28 REDINGTON ROAD LONDON NW3 7RB

Review of planning application 2016/2997/P to Camden Council with respect to 26 Redington Road and Camden development policy DP27.

Report reference G1615-RP-01-E1

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E1	30/08/2016	1st issue

Eldreds

Geotechnical ▪ Geoenvironmental ▪ Civil ▪Structural

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1 Introduction and summary of conclusions

1.1 Introduction

1. Planning application 2016/2997/P proposes the demolition and redevelopment of 28 Redington Road NW3 7RB as a six storey building with a single storey rear extension. No.28 and other properties in the road face southwest and are on ground that slopes down from east to west, or diagonally down from right to left when viewing the properties from Redington Road, which is lower than the houses. The proposal is for No. 28 to be built into the hillside so that between half of a storey and the better part of 3 storeys will be below ground.

2. 26 Redington Road is to the right and uphill from No.28. Mr H. Zimmerman, owner of No.26 (the client) has instructed me to consider the application documents posted on the Camden planning website which are relevant to engineering aspects of the subterranean development proposed and advise him of: -

   (i) their compliance with relevant planning policies, and
   (ii) potential development related hazards for No.26 that are not sufficiently mitigated by the application.

3. I am Michael Eldred MSc. CEng. FIStructE MICE, Director of Eldred Geotechnics Ltd and a Consultant in the disciplines of Geotechnical, Geoenvironmental, Civil and Structural engineering. The assessment which follows is exclusively of matters falling within these disciplines.

1.2 Summary of conclusions

4. The relevant planning policy is Camden Development Policy DP27 concerning basements and lightwells. I conclude that the application fails to satisfy the specific policy requirements, makes no attempt to provide and demonstrate the assurances that the policy specifies are required by Camden Council and fails to recognise the existence of that policy.

5. I conclude that there are currently high risks that No.26 would be significantly damaged by the demolition, excavation and construction process implied by the application and by changes to the groundwater regime that are likely to be caused by the development. Some of those risks are overtly recognised by the basement impact assessment (BIA) prepared in support of the application.

6. I conclude that construction of the permanent arrangement of retaining walls shown at the boundary with No.26 by the Architect's drawings could cause unacceptable safety and damage hazards for workers and property respectively.

7. I conclude finally that the Camden BIA Audit Form Part ABC posted on the website with the application documents demonstrates that its compiler did not understand the

content of the current 564 page BIA document, that it is misleading to the Council and the public and that it should be withdrawn.

2 Documents consulted

8. Jo Cowen Architects: drawing sets for the existing building, demolition and proposed development.

9. Mott MacDonald: Basement Impact Assessment Report revision E; Surface Water Drainage Calculations and Surface Water Pro forma.

10. Camden BIA Audit Form Part ABC.

11. Dr M.H. de Freitas: First Steps Report for 28 Redington Road (V2) dated 27 August 2016.

12. StudioMarkRuthven: drawing sets for No.26, existing and proposed, at the time of application 2013/5996/P

3 Camden development policy DP27

3.1 Policy requirements

13. With respect to matters within the compass of this report, the policy states …. *The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity, and does not result in flooding or ground instability. We will require developers to demonstrate by methodologies appropriate to the site that schemes:*

a) maintain the structural stability of the building and neighbouring properties;
b) avoid adversely affecting drainage and run-off or causing other damage to the water environment;
c) avoid cumulative impacts upon structural stability or the water environment in the local area; .

14. The explanatory text with the policy statement includes:- *27.3 For larger schemes, where a basement development extends beyond the footprint of the original building or is deeper than one full storey below ground level (approximately 3 metres in depth) the Council will require evidence, including geotechnical, structural engineering and hydrological investigations and modelling from applicants to ensure that basement developments do not harm the built and natural environment or local amenity. The level of information required will be commensurate with the scale and location of the scheme. These larger schemes will be expected to provide evidence against each of the considerations (a) to (h) in policy DP27.*

15. Parts (d) to (h) of the policy are beyond the scope of this report.

16. The 2015 version of Camden planning guidance CPG4 makes it clear, in case there is still uncertainty, that developers are required not only to see if potential hazards exist but also to provide whatever engineering and scientific input is necessary to overcome them and demonstrate that the construction proposed will comply with requirements a) to c) above. It states that if that cannot be done, the scheme design has to be changed until the risks associated with the hazards have been reduced to acceptable levels.

3.2 DP27(a) structural stability of the building and neighbouring properties

17. There are no structural drawings or other engineering information showing how the development and neighbouring property will be supported in either the temporary stages of construction or permanent state when construction is complete.

18. There are no calculations or other estimates of ground movement likely to be caused by the development and of the potential effect of that on the development and/or neighbouring property. Appendix B of the BIA provides six views of a 3 dimensional computer modelled notional arrangement for a piled retaining wall to surround the development. It currently has no practical function within the scheme.

19. As previously noted the BIA report is currently an unusually large document. Section 5, the actual description of the basement impact assessment, occupies just one page. The report is intended to be read as a whole but for ease of immediate reference, Section 5 and Section 7, Geotechnical Risk Register, have been extracted and are in Appendix A.

20. It will be seen that Section 5 refers only to what it is intended to do in the fullness of time. The third paragraph refers to use of a secant pile wall around the basement, which conflicts with the Architect's drawings. Paragraphs 4 to 6 refer to other things that will need to be done, and paragraph 7 makes it clear that the Architect's design has to change before any more can be done.

21. The implied assumption is everything can wait until after planning consent. But all of the work and assurances promised are essential parts of the work required to satisfy DP27(a). They have not been done and despite the volume of the report and the work it represents, the BIA is currently worthless for its intended purpose.

22. If verification is needed, it is provided by Section 7, the risk register. This uses a standard method to assess risk as the product of probability and consequence of an event. Current risks of damage to other property due to excavation and/or groundwater are given a risk value of 16, which is classified as intolerable.

3.3 DP27(b) avoid adversely affecting drainage and run-off or causing other damage to the water environment

23. Surface water drainage calculations and the surface water pro forma identify a need for attenuation of surface water flow from the site in order to avoid increasing the load on public sewers. A maximum storage volume of 17 cubic metres of water is given as a preliminary recommendation, with the further recommendation that the site drainage network should be used for the "small" amount of storage required.

24. The wording of the recommendation is capable of being interpreted in so many ways that it fails to provide meaningful information relevant to an impact assessment, but at the same time it seems to imply a trivial situation. 17 cubic metres of storage is certainly small for a large development, but finding a site for an underground tank that is about 2m in diameter and 7m long and buried to a depth of perhaps 3m in a single residential property is not necessarily straightforward. There are many trees in both the back and front of the site with extensive root protection area requirements that might restrict the land available for drainage installations. The development is intended to fill the site width and a significant area of the front access area is intended to be occupied by a vehicle lift for the basement car park.

25. There is also doubt concerning the groundwater level and possible tank flotation. Answers inserted into the surface water drainage pro forma (or questionnaire) state a groundwater depth of 4.5m below ground level. But Dr de Freitas disputes that and the entrance hall flood at No.30 adds strength to that view.

26. A further consideration is the intended method of dealing with groundwater pressure below the proposed lower ground floor slab. The absence of structural information and uncertainty about groundwater levels bears upon this. If a pressure relief drainage system were to be selected as an alternative to a floor that resisted the pressure, the additional drainage flow from below the slab would add to the surface water flow.

27. Question 9 of the surface water pro forma asks for details of the flood routes in case of exceedance flow. No information is provided other than that the route would be to the highway.

28. Better information is required to satisfy DP27(b).

3.4 DP27(c) avoid cumulative impacts upon structural stability or the water environment in the local area

29. Referring to the report by Dr de Freitas, ground investigation has not provided sufficient information and that which exists has not been interpreted sufficiently for the application to comply with DP27(c)

4 Evident risk of damage to No.26 (Refer to Figure.1)

4.1 Existing

30. Figure 1 is in Appendix A.

31. The figure illustrates 3 situations at the boundary between Nos.26 and 30; existing, demolition and proposed. Two cases are considered, one near the front of the properties and one at the rear.

32. At present, according to the various drawings the boundary wall is astride the property boundary and thus a party wall. 2013/5996/P proposals, which have since been constructed, suggest that a 100mm thick lining wall was built against the party wall. No 26 has lower ground floor rooms in its front left part with stairs rising from these to the ground floor between the original external house wall and the lined party wall.

4.2 Demolition

33. Architect's drawings for No 28 show an intention to demolish the existing party wall. Supposing that this could be done without disturbing the lining wall – I have no knowledge of its construction or the method by which it is supported – the 100mm wall remaining would be at considerable risk of being sucked out and demolished in the event of gale force winds. What is more likely is that the thinner wall was lightly tied to the party wall in some way during its construction and that attempts to demolish the much thicker party wall would take the lining wall with it and render parts of No.26 dangerous and uninhabitable.

4.3 Proposed

34. Following demolition, the Architect for No.28 proposes to build the retaining wall for No.28 entirely upon the No.28 side of the boundary. As currently intended that would leave a gap between the new wall and the lining wall of No.26 and, at the rear, as far as can be estimated from the drawings, the lining wall is likely to be left exposed above a low terrace in No.28.

4.4 Outcome of 4.1 to 4.3

35. It would probably be argued that none of these situations are intended and that, of course, they would never be allowed to develop. But the fact is that these situations are those for which the developer is currently seeking planning consent.

36. The risk of severe damage to No.26 from these features of the application, is currently real and yet further example of the scheme's failure to satisfy DP27(a); this time in a way not contemplated by the BIA risk register.

4.5 Feasibility of retaining wall construction method (Refer to Figure 1)

37. The form of the retaining wall proposed by the Architect is illustrated by the solid black profiles in Figure 1. At the front of the property it would have to support nearly 2 storey heights of ground below No.26; from the top of the stairs in No.26 to the back of the house, there would be nearly 3 storeys of ground and the building above to support.

38. Construction of the wall shown by the Architect would require the whole of the basement to be excavated in stages with earth sides shored so that the walls could be constructed from the bottom up. The procedure would require a complex sequence of lateral support wherein supports would be frequently repositioned to allow the construction of the wall and floors to progress upward.

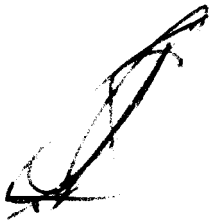
39. Even in good ground free of slope instability and high groundwater hazard, the expected outcome would be excessive ground movement and damage of No.26. The ground conditions as interpreted by Dr de Freitas could increase the health and safety hazard for work people to a dangerous level. Designers as well as contractors would need to consider their duties under HSE regulations.

40. The BIA refers to the use of a secant pile wall around the perimeter of the excavation. This would be the normal form of construction in the circumstances but the piles would have to be set in from the boundary sufficiently to provide safe working conditions. The distance varies according to the type and size of pile and the contractor employed. Broken lines on Figure 1 show what might be a reasonably indicative inset of the perimeter wall.

41. As presented the Architect's drawings depict a form of retaining wall construction with a high risk of causing excessive damage to No.26. that could not be ameliorated without change of design. The scheme again fails to satisfy DP27(a)

5 Camden BIA Audit Form Part ABC

42. The form has been completed to show that everything required of a basement application and within a BIA has been provided. This report has demonstrated that to be untrue. Further it has shown that in that respect Camden's decision to validate the proposal is questionable.



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ELDRED GEOTECHNICS LTD
30th August 2016

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Appendix A

Mott MacDonald BIA Section 5

Mott MacDonald BIA Section 7

Figure 1

5 Stage 4 – Impact Assessment

From the information summarised in the previous three stages (screening, scoping and site investigation and study) an impact assessment can now be undertaken. This stage will describe and quantify the potential effects of the proposed development on the surrounding environment and detail any mitigation measures that may be required.

The Site is located on Redington Road, a residential street within Hampstead, north west London and is surrounded by other residential properties and associated infrastructure. The Client will therefore be negotiating and entering into Party Wall Agreements with the adjacent buildings freeholder owners as required.

The differential depth (exact differential depth to be confirmed) of the foundation relative to the neighbouring properties will be mitigated by the detailed design of the basement walls that will be fully designed and submitted for Building Control Approval. The structural solution that is currently deemed the most suitable for the proposed development is to construct a secant wall. The outline sequence of works is subject to design development and will be issued at design stage.

The neighbouring properties will be monitored throughout the construction period for any structural movement and assessed with respect to the Burland Category prior to works commencing (a methodology for measuring the possible extent of structural damage), in accordance with Camden Planning Guidance CPG4. This should identify any impact that the proposed development has on the neighbouring properties and allow for suitable mitigation to be put in place.

Excavations at the site are likely to require propping and due to the groundwater level at site it is possible that excavations will require dewatering during construction. It is also possible that during site works temporary localised pumping of excavations may be required as a result of possible rainfall runoff collecting in the temporary excavations. The basement walls will be suitably designed to mitigate the potential ingress of water using a method such as a drained cavity membrane.

As part of the developed and technical design stages a detailed design and method statement will be prepared to accompany the working drawings. In addition to this a Construction Management Plan, Construction Traffic Management and Access Plan and Construction Environmental Impact Assessment and Control Plan will be provided at the appropriate stage.

To complete ground movement analysis in accordance with Camden Planning Guidance CPG4, the design of this scheme requires development. This will require the progression of the architectural design, structural design and geotechnical design in parallel to provide a co-ordinated scheme.

Potential impacts of the proposed scheme have been identified within Section 7 of the GIR (Appendix D), which includes a geotechnical risk register, highlighting key areas of identified risk which will require evaluation and mitigation. In our expert opinion we believe the risks of this basement are manageable and that the scheme can be undertaken in a controlled manner in accordance with CPG4.

7 Geotechnical Risk Register

Table 7.4 details the preliminary Geotechnical Risk Register for the scheme. The risks associated with other aspects of the scheme, such as procedures and contractual and strategic issues are not dealt with here and the scheme risk register should be consulted for information on these elements.

The methodology is based on advice given in HD22/08[2]. The Geotechnical Risk Register should be considered as a live document and updated throughout the course of the scheme. It is incumbent on all parties involved in the scheme to advise the other members when the risks change.

Various threats are identified and the potential consequences of these occurring are described. The risk assessment is qualitative and the various threat are assessed using the following criteria:

- Cost;
- Programme;
- Health and Safety; and,
- Environment.

The risk is derived by considering the impact and likelihood for each threat and opportunity. Both the impact and likelihood have been assessed using a scale of 1 to 5, corresponding to “very low” to “very high” for impact and “negligible / improbable” to “very likely / almost certain” for likelihood. These ratings are summarised in Tables 7.1 and 7.2.

Table 7.1: Hazard Impact Table

Impact			Cost	Programme	Health and Safety	Environment
1	Very Low	Negligible	Negligible	Negligible effect on programme	Negligible	Negligible
2	Low	Significant	1% Budget	5% effect on programme	Minor injury	Minor environmental incident
3	Medium	Serious	10% Budget	12% effect on programme	Major injury	Environmental incident requiring management input
4	High	Threat to future work and Client relations	20% Budget	25% effect on programme	Fatality	Environmental incident leading to prosecution or protestor action
5	Very High	Threat to business survival and credibility	50% Budget	50% effect on programme	Multiple fatalities	Major environmental incident with irreversible effects and threat to public health or protected natural resource

Table 7.2: Hazard Likelihood Index

Likelihood		Probability
1	Negligible / Improbable	< 1%
2	Unlikely / Remote	> 1%
3	Likely / Possible	> 10%
4	Probable	> 50%
5	Very Likely / Almost Certain	> 90%

The risk score is calculated by multiplying the impact score by the likelihood score, giving the scores shown in Table 7.3.

Table 7.3: Risk Level Matrix

		Impact				
		1	2	3	4	5
Likelihood	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Using the matrix in Table 7.3, the scores are categorised into the following four threat levels:

- Negligible (0 – 4)
- Tolerable (5 – 9)
- Significant (10 – 12)
- Intolerable (15 – 25)

Ground investigation can help to mitigate ground and groundwater risks; however these risks cannot be eliminated. Ground investigations by their nature can only investigate and monitor a small part of the sub-surface conditions for a limited duration. Conditions on site identified during construction could reveal ground conditions that could not have been taken into account from the results of the ground investigation.

It is recommended that adequate and appropriate supervision must be provided during construction to assess the ground conditions encountered and interpret the results of the site testing. When appropriate this supervision during construction should be undertaken by a suitably experienced and qualified Engineering Geologist / Geotechnical Engineer.

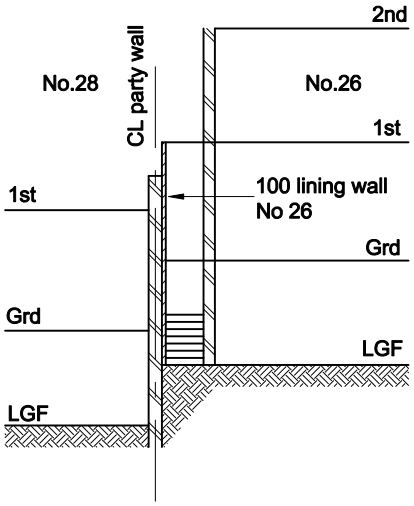
Table 7.4: Geotechnical Risk Register

Threat	Consequences	Impact					Risk				Risk Control Measures / Actions to Mitigate	Owner	Action By
		Cost	Programme	Health and Safety	Environment	Likelihood	Cost	Programme	Health and Safety	Environment			
1. Service / structure strike.	Delays to construction, severe financial and political repercussions.	3	3	3	1	2	6	6	6	3	Thorough review of detailed service search prior to conducting works.		
2. Unexploded Ordnance	Potential serious injury to construction workers, damage to plant and / or structures.	4	4	4	2	1	4	4	4	2	Maintain vigilance and adopt best practice during construction.		
3. Topsoil	Variable lithologies and engineering properties. Stability and settlement issues. Damage / loss of a reusable commodity.	3	2	2	3	2	6	4	4	6	Ensure that all Topsoil is removed prior to construction. Excavation of materials should be supervised by a suitably qualified Engineering Geologist / Geotechnical Engineer. Consider storage and reuse of the Topsoil as part of the development.		
4. Made Ground	Variable lithologies and engineering properties. Possible contamination (see threat no. 14)	4	4	2	2	3	12	12	8	8	Ensure that all Made Ground is removed prior to construction. Excavation of materials should be supervised by a suitably qualified Engineering Geologist / Geotechnical Engineer.		
5. Bagshot Formation	Variable lithologies and engineering properties. Perched groundwater may be encountered (see threat no. 8). Vibration settlement may occur in areas the stratum is loose.	4	4	2	2	2	8	8	4	4	Inspection and approval of formations in variable strata by a competent person at construction stage. Best practice during construction.		
6. Claygate Member	Variable lithologies and engineering properties. Swelling of the Claygate Member during excavation and construction.	4	4	2	2	2	8	8	4	4	Inspection and approval of formations in variable strata by a competent person at construction stage. Best practice during construction.		

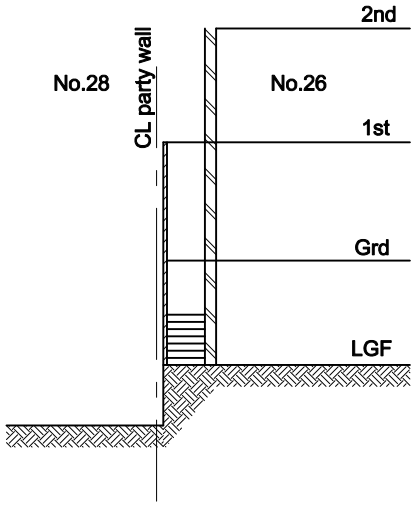
Threat	Consequences	Impact					Risk				Risk Control Measures / Actions to Mitigate	Owner	Action By
		Cost	Programme	Health and Safety	Environment	Likelihood	Cost	Programme	Health and Safety	Environment			
7. London Clay Formation	Variable lithologies and engineering properties. Locally identified beds of silt are likely to have high dilatancy and be sensitive to moisture content variations. Locally identified beds with increased granular content. Swelling of the London Clay Formation during excavation and construction. Encountering groundwater (see threat no. 8)	4	4	2	2	2	8	8	4	4	Inspection and approval of formations in variable strata by a competent person at construction stage. Best practice during construction.		
8. Groundwater	Measured groundwater levels are higher than the level of the proposed basement. Potential for water ingress into the basement, difficulties during construction, alteration to the groundwater regime within the area. Dewatering may reduce effective stress and induce ground settlement on neighbouring properties. Difficulties with temporary works. Possible groundwater within the Bagshot Formation.	4	3	4	4	4	16	12	16	16	Carry out detailed analysis of the effect of the proposed structure on the groundwater levels, flow etc. at the site and identify required mitigation measures. Design the basement appropriately to mitigate the risk of groundwater ingress. Undertake a foundation risk assessment. Ensure adequate temporary works measures are put in place. Ensure adequate dewatering measures are in place during and post construction. Incorporate groundwater monitoring within the Bagshot Formation into future ground investigation.		

Threat	Consequences	Impact					Risk				Risk Control Measures / Actions to Mitigate	Owner	Action By
		Cost	Programme	Health and Safety	Environment	Likelihood	Cost	Programme	Health and Safety	Environment			
9. Slopes to adjacent properties	Gradient unknown, however steep changes in level are evident to adjacent properties in rear garden. Potential for instability during any construction works on site.	4	4	4	2	3	12	12	12	6	Prior to commencing construction a detailed survey of levels on neighbouring properties and review of this is required. Appropriate construction methodologies to be employed to mitigate the risk of instability.		
10. Step level changes to adjacent properties	Step level changes are evident between neighbouring properties with limited information regarding the foundations of associated retaining features. Potential for instability and collapse during any construction works on site.	4	4	4	2	3	12	12	12	6	Prior to commencing works further information relating to the retaining features should be sought. Undertake a ground movement assessment and damage impact assessment as part of the geotechnical design works.		
11. Unknown structure / foundations / basement depths of adjacent properties	Potential damage to adjacent properties during construction.	4	4	4	2	4	16	16	16	8	Undertake a ground movement assessment and damage impact assessment as part of the geotechnical design works. Conduct ground investigation works including inclined boreholes to investigate the position and depths of foundations in neighbouring properties. This will require consent from neighbouring properties.		
12. Encountering asbestos	Asbestos has been identified within the existing structure on site.	4	3	4	4	3	12	9	12	12	No intrusive works should be undertaken within the current structure. An asbestos specialist must be consulted prior to any demolition works on site.		

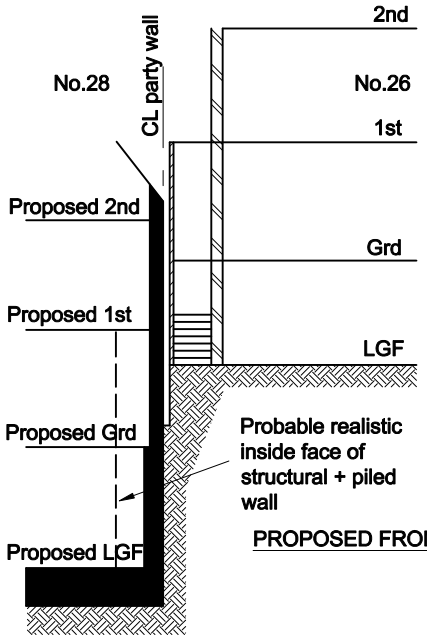
Threat	Consequences	Impact					Risk				Risk Control Measures / Actions to Mitigate	Owner	Action By
		Cost	Programme	Health and Safety	Environment	Likelihood	Cost	Programme	Health and Safety	Environment			
13 Trees on site subject to Tree Preservation Orders (TPO)	Damage to protected trees during construction. Overhead obstruction to plant in certain areas of the site due to overhanging branches.	2	2	3	3	3	6	6	9	9	Ensure consultation with TPO officer prior to any intrusive works on site. Ensure all members of staff on site are briefed by TPO officer prior to commencement of intrusive works.		
14. Unforeseen ground contamination	Contamination risks to construction workers who may come into contact with contaminated material during the works. Pathways could be opened up that may lead to the contamination of groundwater.	3	3	4	4	2	6	6	8	8	The risk of encountering ground contamination is thought to be low to very low. Maintain vigilance for signs of any unexpected contamination during works. Should any suspected contamination be encountered stop works and assess the situation.		
15. Aggressive ground conditions on site.	Moderately high levels of sulphates have been measured within the ground. This could lead to the degradation of the concrete strength and quality. Groundwater could pose a similar risk.	3	3	3	2	4	12	12	12	8	Ensure any concrete on site is designed in accordance with the measured levels of sulphates within the soil.		
16. Ground gas.	Risk to construction workers health, design changes to structures.	3	3	4	3	1	3	3	4	3	Ground gas monitoring conducted does not indicate elevated levels of ground gas. Maintain vigilance and adopt best practice during construction.		



EXISTING FRONT

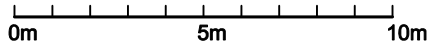


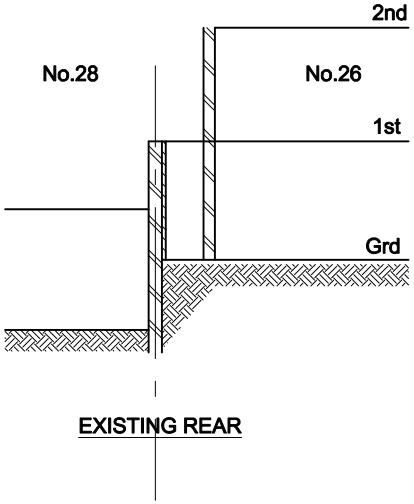
DEMOLITION FRONT



PROPOSED FRONT

Information shown has been scaled from pdf drawings for the current application 2016/2997/P for No.28 and former application 2013/5996/P for No.26 using the Adobe measuring facility and presented at 1:200 scale.
Accuracy is approximate but proprtionally indicative.





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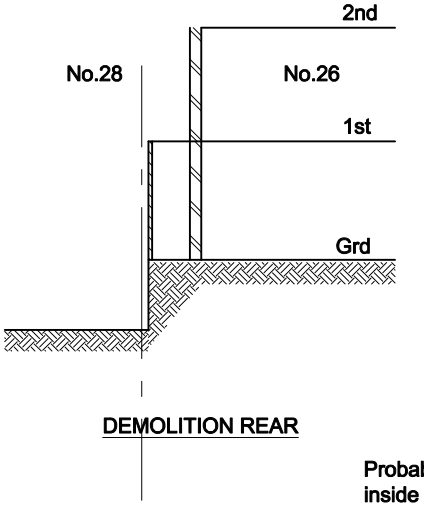
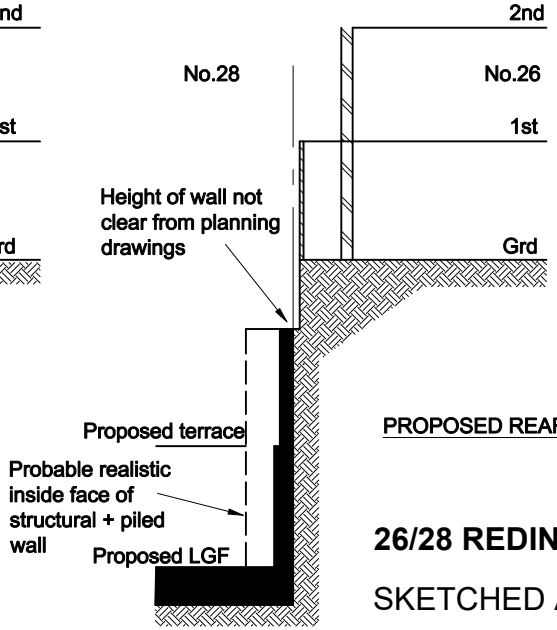


DEMOLITION REAR



PROPOSED REAR

26/28 REDINGTON ROAD NW3 7RB.

SKETCHED APPROXIMATE BOUNDARY SECTIONS

G1615-RP-01-E1

Figure 1.