Property	Royal Free Hospital, Pond Street, London, NW3 2QG
Project No.	12449
Date	12 October 2017
Planning Application Number	2014/6845/P
Section 106 Agreement	25 April 2016

Scope

CampbellReith was appointed by the Royal Free Charity as the 'Certifying Engineer' under the requirements of Clauses 3 and 4 of the Section 106 Agreement of the Town and County Planning Act 1990 (as amended) and Section 278 of the Highways Act 1980, to review the "Detailed Basement Construction Plan" for the development and to report on the compliance with S106 Agreement Clauses 2.16 (1) to 2.16 (4)(ii)(c)(7).

Documents Reviewed

Heyne Tillett Steel "Detailed Basement Construction Plan Revision D".

Neighbouring Properties to be considered

The neighbouring structures and, in some cases, structures further away have been assessed including:

- St Stephens Church and Hampstead Hill School (including the listed retaining wall) located to the west and north of Hampstead Green public footpath,
- The George Public House, located to the south of Rowland Hill Street,
- Cabman's Shelter, located to the west of Hampstead Green, and
- Several properties (5 to 21) along Pond Street.

Proposed Basement Construction

The proposed development includes the demolition of the existing car park structure and the building of a new two-storey basement across the footprint of the new building, with five storeys over. The proposed basement will be formed by large-diameter rotary-bored segmental-cased contiguous piling to the south, west and part north elevations. The basement will therefore effectively consist of embedded pile walls to the earth retaining sides, with a 350mm water-resisting reinforced concrete liner wall acting as the retaining structure in the permanent case, propped by the Level 00, 01 and 02 slabs. The basement slab has been designed as suspended, spanning on the internal pile caps and the perimeter pile wall.

A Construction Management Plan has been developed which has been accepted by the London Borough of Camden.

Hydrogeology & Basement Ground Water Control

During the construction of the basement, localised water ingress is anticipated through seepages at the top of the clay together with isolated minor aspects of groundwater associated with claystones/concretions in the London Clay. This will be managed by the provision of pumps and a settlement/silt capture solution prior to discharge to the foul sewer. This is unlikely to comprise a large volume of water, hence the prescribed contiguous piling retaining wall solution.

It is acknowledged that the basement wall may have a damming effect on groundwater which could reduce the stability in the slope to the west. OGI were commissioned to produce an independent hydrogeological assessment and recommended the incorporation of drainage through the basement wall. Wick drains are to be installed between the contiguous piles to prevent damming and the build-up of pore pressures behind the wall. Land drains are to be installed to avoid any adverse impact on shallow groundwater levels once the watertight basement box is completed.

The wick drains are to be designed with sufficient redundancy to overcome the need for maintenance. The design of the land drains includes the construction of manholes to permit their maintenance. Piezometers are to be monitored during and post construction to ensure the efficacy of the drainage and mitigation measures are described should trigger levels be reached.

Ground Movement and Building Damage Assessment

A Ground Movement Assessment has been undertaken by A-Squared, based on existing and

supplementary ground investigation data (contained within Appendix B of the BCP), and the neighbouring properties have been assessed to have a Burland Category of Damage limited to Category 0 (negligible), as required by the Section 106 Agreement.
An 'early warning' monitoring regime has been designed incorporating arrays of inclinometers between the basement and the most sensitive structures (the church and school). These will allow the magnitude of any ground movements associated with the basement construction to be identified and assessed and mitigation implemented, if required, to safeguard nearby structures. It is acknowledged that final trigger levels are to be agreed once further detailed ground modelling is completed.
A number of trees are to be removed to permit basement construction. Typically surrounding foundations are outside the zones of influence or are at sufficient depth not to be at risk of heave. Two small sections of the school wall and a length of the church boundary wall could potentially be affected. It is proposed to inspect these walls at least annually and make good any damage that can be attributed to heave.

Compliance with Section 106 Agreement

Clause	Information Provided	Comments
2.16 (1)	DBCP Appendix B, D & M	Accepted
2.16 (1)(i)	DBCP Appendix B, C & D	Accepted
2.16 (1)(ii)	DBCP Appendix M	Accepted for St Stephens, Hampstead Hill School and RFH
2.16 (1)(iii)	DBCP Appendix M	Accepted
2.16 (2)	Appendix K & L	Accepted
2.16 (2)(i)	Appendix E, F & J	Accepted
2.16 (2)(ii)	Appendix H & I	Accepted
2.16 (2)(iii)	Appendix H	Accepted
2.16 (2)(iv)	Appendix H & I	Accepted
2.16 (3)	DBCP Appendix N	Accepted
2.16 (3)(i)	DBCP Appendix N	Accepted
2.16 (3)(ii)	DBCP Appendix N	Accepted
2.16 (3)(iii)	DBCP Appendix N	Accepted
2.16 (3)(iv)	DBCP Appendix N	Accepted
2.16 (3)(v)	DBCP Appendix N	Accepted
2.16 (3)(vi)	DBCP Appendix N	Accepted
2.16 (3)(vii)	DBCP Appendix N	Accepted
2.16 (3)(viii)	DBCP Appendix N	Accepted
2.16 (3)(ix)	DBCP Appendix N	Accepted
2.16 (3)(x)	DBCP Appendix N	Accepted
2.16 (4)	DBCP Appendix E	Accepted
2.16 (4)(i)	Appointment of HTS & A2 by Willmott Dixon, Appendix A	Accepted
2.16 (4)(ii)	DBCP document	Accepted
2.16 (4)(ii)(a)	Section 1.3 (fig 4) of the DCBP and Appendix A	Accepted
2.16 (4)(ii)(b)	Section 7 of the DCBP and Appendix M	Accepted
2.16 (4)(ii)(c)	Section 1.3 and Figure 4 of the DBCP	Accepted
2.16 (4)(ii)(c)(1)	DBCP Appendix O	Accepted
2.16 (4)(ii)(c)(2)	Construction Management Plan, DBCP	Accepted

	Appendix J, K, L and N	
2.16 (4)(ii)(c)(3)	DBCP Appendices E and J	Accepted
2.16 (4)(ii)(c)(4)	Section 1 & 9 of the DBCP and Appendix A & N.	Accepted
2.16 (4)(ii)(c)(5)	Section 5.2 of the DBCP & Appendix I	Accepted
2.16 (4)(ii)(c)(6)	DBCP Appendix B, I and N	Accepted
2.16 (4)(ii)(c)(7)	Appendix L	Accepted

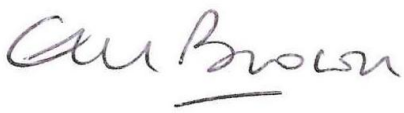
Certifying Engineer Statement

CampbellReith has reviewed the information submitted in the Willmott Dixon "Detailed Basement Construction Plan" and is satisfied that it is in a form approved by the Basement Design Engineer and Certifying Engineer and has been formulated in accordance with the relevant terms and clauses of the Section 106 Agreement.

Prepared by: Hannah Smith MEng(Hons) CEng MIStructE

Signed: Date 12 October2017

Checked by: Elizabeth Brown MSc BSc CGeol FGS



Signed:

Date 12 October 2017