large. The nature ground slopes down towards the rear of the property with an external pathway down the left side of the property leading to the rear garden by a series of steps. This is the only area of the site where localised gradients exceed seven degrees. The garden slopes down slightly towards the rear boundary where a retaining structure supports the ground before dropping down approximately two metres to the rear gardens of the houses in Rosslyn Hill. A basement construction is currently underway within the Rosslyn Hill property immediately to the rear. Considering the slope of the garden, retaining wall and excavation, the Rosslyn Hill basement is likely to extend downwards around 6m lower that this proposed basement albeit at a distance of over 30m.

To the left of the property a party fence wall runs down between N°14 and N°13 and a garage building has been constructed tight to the party fence wall. The ground profile of the garden to the left appears similar to that of N°14 while the main building is remote from the boundary.

To the right of the property a party wall is shared with N°15. A basement extension has previously been carried out at N°15 extending the original basement at the rear of the property through to the front and extending under the front garden to a position approximately 1800mm from the pavement line. Consequently a retaining wall already exists along the right side boundary with the exception of the front 1.8 metres.

The proposed basement area is intended to be slightly lower than the existing basement towards the rear and the existing basement at N°15 and therefore shallow underpinning will be required along those two faces. Full height retaining walls would be required along the right side to retain the pathway, party fence wall and surcharge from the garage structure. It is intended that the new lowered area be extended into the front garden to form a light well and access steps containing planters and bin stores up to the pavement line.

An under floor void exists in the ground floor flat extending downwards to approximately 1.0 metres and therefore this degree of excavation will not be required prior to lowering of the main body of the ground. Drainage to the existing basement runs out towards the front along the left side path. A manhole to the rear reveals that the drainage at that position is already lower than the proposed basement and this runs down to a manhole at the front under the pathway.

Consequently the new basement will not be lower than the existing drainage which will be able to serve the new area without resorting to pumped drainage.

3.2 Site investigation

A visual survey and measured survey have been carried out to the existing property and surroundings. These did not reveal anything prohibitive with respect to the proposals.

An intrusive ground investigation has been carried out by CET Structural Ltd. in terms of a trial hole at the front of the property and one bore holes at the rear of the property to ascertain the nature of the ground and presence of ground water.

The full report forms part of the Basement Impact Assessment, however in general terms the natural ground was found to be very stiff brown London clay.

This ground will be suitable for re-support of the building on new foundations and for staged excavations. While temporary shoring of excavations is required as a matter of course, clay stands up well in the temporary condition and it will be possible to cut the ground to accurate lines to form the various underpinning stages.

Tendency for the clay to heave due to removal of overburden pressure will be compensated by the bearing pressure of the new foundations. The basement slab between the foundations will need to be suspended to combat clay heave.

3.3 Potential Impacts

POTENTIAL IMPACT	POSSIBLE CONSEQUENCES
1. The existing building will need to be temporarily propped and re-supported on a new steel framework as part of the works.	Movement to superstructure during load transfer
2. The existing building will need to be underpinned as part of the works.	Movement to superstructure and upper floors as a result of underpinning works
3. The party structure to the right will be undermined as part of the works	Movement and structural damage to party structure
4. The party structure to the left will be undermined as part of the works	Movement and structural damage to party structure

4.0 Proposed Construction

4.1 Proposed Structural Form

In view of the traditional ground bearing foundations to the existing terrace, it is proposed to use ground bearing retaining walls (as opposed to piled) to maintain continuity of structural form and compatibility with the existing foundations with respect to seasonal movement in the bearing strata. Existing foundations, extended foundations and new foundations are all proposed to be founded on the same bearing strata. The existing superstructure is to be re-supported on a new framework of steel beams and columns which can be installed in turn and brought to bear on the new foundations. The existing ground floor slab would be replaced with a new precast floor with in-situ concrete build-up. Underpin retaining walls are proposed to be used to facilitate the ability to excavate and re-support only short sections at a time and limit the movement in the surrounding ground and buildings during the operation.

4.2 General Underpinning Method

Underpinning for basement creation below existing buildings is routinely carried out in London and can be successfully achieved by a system of sequenced excavations and construction of short lengths of concrete walls and foundations. These serve to provide new vertical support to the existing building, as well as retain the ground for the formation of the basements. Limited excavations of approximately one metre wide are carried out to ensure that a short length of building only is undermined at any point in the construction sequence. By the nature of the operation, the excavations are carried out in a confined working space and can require temporary shoring if sections of the ground are found to be insufficiently cohesive to be stable in the temporary condition. Once the short section of reinforced concrete has been cast and the building re-supported by pinning up tight off the new construction, the next section of excavation is commenced in a location remote from the first. This method of working ensures the temporary stability of the existing building. As the sequence progresses, more and more of the existing building is re-supported on new foundations, which are usually more rigorous than the original due to the increased founding depth.

4.3 Impact from Underpinning

The underpinning essentially projects the existing footing arrangement downwards. In this case the downward projection is relatively small on the rear and party wall edges as basements already exist and the underpinning is only required to improve headroom in the new basement area. This can be done with simple mass concrete underpinning, centred on the wall.

In the event of the adjoining owner wishing to lower their basement to the same level in the future, this can be achieved by excavating to the top of the underpin level and then casting new construction against the underpin.

Should the adjoining owner wish to create a deeper basement, a further set of underpinning would need to be carried out below the current proposal, after which the projection section of the pin may be cut back flush, having become redundant.

On the left side, deeper underpinning is required and would been to be reinforced. In this area the retaining wall construction is entirely on the building owners land and therefore does not inhibit or interfere with any future construction that the adjoining owner may contemplate in the future.

4.4 Outline Method Statement

1) Construct dedicated protected bridge access to front door to allow access to building during the works.
2) Demolish eternal structures in front garden and sink first pit near to centre of front garden keeping sides of excavation shored.
3) Construct first pin in front garden and then continue in sequence until the whole of Stage A is completed.
4) Tunnel in under bay window at reduced level and cast a temporary foundation base.
5) Tunnel in under front door at reduced level and cast a temporary foundation base.
6) Install temporary steel needle beams at underside of ground floor level and prop down onto temporary foundation bases.
7) Excavate out on right side and reduce level down to bottom of existing adjacent basement levels, installing temporary props as work proceeds to support ground floor structure.
8) Underpin existing party retaining wall in sequence until the whole of Stage C is completed.
9) Underpin existing rear retaining wall in sequence until whole of Stage D is completed.
10) Cast permanent foundation base to new steel columns, Stage E
11) Install steel columns and new steel spine structure tight to underside of ground floor.
12) Commence underpinning to left side wall, excavating inwards from the right in sequence until all of Stage F is complete, installing temporary props as work proceeds to support ground floor structure.
13) Install remaining steel beams to underside of ground floor structure.
14) Remove temporary props and reduce ground level over area of slab.
15) Install anti-heave board and reinforce and cast slab.
16) Install the waterproofing system.
17) Provide fire protection to steelwork to Building Control Officer's approval.
18) Continue with insulation, screed, walls, stair and finishes.

4.5 General Method Statement

The fully detailed method of working would be specified in the consulting engineer's General Method Statement following detailed design and forming part of the contract documentation with which the contractor is obliged to comply.

4.5 Contractor's Method Statement

Actual working practices on site would be subject to the Contractor's Method Statement which the contractor would be obliged to produce prior to start of works on site.

5.0 BASEMENT IMPACT ASSESSMENT

5.1 Impact on the Building

While there is a potential impact on the existing building in terms of differential movement during load transfer the risk is no greater than for any other typical alteration and refurbishment project. Care will need to be taken to sequence the ground works so that excavations are kept to short sections and re-supported immediately during the works. Dry-packing will be rigorously carried out at the foundation interface to minimise deflection during load transfer. Providing such measures are taken the impact on the building is anticipated to be small with category of damage under the Burland Scale being 0 or 1, Negligible or Very Slight.

5.2 Impact on Party Walls and Adjacent Buildings

The sequential nature of underpinning work carried out in short sections protects adjacent structures from undermining and subsequent ground movement, particularly in the case of cohesive clay. The impact on the party wall with the adjacent properties is therefore anticipated to be small with category of damage under the Burland Scale being 0 or 1, Negligible or Very Slight.

5.3 Impact on Land Stability

A slight slope exists down towards the rear of the property. The basement will extend below the level of the land towards the rear and essentially equalise the founding level between the front and rear of the property. Consequently it is anticipated that the development will have no adverse impact on land stability and in fact improve land stability.

5.4 Impact on Ground Water

A hydro-geological review has been carried out by Lustre Consulting which forms part of the basement impact assessment. The report concludes that the proposed development will have no significant impact on the local groundwater.

5.5 Impact on Surface Water and Flooding

Reference is made to the Flood Risk Assessment undertaken by Lustre Consulting which forms part of the basement impact assessment. The report concludes that the proposed development will have no significant impact on the existing drainage or risk of flooding.

5.6 Impact on Trees

No trees are present on the site in the vicinity of the development and preliminary enquiries with the LB Camden have indicated that therefore no arboricultural assessment is required.

5.7 Cumulative Effects

It is probable that other houses in the street of similar design also have original basements at the rear of the property. Extending the basement towards the front therefore does not add to a cumulative effect.

The existing passageway to the left of the proposed basement remains free for the movement of ground water as before. The property to the left is remote from the building leaving ample for movement of groundwater. The cumulative effect is therefore assessed to be negligible or non existent.

5.8 Impact on Underground Structures.

The North London Line between Hampstead Heath and Finchley Road & Frognal runs in a tunnel which is situated partially under the site. This runs under the rear garden and clips the rear left corner of the existing basement footprint as seen on the architectural drawings. The proposed area of new basement is outside the confines of the tunnel. Moreover, the tunnel runs directly beneath Nos. 27 and 27A Rosslyn Hill, both of which have basement and are situated considerably lower. Due to the natural fall of the land and taking those basement depths into account, the basement construction in those properties must be at least 6m below this proposed basement. Consequently it is self evident that the tunnel must be deeper than the Rosslyn Hill basements and therefore is well below this proposed basement. No piling or deep excavation is envisaged as part of this development. It is anticipated therefore that the development will have no impact on the railway tunnel.

6.0 MITIGATION

6.1 Sequencing

The sequencing of the work has been carefully designed to maintain support at all times and prevent movement of this building and the adjacent building during the works.

This is explained in detail in the outline method statement and in the engineering drawings attached.

Essentially the building structure above is to be independently supported on a temporary structure at ground floor level to avoid surcharging the ground works. Once this is done the underpinning sequence can progress and the very limited extent of undermining of the party and other walls will ensure ongoing stability during the works.

6.2 Monitoring

To ensure the ongoing stability of this building, party structures and adjacent buildings, precise level monitoring would be carried out to the front and left side wall of No 14 Eldon Grove, the front wall of No 15 Eldon Grove and the garage building to the left of the site prior to commencement of excavation work and at regular intervals during the course of excavation. A trigger level would be set to allow immediate notification of excessive deflections so that any shortfall in the effectiveness of working methods can be identified and rectified as work proceeds. This will ensure the protection of this building and the adjacent building structures from any unexpected effect of the works.

6.3 Protection and de-watering

While only a small degree of ground water at the base of the excavations is anticipated, protection of excavated areas is recommended together with de-watering facilities to ensure that all excavations and reinstatement works are carried out in the dry.

6.4 Noise, Dust and Vibration

While all building operations generate some degree of noise dust and vibration, an obligation would be placed on the contractor that this be kept to an absolute minimum, particularly with respect to the occupants of the building.

6.5 Pre-deflection

Due to the long spans involved in the re-support steelwork, main beams would be pre-deflected by means of sacrificial flat jacks, pressured against the existing structure above, so that elastic deflection is removed from the spanning steel beams prior to transfer of load from temporary to permanent structures. This will minimise cracking in the building superstructure.

7.0 Conclusion

In preparing this report the following aspects have been considered and the conclusions can be summarised as follows:-

Whether the geology is capable of supporting the loads and construction techniques to be imposed.	Site investigation and calculations as appended have confirmed this.
The impact of the subterranean development, and associated construction and temporary works, on the structural integrity and natural ability for movement of existing and surrounding structures, utilities, infrastructure and man-made cavities, such as tunnels.	This has been discussed in detail in the assessment and demonstrated to be satisfactory.
Whether the development will initiate slope instability which may threaten its neighbours.	The development will improve the current situation with respect to slope stability as discussed in the assessment.
The impact of the subterranean development on drainage, sewage, surface water and ground water, flows and levels.	These aspects have been considered in detail in the Lustre Consulting report and no adverse effects found.
How any geological, hydrological and structural concerns have been satisfactorily addressed.	Fully addressed in the Lustre Consulting report.
The engineering details of the scheme, including proposals for the excavation and construction.	This is described in the engineering drawings and in the Outline Method Statement.
The impact of the proposed subterranean development on the structural stability of the existing and adjoining buildings, especially listed buildings.	This has been discussed in depth under the section "Party Walls and Adjacent Buildings" and in the Outline Method Statement.
The impact of the proposed subterranean development on existing and proposed trees.	As advised by LB Camden this aspect is not applicable.
The sequence for the temporary works, which mitigates the effects on neighbours	The "Outline Method Statement" describes how temporary works can be sequenced with permanent works to ensure stability at all times.
The preferred method of Temporary works.	Traditional trench sheeting to excavations. Traditional needling and propping as per standard practice.

The new basement construction as set out in the drawings and method statement gives due consideration to the occupants and building structures on and adjacent to the site and allows work to proceed in a way which can be monitored as it progresses, so that any variations in soil conditions or unforeseen anomalies can be dealt with as they arise.

The works can be constructed in such a way as to ensure the temporary and long-term stability of the boundary walls and adjacent structures.

The methods of working described in the proposals are common methods of construction, regularly employed and do not involve any unusual or experimental techniques.

The foregoing demonstrates that, using methodologies appropriate to the site, the proposed development can be carried out in such a way that maintains the structural stability of the building and neighbouring properties, avoids adversely affecting drainage and run-off or causing damage to the water environment and avoids cumulative impacts on structural stability or the water environment in the local area.

The proposed subterranean development is therefore considered feasible.

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