Assessment of Basement Excavation Justification at 29 New End, London NW3 1JD: *Revised* Planning Application

by **RKD Consultant Ltd.**
On Behalf of :

Camden Development Management Planning Services

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4th floor
Wigham House
16-30 Wakering Road
Barking
IG11 8QN

Tel: 020- 8591 9747
Fax: 020- 8594 1331

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1 Introduction

1.1 General

Camden Development Management Planning Services required an independent assessment of the basement excavation justification for the revised planning application 2012/3089/P at 29 New End, London, NW3 1JD. This revision is made up of addendum documents to the original application, dated around April 2013, and these broadly address an amended line of the basement wall adjacent to Lawn House and away from existing buttresses supporting the garden wall at this boundary.

Following the first review of this original scheme proposal, they approached myself, Dr Adam Pellew MSc PhD CEng MICE, a Director at RKD Consultant ltd to carry out a review of this revised application and with respect to surface flow and land stability aspects. This document represents this review and should be read in conjunction with the original first review [RKD report dated 27th September 2012 and henceforth referred to as the RKD Report.] In relation to subterranean groundwater flow, Mr Ian Marychurch of Card Geotechnics ltd is providing a review on this same revised application.

My terms of reference are described below together with the BIA documentation reviewed. The BIA is first reviewed and then the questions put by Camden Development Management Planning Services are addressed (Section 6 and 7). This report articulates my findings on behalf of RKD Consultant ltd.

Particular attention has been drawn by CDMPS to the comments provided by Stark Associates. Therefore, appended to this Review are comments made in response to the 42 particular points originally listed by Stark Associates. Further comments, where these do not duplicate the 42 points, and made in relation to the TWS and GCG addendum documents are addressed here.

1.2 Comment on the Level of Detail required by the BIA submission

Many comments provided as argument against this BIA submission to-date include the idea of there being insufficient detail in the design proposals to be confident that the stated conclusions of the BIA can be met. For clarity of reasoning, the question is broadly considered here.

The Council asks in DP27 for “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 word ‘evidence’ appears to be chosen carefully and it does not mean the same as the provision of fully worked up detailed design and methodology documentation such that the work is construction-ready. This would be usual for Planning Applications of any complexity and it is entirely normal that some design development remains to be carried out up to providing construction status drawings.

The Party Wall etc. Act (1996) provides a process that usually leads to the provision of an Award just before construction. Therefore it has the advantage of permitting the inclusion of detailed proposals from the Contractor carrying out the work in addition to the designer’s detailed provisions, all as requested by the Surveyors. Together with rights of access and inspection these factors provide a good level of control on those matters that trigger the provisions of the Act. Furthermore, the affected owners and neighbours are at liberty to choose their representatives in this process. The BIA process, occurring earlier and in respect of these matters, should therefore lead to

provision of a scheme with a suitable concept, adequately investigated and demonstrated, but not one so specified that it will be unpicked through the processes of the Act and where the provisions of the Act apply.

Submission of drawings and calculations through Building Control may provide some level of engineering control, i.e. that calculations are correctly executed and are consistent with the drawings. This may not of itself lead to addressing particular issues of concern within the BIA process.

In addition to design drawings and specification, the potential for ground movement in particular is always additionally dependent on the details of construction process, method and plant. This will naturally depend on the particular Contractor and individuals involved after the Planning stage. The BIA cannot address this and the Arup report for CDPMS shows that this was not intended in any case. In these respects it is therefore not a fair criticism of the BIA that it lacks detail. The designers' references to working with the contractor to optimise methodology are entirely fair while these are non-design, construction elements requiring the contractor's experience. Casing for piling is a particular example of this raised in the GCG addendum document. In the context of this application the Developer has so far sought advice from reputable and experienced designers and contractors.

In view of these considerations, it seems that the BIA needs to provide adequate evidence, including sufficient investigation and following the stated procedure, that items of concern to the process have been investigated and addressed. The BIA would need to include a robust and adequately detailed scheme to articulate the engineering design intent and CDMPS's text on the Scope of the Review (see Section 3) is consistent with this.

2 Information Reviewed

The design both uses the input information made available and listed out in the RKD Report (of 27th September 2012) and in addition (superseding earlier revisions where applicable):

- Addendum to the Basement Impact Assessment by Taylor Whalley Spyra (TWS), dated 29th April 2013;
- Addendum to report on potential effects on construction, by GCG, dated April 2013;
- Set of revised Architectural drawings, by KSR, illustrating the Proposed Project, reference NEN-PL-090 revP, -100 revM, -110 revL, -120 revL, -130 revL, -140 revK, -150 revJ, -160 revI, -210 revN;
- Set of TWS drawings 8082/PW01(revF), /PW02(revB), /PW03(no rev), /CSW01 to CSW12 all at revF, /CM03 revC and revised Exploratory Hole Location Plans (with water level readings[updated]) 8082-SI-01 rev E (new TH7 added);
- Letter from Arup (Paul Morrison) to Camden Planning Department, dated 3rd May 2013, titled: 29 New End Hampstead NW3 1JD and referencing information above;
- Stark Associates covering letter dated 27th June 2013, 'Comparison Report revA' tabling 42 points and further points on the TWS and GCG addenda documents referred above;

Note that the RKD Report also addressed an earlier TWS Addendum Report dated 25th September 2012 which was provided to this Reviewer by way of explanation and clarification to the original submission, as described in Section 4.1 of the RKD report.

3 Scope & Terms of Reference of the Review

The express requirement of the review was to address the following specific points on the BIA documentation, excluding for RKD the subterranean flow issues:

1. The submission contains a Basement Impact Assessment, which has been prepared in accordance with the processes and procedures set out in CPG4;
2. The methodologies have been appropriate to the scale of the proposals and the nature of the Site;
3. The conclusions have been arrived at based on all necessary and reasonable evidence and considerations, in a reliable, transparent manner, by suitably qualified professionals, with sufficient attention paid to risk assessment and use of conservative engineering values/estimates;
4. The conclusions are sufficiently robust and accurate and are accompanied by sufficiently detailed amelioration/mitigation measures to ensure that the grant of planning permission would accord with DP27, in respect of a) maintaining the structural stability of the building and any neighbouring properties, b) avoiding adversely affecting drainage and run-off or causing other damage to the water environment and c) avoiding cumulative impacts on structural stability or the water environment in the local area;

In addition, comment is required on the reports and critique submitted by the neighbours [Stark Associates] and in particular addressing whether these:

5. raise any reasonable concerns about the technical content or considerations of the submission which should be addressed by the applicant by way of further submission, *prior* to planning permission being granted. In this case it would need to be apparent that the submission is so deficient in some respect that the three conclusions (4a-c above) cannot be guaranteed without the provision of further information at this stage. Please clearly denote the precise information (if any) that would be required to satisfy (4a-c).
6. raises any relevant and reasonable considerations in respect of the structural integrity or condition of the road and the neighbouring properties which may be unknown or unaccounted for by the submission or which would benefit from particular construction measures or methodologies in respect of the development *following* a grant of permission for the development. Please clearly denote what such conditions should entail.

4 Basement Impact Assessment Documentation Review

4.1 Introduction

The BIA processes of screening, scoping and mitigating are all described in the earlier RKD Report and these matters all remain valid and pertinent except in the context of the particular elements described below.

4.2 Variations presented in the addendum documents

The addendum documents presented for the BIA show the following variations or changes from the earlier presented information:

1. Additional groundwater monitoring data. Standpipe levels of 16/10/12, 31/11/12, 5/03/13;

2. Additional trial pit to northernmost buttress shown on plan drawing 8082/SI-01(revE) as TH7. The TH7 finding of the buttress foundation at 800mm below ground level is noted on drawing 8082/PW01(revF) and further described in the TWS document with reference to a further adjacent pit.

3. Alteration to the alignment of the west side piled wall adjacent to Lawn House and to avoid the two northernmost buttresses supporting the garden wall locally. This is in the top step level of the capping beam and is shown on drawing 8082/PW01(revF) with offset distances from the buttresses to the capping beam.

4. Revised top step piling platform level and consequently pile trim and capping beam level (at +119.5mOD), now 1m higher than previously. Temporary propping kept as per the previous presented level, i.e. now below the capping beam.

5. Minor alteration to the alignment of the piled wall on the east side adjacent to Christchurch passage at the northern end and slightly away from the boundary wall.

The TWS addendum report mentions the trial pits in point (2) above and an additional pit also not independently factually reported. This simple reported information certainly does not seem surprising and is taken here at face value.

4.3 Impact and Mitigation: surface water flow

The addendum proposals here and with respect to the surface water flow issues are no different to the original proposals. The same points as in the RKD report apply.

4.4 Impact and Mitigation: ground movement and structural impact

There are three buttresses to the boundary wall on the Lawn House side. The northern and central buttresses are to be avoided and the southern buttress also combines as a retaining wall and this last will have to be cut and as per the original proposal.

With respect to the southern buttress the comments made in the RKD report still stand. It would appear likely that the buttress function will need complete replacement in view of the space needed to be cut out to enable the piling. This might for example take the form of a large pier, similar to others on the wall, perhaps built into the brick corner locally and in part enabling saw-cutting of this retaining wall. Refer to Section 4.7.1 of the RKD Report.

The northern and central buttresses are shown and stated by TWS to be at a closest distance of 850mm from the back face of the capping beam. The underside of the cap is at +118.46mOD and the found base of the buttress footing is at +119.05mOD[1], a distance of 590mm. A little more space would be needed for the pile guide wall, say reducing the 850mm to 700mm. The ratio 590/700 equates to around 40 degrees, i.e. the slope of the local line from the bottom of the footing to the necessary dig level. This could be adequately stabilised with trench sheets, i.e. without battering to

[1] Using local spot ground levels.

this line. From this it would seem therefore that the pile installation and capping beam can in principle be installed without de-stabilising the end of the buttress.

The TWS addendum report mentions “very slight to slight” in the damage categorisation (paragraph 5.2) and this is taken for the addendum proposals in relation to the buttresses and their connections alone and as confirmed by GCG’s addendum report. The implication that this occurs also for the Lawn House structure is not supported by GCG’s statements or analysis work. GCG state that the addendum proposals amount to a very small improvement in the movement impact, these buttresses aside, and therefore no re-calculation is offered. This point is reasonable.

The actual stated possible maximum crack width for the buttress connections is 3mm between buttress and wall and as taken from the CIRIA C580 figures for this procedure. This is indeed ‘slight’ in the Burland damage scale and therefore within but at the limit of acceptability within CPG4 (cl. 2.30). It is a conservative evaluation from a design perspective and the results database referred in CIRIA C580 since it is both a ground surface evaluation and ignores the effect of the stiffness of these structures in their ground interaction. As GCG state, actual movement at these locations is also dependent on the details of pile construction methodology.

The raising of the piling platform level by 1m should not itself be a problem for the perimeter sections and their stability on the western and northern sides. On the eastern side, adjacent Christchurch passage, the adjusted alignment in the northern half improves the situation with respect to avoiding the existing wall foundations and which will have to be done as previously described.

The alignment of the end of the +119.5mOD step in the capping beam (and piling platform) on the eastern side is currently adjacent to the boundary wall where its top level drops sharply to around +118.6mOD. Hence the perimeter of the piling platform here is not contained and the extent of this zone will need to be moved northwards a short distance to avoid this. Again and as previously stated the construction detailing will need to avoid surcharging of this boundary wall as well as avoiding existing wall foundations and the current alignment in this southern section will need to be located sufficiently inboard to ensure this. The current drawing (say 8082/PW02revB) and in this location appears to remain ambitious in this respect.

5 Review Conclusions

The addendum proposals considered here meet the BIA requirements as articulated in this document and in the RKD report (27th September 2012).

The conclusions given in the original RKD report should be referred as these remain relevant and again it is stressed that if carefully executed the proposed construction is not expected to impact the conclusions of the BIA and it may be considered prudent to audit particular items as having been suitably addressed prior to construction. Of the ten points listed in the RKD report and in reference to this, the Desk Study point (1) has already been addressed including utilities searches and historical maps and the design risk in this respect has been addressed. The TWS addendum report indicates appropriate intentions with respect to the monitoring requirements [point (10)].

Valid concerns are raised in the Stark Associates 42 points and responses have been given to these as appended to this report and refer also to Section 1.2 above on the BIA process.

6 Answers to Questions 1 to 4

Q1:
The BIA has been carried out according to the processes and procedures described in the Arup report and CPG4.

Q2:
The methodologies used in the BIA have been appropriate to the scale of the proposals and the nature of the Site.

Q3:
The conclusions have been arrived at based on all necessary and reasonable evidence and considerations, in a reliable, transparent manner, by suitably qualified professionals, with sufficient attention paid to risk assessment and use of conservative engineering values/estimates.

Q4:
The conclusions are sufficiently robust and accurate and are accompanied by sufficiently detailed amelioration/mitigation measures to ensure that the grant of planning permission would accord with DP27, in respect of

a) maintaining the structural stability of the building and any neighbouring properties;
b) avoiding adversely affecting drainage and run-off or causing other damage to the water environment; and
c) avoiding cumulative impacts on structural stability or the water environment in the local area;

7 Reports and critique submitted by the neighbours: Answers to Questions 5 and 6

Note that responses to Stark Associates' 42 points are appended to this report.

Q5:
While there are reasonable technical concerns raised in the Stark Associates and earlier reports and critique submitted, it is clear that none of these lead to the conclusion that the submission is "so deficient.. that the three conclusions (Q4a-c) cannot be guaranteed without the provision of further information at this stage." Section 1.2 of this report provides reasoning for a part of this and otherwise it is recommended that certain stated issues are audited prior to construction as set out in the RKD report.

Q6:
The RKD report addresses issues that it would be prudent to audit as having been suitably addressed prior to construction. Apart from these issues, the reports and critique submitted do not raise relevant and reasonable considerations in respect of the structural integrity or condition of the road and the neighbouring properties which may be unknown or unaccounted for by the submission or which would benefit from particular construction measures or methodologies in respect of the development *following* a grant of permission for the development.

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
(1)	Information about age, construction of Christ Church passage.. etc.	The boundary wall with Christchurch passage has been investigated by trial pit from the inside. The scheme as presented does not threaten these elements in principle, though refer comments in this Review in relation to the piling platform extent. The boundary wall and structures within 6m of the excavation will be subject to the Party Wall Act which will provide adequate residual protection.
(2)	Information about construction and purpose.. of brick buttressing to Christchurch and Lawn House..	The buttressing is discussed in this review. The boundary wall and structures within 6m of the excavation will be subject to the Party Wall Act which will provide adequate residual protection on provision of detailed design and construction proposals.
(3)	No foundation or superstructure details of the adjacent buildings..	This is not true with respect to the movement assessment and damage category methodology that has been followed. The adopted methodology examines worst case movements at ground level and is conservative with respect to the unknown information referred. Should structures be founded deeper, as is usual to some degree, then predicted movements would be smaller.
(4)	..Bagshot Sand.. depth of the material..[unknown]..	See comments from CGL.
(5)	..method of construction of piles and capping beam along Christchurch passage.	The final pile wall alignment needs to respect the boundary wall location and its foundations, as previously discussed and refer comments in this review. Drawing 8082/PW02 recognises in principle that there will likely need to be some permanent support provided to the low level of the eastern side boundary wall. Refer to point (2).

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
(6)	..top of piled wall by Lawn House.. propping will not support the wall adequately and will allow excessive movement.	The proposed temporary prop levels remain as previously given and despite the increased level of the pile cap. This remains a reasonable proposal.
(7)	..ground water level.. at about 6m below ground level. .whether this is [the] true.. level or whether this is perched water.	See comments from CGL.
(8)	No allowance..[or investigation] made for the underground rivers.. which are known to exist.	See comments from CGL.
(9)	..proposed propping system that is likely to cause lateral movement, twist and/or settlement.	There is nothing intrinsically wrong with the proposed propping system, including its out-of-balance/lateral loading consideration. The concept is demonstrated adequately and with calculation. Ground movement effects (e.g. settlement) for this design have been adequately addressed. The earlier RKD report highlights that there may be further consideration required in detailed design work.
(10)	Only 6 trial holes have been excavated and 3 boreholes. [deemed inadequate here]	The ground investigation coverage has met the good practice requirements of British Standards (BS5930) and as sought by the BIA process. Refer also to points (1) and (3).
(11)	Updated water monitoring results are required. Method [deemed inadequate here] and direction of flow [questioned]	See comments from CGL. The RKD report refers to details that need to be addressed in detailed design and in construction details in respect of piled walls and drainage.
(12)	[Quality] of Site Investigation, SPT tests; limited laboratory testing.	The statement “the whole design proposal may be wrong” presumably in the absence of further or better quality data is incorrect. The RKD report does draw attention as to why the presented evidence is ‘far from perfect’ but also carefully assesses in detail the significance of the presented information and the presented interpretation both for cautiousness in calculation and the robustness of the presented scheme proposals. As stated, these are found adequate.

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
		With respect to soil permeability see comments from CGL.
(13)	De-watering of the Site..might cause loss of fines and settlement..	The issue of 'loss of fines' during pumping may be suitably addressed through appropriate detailing of the well and is not an intrinsic risk to the presented scheme proposals. See comments from CGL. The RKD report (section 4.7.3) describes considerations of differential settlement in consequence of de-watering and its impact within the BIA context. Discharge of water used in construction de-watering is an issue for the Developer but does not intrinsically threaten the BIA proposals. Refer footnote 4 in RKD report (section 4.6).
(14)	Water will collect behind the basement wall..	The scheme does not include for a 1m rise in ground water level as suggested here. See comments from CGL. Refer footnote 3 in RKD report (section 4.6).
(15)	Services Survey	The need to address the presence of local utilities was raised in the RKD report. Further to the RKD report the Developer made available, through Camden and for RKD, utility investigation information which was not otherwise included within the BIA documents. These were inspected by RKD. Confirmation was provided that this information had been inspected and that this did not affect the BIA assessment and all as detailed in section 5 of the RKD Report.
(16)	Ground related risks have not been highlighted for design, damage to neighbours etc.	The report addresses the requirements of the BIA process. Ground movement was contoured in Addendum documentation provided. Refer point (3).
(17)	Further works being required	This appears to be a reference to detailed design and construction details. The location of the basement perimeter wall is adequately shown in the presented drawings and with respect to the purposes of the BIA.
(18)	Contamination testing. Desk Study.	Contamination testing is not a particular requirement of the BIA process. There is no particular reason as to why Contaminated land issues might be an exceptional risk here and this is not supported by available evidence. Refer to point (15).
(19)	Seasonal path of [ground] water.	See comments from CGL.

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
(20)	No assessment of water pressure or heave on the design.	Ground heave is not an issue for neighbouring properties, or indeed the proposed basement slab, at this location given its proven geology and ground movement issues are adequately addressed in the BIA following appropriate methodology. Effects of water pressure on the new basement slab can be addressed in detailed design and do not threaten the BIA proposals. See comments from CGL.
(21)	Updated results and further monitoring .. water levels.	See comments from CGL.
(22)	Slope stability check is required in the temporary condition.	Slope stability (slip circle) check carried out and presented covers the temporary condition and addresses pile toe level. Pile toe level also checked in the WALLAP calculations presented.
(23)	No assessment of out-of-balance forces and ground level.. surcharge differences.	Out-of-balance forces are discussed in RKD Report Section 4.7.2.
(24)	Foundations to the adjacent buildings.. have not been fully investigated.	Refer point (2).
(25)	No damage assessment to the adjacent properties and garden walls..	Refer point (3).
(26)	Method of support [adequacy]	Residual detail design to be completed but the scheme is demonstrated adequately robust with respect to the BIA process.
(27)	No remedial works of the adjacent buildings..proposed.	Refer point (2).
(28)	No adequate details nor design of the existing garden walls.. given.	Refer point (2).

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
(29)	Surface drainage, SUDS.. not .. adequately dealt with.	The detailed design of the drainage system will follow pumping tests on the Site [RKD Report Section 5] but the assumptions made are sufficiently robust for the BIA process.
(30)	Construction proposal concerns.	A number of comments in this respect are outside the scope of the BIA: there will always be a need for careful construction details and consideration which will occur at construction stage. There is nothing intrinsic to the BIA proposals that suggest that construction will be made difficult in direct consequence.
(31)	.. intention to prop and monitor movement is questionable.	Propping and monitoring basements and structures is everyday construction practice and there is no reason to think the proposals are questionable. Note that the propping contractor approached and from whom calculations have been provided is a reputable firm and the RKD Report comments on this issue (Section 4.7.2). Precise details of monitoring may depend on Party Wall Act process and Surveyor requirements.
(32)	..difference between proposed.. basement level and adjacent buildings [level].	Refer point (3).
(33)	Pile design required.. drainage [behind the walls]	Pile design information is adequately covered in the BIA proposal. Refer point (29).
(34)	Clarification of construction along the boundaries.	Refer point (2).
(35)	Profiles of movement for worst case conditions withal adjacent buildings..	The movement contours were provided in an Addendum to the BIA proposals and as described in the RKD Report, as written in section 4.7.3.
(36)	..details of loading and surcharge pressures used.	Surcharges are given in the WALLAP calculations.
(37)	Method of piling and use of rig near adjacent buildings..	These are construction details [point (30)] and also refer point (2).
(38)	No assessment of long-term heave and settlement behind the wall ..	Refer point (20).

29 New End – RKD Review of August 2013
Stark Comments & RKD Comments in response

Item	Stark Comment (abbreviated)	RKD Comment in response
(39)	..long-term movement on existing buildings..	Long-term movements are not an issue at this Site (refer point (20)), all potential movement effects will be evident during the construction stage.
(40)	Category of damage is based on a CIRIA report but examples of works in sand rare.	The selected assessment methodologies are acceptable and widely used in all locations and across projects of all sizes.
(41)	..rail tunnels nearby.	This has not been overlooked.
(42)	Drawings to be fully dimensioned.	With respect to the requirements of the BIA, the drawings are adequately presented and with sufficient detail to be consistent with assessment methodologies and outcomes.