CONSTANT

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Monday, 07 December 2020

11 Highgate West Hill

Structural Method Statement

Constant Structural Design

This report has been prepared for the sole benefit, use, and information for the client. The liability of Constant Structural Design Limited (CSD) with respect to the information contained in the report will not extend to any third party. Our report is provided for the sole use of the named client and is confidential to the client and his professional advisors. All parts of the property that were covered, unexposed or inaccessible were not inspected and therefore we are unable to report that such parts are free from defects.
It should be read in conjunction with all other Consultants reports and specifications and CSD drawings.

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Appendices

1 Non technical summary

With good workmanship, the basement to 11 Highgate West Hill can be constructed safely, without imposing more than negligible damage to the neighbouring buildings.

A possible structural sequence of works (and temporary propping) has been outlined in this report. Movement monitoring is recommended as a precaution to ensure that works stop, and issues can be rectified should the movement exceed what has been predicted.

The proposed development will not increase flood risk at the site or in the surrounding area. It will also not adversely impact the Council's sustainability objectives.

2 Introduction

Constant Structural Design has been to provide structural advice and a report to accompany their planning submission for proposed basement insertion and rear extension.

The purpose of this report is the review the impact of the basement excavation and construction. It includes a desk study of the site and refers to intrusive ground investigations, to assess ground movements, flooding and the ongoing stability of the surrounding buildings.

Based on these assessments we establish an outline method statement to carry out the proposals safely. This is followed by more detailed scheming for key elements and conclusions.

Figure 2.1 – Aerial view

3 Desk study

3.1 Site history & existing structure

The site consists of a semi-detached 2 storey period property, with a converted loft and cellar.

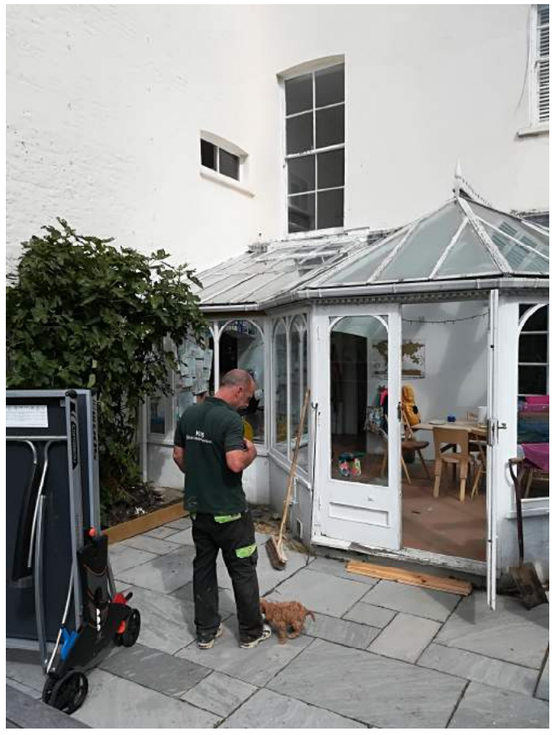
The site is not within an Archaeological Priority Area.

3.2 Visual survey

The ground floor is raised 2-3m above street level with steps and retaining walls along the roadside/northeast boundary.

The existing cellars show signs of damp.

The rear garden is level accessed through a conservatory.



3.3 Neighbouring structure

A party wall is shared with 10 Highgate West Hill along the southeast boundary.

The semi-detached building is further divided with a separate dwelling extending to the west (no. 11A).

No. 12 Highgate West Hill is the adjacent property to the north.

There appears to be no previous planning applications referring to full depth basements in the vicinity and there currently appear to be no planning applications for basement insertions in the area in the future.

3.4 Ground conditions

According to British Geological Survey (BGS) mapping, the local ground conditions are assumed to be London Clay with overlying Claygate Member and made ground.

Figure 3.1 – BGS map extract

Refer to section 6.1 for the ground investigation summary.

3.5 Trees

There are no trees on the footprint of the proposed basement.

Referring to the aerial photo above by inspection the excavation will have negligible impact on the stability of any mature tree. There will also be negligible tree influence on the ground conditions below the proposed groundworks.

3.6 Underground infrastructure

According to transit mapping there are no London Underground tunnels local to the site.

A CCTV survey has been carried out to map the existing drainage. A Thames Water sewer runs across the site and the basement has been designed around this.

Any existing services local to the excavation will be confirmed prior to construction.

3.7 Current/historical water courses

According to records there are no current or historical water courses local to the site. The nearest runs from the reservoirs to the west.

3.8 Flood risk and surface water considerations

Based on Environment Agency mapping the site is within Flood zone 1.

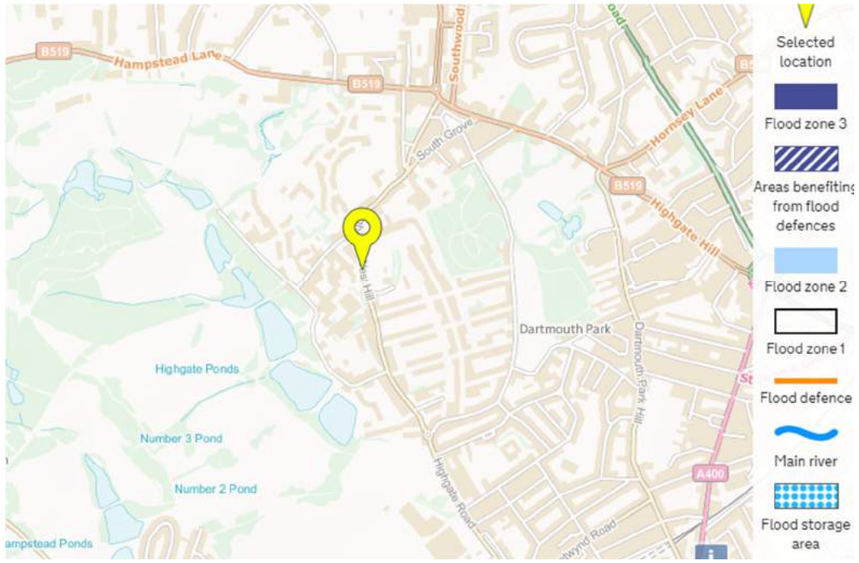


Figure 3.2 – Environment Agency map extract

The site is within Critical Drainage Area Group3_001.

Highgate West Hill highway is at high risk of surface water flooding.

4 Outline proposals

The existing cellar beneath the stairwell and the north east corner of the building will be lowered.

The rear conservatory will be demolished and a new basement constructed with a new rear extension above.

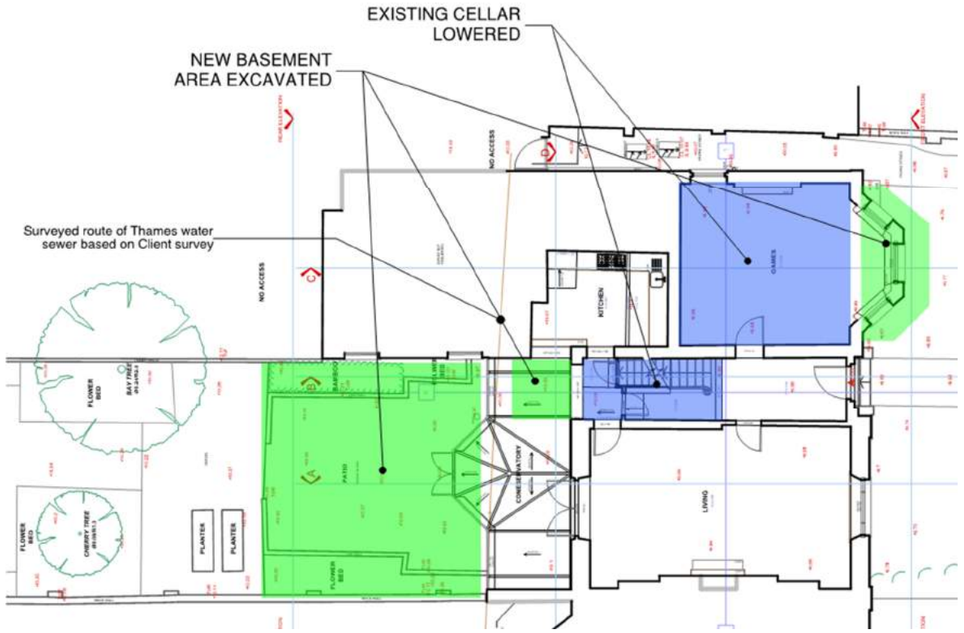


Figure 4.1 – Outline proposals

4.1 Key design constraints

The sewer across the site has been set out and the basement and buildover details will be approved by Thames Water.

The existing stair between ground and first floor appears to be of cantilevering stone construction. This is considered movement sensitive and its protection will be considered carefully in the proposals.

5 Screening & scoping

Refer to the Ground movement assessment by Ground and Project Consultants for screening and scoping for land stability.

Refer to the Groundwater and Surface Water assessment by H Fraser Consulting for screening and scoping of flooding risks.

6 Site investigations and additional assessments

6.1 Ground investigation

Intrusive soil survey has been carried out by Ground & Water. The following summarises the report:
Trial pits were excavated at the rear of the property and within the existing cellar, and 1 No borehole to 8.45m depth.

- The made ground is underlain by the London Clay.
- The borehole struck water at 3m bgl. All the cellar trial pits struck water 0.25m bgl. This groundwater is considered perched and isolated.
- Further monitoring indicated a level 1.5m bgl in the borehole.

Key structural information as follows:
The provisional bearing capacity at basement formation level is 130kN/m2.

6.2 Additional assessments

A groundwater and surface water impact assessment has been carried out by H Fraser Consulting.

A land stability impact assessment has been carried out by Ground and Project Consultants.

A Construction Management Plan has been provided by Paul Mew Associates.

A Flood Risk Assessment has been provided by Base Energy.

7 Structural method statement

7.1 Brief sequence of works

The following method statement outlines one possible sequence of works. This will be superseded by the information submitted by the contractor prior to construction.

1. Erect site hoarding with skip located in front garden.
2. Strip out existing cellars and demolish rear conservatory.

REAR BASEMENT EXCAVATION

3. Underpin the party wall in short sections in a hit and miss sequence (marked up in red below).
4. Cast a 1200 deep reinforced concrete ground beam at the top of the proposed basement walls (marked up in yellow below).

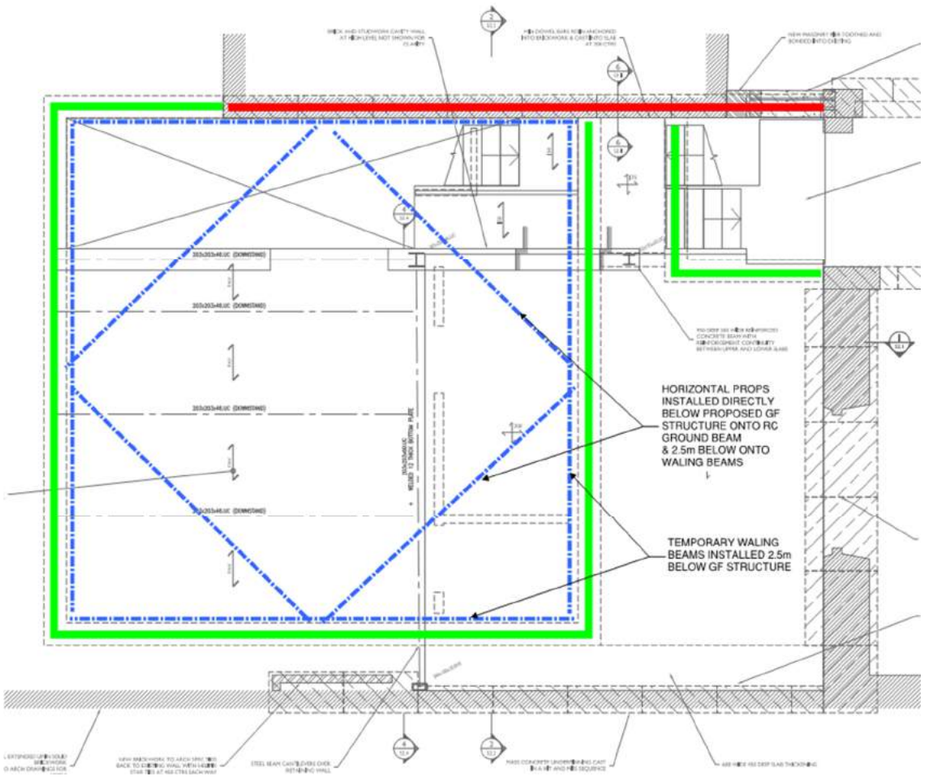
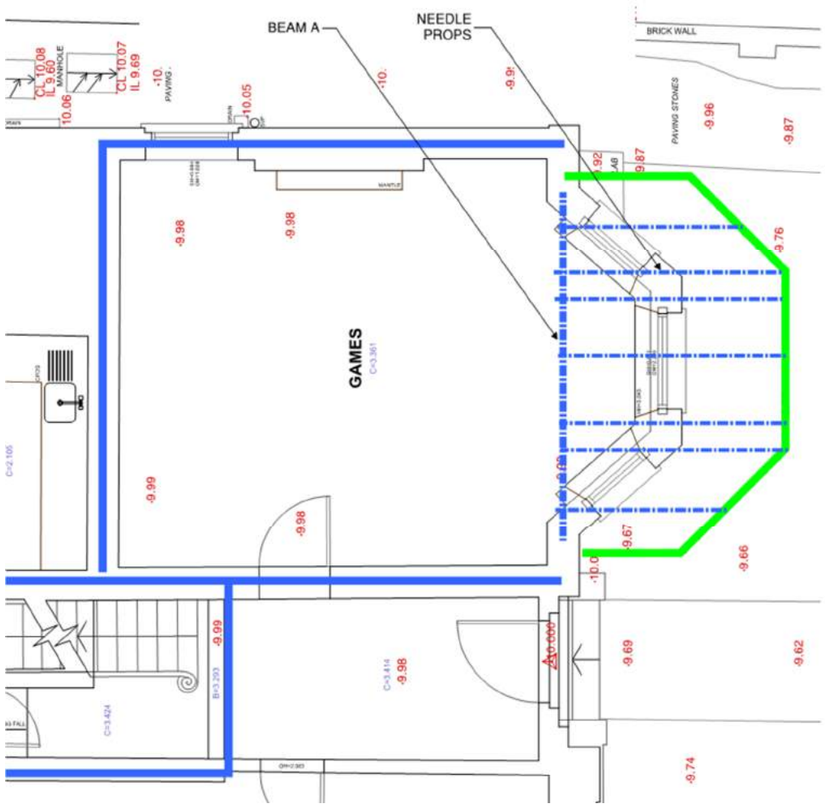


Figure 7.1 – Mark up of proposed GF structure

5. Install horizontal Megashor MK1 props fixed to the RC beam directly below the proposed GF structure.
6. Underpin the ground beam in short sections in a hit and miss sequence, extending the reinforced concrete down into the ground to provide a shear key.
7. Install lower level temporary propping onto Megashor waling beams.
8. Excavate the remaining spoil.
9. Cast the basement raft foundation.
10. Install the basement and ground floor level steelwork.
11. Underpin the garden wall and existing rear elevation in mass concrete.
12. Cast the ground floor slab.
13. Remove the temporary propping to the basement walls.
14. Install the remaining extension steelwork and timber superstructure.

FRONT BASEMENT EXCAVATION

15. Prop ground floor structure and install Beam A.
16. Cast 1200 high reinforced concrete ground beam at the top of the proposed lightwell retaining wall (marked up in yellow below).
17. Install needle propping to support bay window.



18. Underpin the lightwell groundbeam in short sections in a hit and miss sequence.
19. Underpin existing cellar walls in short sections in a hit and miss sequence.
20. Excavate the remaining spoil.
21. Cast the basement raft foundation.
22. Install the permanent steelwork supporting the bay window.

The underpinning will be in reinforced concrete with continuity into the new basement raft foundation. Each pin is to be completed and dry-packed, and a minimum of 48 hours must pass before an adjacent excavation can begin.

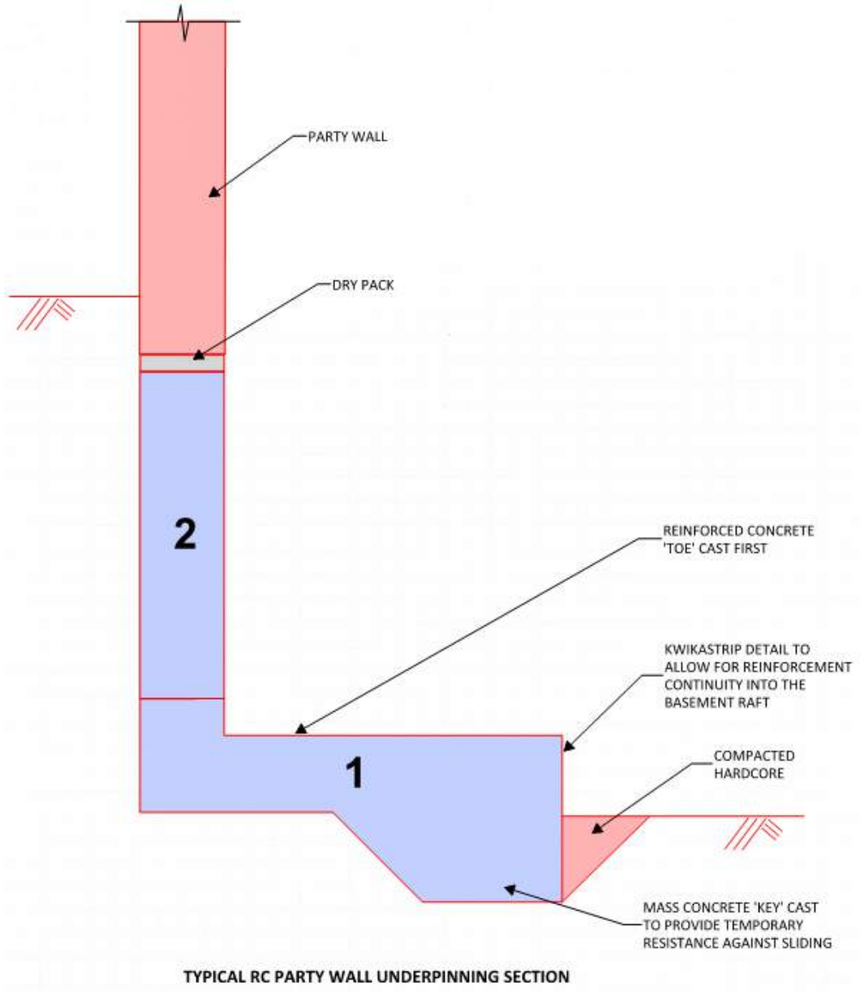


Figure 7.2 - Reinforced concrete underpinning section

A reinforced concrete toe will be cast first with a key extending below the proposed raft formation level. This is required to resist the lateral earth pressure exerted upon the retaining wall until the raft is cast in full.

The stem of the retaining wall is then cast before being dry packed to the underside of the existing brickwork.

Continuity of reinforcement will be specified and detailed between each section.

The sequence of underpinning is to take place in an order arranged prior to works beginning, and in general a 1-3-5-2-4 sequence will be adopted.

7.2 Permanent works proposals

7.2.1 Rear basement

The rear basement retaining walls are designed to cantilever from the basement raft foundation in the permanent condition. In the temporary condition the walls will be propped at high and low levels to allow the raft to be cast.

The 400 thick reinforced concrete raft is required to design against buoyancy in the event that the water table rises to ground level. It will also distribute the retaining wall base moment to the perpendicular retaining walls.

Heave protection is installed to allow for heave due to overburden relief over time.

7.2.2 Front basement & stair well link

Where the existing cellars are to be extended down the reinforced concrete underpinning will cantilever from the raft foundation. The overburden relief will be negligible allowing the raft foundation to be cast on compacted hardcore.

7.2.3 Superstructure framing and stability

The steelwork framing to the extension is designed to distribute wind load and notional horizontal loading down to ground level.

7.3 Temporary works proposals

The contractor will be responsible for the temporary works design and sequencing.

As outlined above horizontal temporary propping is required in two levels in order to excavate the rear basement down to formation level. This is in line with the ground movement assessment carried out by Ground and Project Consulting.

Temporary propping is also required in order to resupport the front bay window.

Trench excavations for each underpin will require trench sheets propped with waling struts at maximum 1m vertical ctrs.

Whilst the soils are cohesive and the dewatering should be limited, this will be confirmed through investigation as early as possible to confirm the strategy.

7.4 Basement waterproofing and drainage

A Grade 3 performance level will be adhered to.

GRADE OF BASEMENT*	USAGE*	PERFORMANCE LEVEL*	PERFORMANCE LEVEL**	
			RELATIVE HUMIDITY**	DAMPNESS
1 (Basic utility)	Car parking Plant rooms (excluding electrical equipment) Workshops	Some leakage and damp areas tolerable. Local drainage may be required	> 65% normal UK external range	Visible damp patches may be acceptable
2 (Better utility)	Workshops and plant rooms	No water penetration but damp areas tolerable***	35–50%	No visible damp patches***
3 (Habitable)	Ventilated residential and commercial areas	Dry environment. No water penetration. Additional ventilation, dehumidification or air conditioning appropriate to intended use	40–60% 55–60% for restaurants in summer	None acceptable. Active measures to control internal humidity may be necessary

* Based on Table 2 of BS 8102[16].

** Based on Table 2.2 of CIRIA Report R140[20].

*** A damp area is defined under BS 8102 as an area which, when touched, might leave a light film of moisture on the hand but no droplets of water (i.e. beading). ‘Damp areas tolerable’ may be considered to be inconsistent with ‘no visible damp patches’ to CIRIA R140. Where needed, clarification of expectation should be sought from the client.

Table 7.1 – Basement grade

Achieving the required grade of performance in the grade 3 spaces will be ensured primarily through adoption of a type C drained cavity system.

A sump will be installed at basement level within a reinforced concrete surround.

HDC drainage are responsible for the below ground drainage design. This has been coordinated with the structure.

As discussed above the drainage design will take into account the risk of surface water flooding. Pumping will be required from basement level to the level of the main sewer in the road.

A one-way valve will be used when connecting to the existing sewer to prevent the sewer flooding the property.

8 Construction management

A Construction Management Plan has been carried out by Paul Mew Associates, which should be referred to.

8.1 Contractor qualifications

The client should appoint a contractor with suitable experience in basement construction within the London area. They should be a member of the Considerate Contractors Scheme.

The underpinning contractor should be a registered member of the Association of Specialist Underpinning Contractors.

8.2 Construction waste and traffic management

Access for materials and removal of spoil will be from the front of the property. Skips will be within a hoarded area adjacent to the highway. The frequency of skip removal trucks during the demolition and excavation, and the concrete mixers during the construction, will be confirmed by the contractor for approval prior to works starting onsite.

Details should be included in the Contractor's Site Waste Management Plan.

8.3 Noise, vibration and dust

The demolition will take place within a hoarded area.

All concrete and masonry demolition work will be regularly watered down to reduce airborne dust. The pavement adjacent to the site will be cleaned daily.

Concrete to be broken out using non percussive techniques.

Working hours to be restricted as required by the Local Authority.

8.4 Construction monitoring

The following monitoring is recommended during the construction period:

Contractor to allow for weekly monitoring at 8 no façade points throughout the basement excavation works. 2 locations to be set out on each neighbouring façade at the rear. Final regime/locations to be confirmed with SE.

- Monitoring to be carried out by an approved independent monitoring company.
- Readings to be taken at the same time of day.
- Superstructure movement of +/- 4mm recorded at any of the predefined locations to be communicated to SE immediately.
- Superstructure movement of +/- 8mm recorded to result in the works stopping and being made safe. SE to be notified immediately.

9 Basement impact assessment

9.1 Land stability and ground movement assessment

The ground investigation confirmed a suitable bearing stratum.

The land stability assessment has concluded that the basement construction should not have a significant impact on land stability.

The design of the basement takes into account the proximity and worst case depth of neighbouring footings. It also allows for the volume change potential of the clay subsoils due to overburden relief.

9.2 Cumulative impact

There are no consented or constructed basements in proximity to the site that give rise potential cumulative impacts.

9.3 Hydrogeology assessment

Given the consistency and low permeability of the clay the proposed excavation is highly unlikely to adversely affect the flow of groundwater across the site.

There is a very low risk of groundwater flooding and the risk of groundwater backing up around the basement is also considered to be low.

Should any dewatering be required the ground conditions mean this should be relatively straight forward with minimal risk of the movement of fines causing subsidence to neighbouring buildings.

9.4 Flood risk, river and tidal flooding

The site is located within Environment Agency flood zone 1. As the site is below 1 hectare in size a detailed Flood Risk Assessment is not recommended. A basic assessment carried out by Base Energy should be referred to.

The H Fraser report concludes that there is no risk of flooding from reservoir flooding, and very low risk of flooding from rivers or tidal flow.

9.5 Surface water and sewer flooding

The H Fraser report concludes that there is very low risk of surface water flooding.

A SuDS strategy is recommended as a mitigation measure against an increase in surface water drainage volume to the sewer.

The rear extension therefore includes sedum roof areas and planters to delay the runoff into the sewer.

10 Conclusions

Primarily based on the ground investigation results it is our opinion that the proposed excavation can be carried out safely in the sequence described.

We do not anticipate any damage to the neighbouring buildings or the highway as a result of the works.

The risks of flooding through groundwater and surface water have been analysed and determined to be low.

The permanent works have been designed to accommodate all vertical, lateral loads and combinations in line with the latest Eurocodes. A suitable temporary works proposal has been established and going forward this will be fully designed and detailed by a qualified structural engineer employed by the contractor.

The engineering design described here has been advanced to Technical Design Stage (RIBA Stage 4). Refer to the Stage 4 structural drawings attached.

Appendices

Appendix A - Structural drawing set – Constant Structural Design

Appendix B - Ground investigation report – Ground & Water

Appendix C - Groundwater and surface water BIA – H Fraser Consulting

Appendix D - Land stability BIA – Ground and Project Consultants Ltd

Appendix E - Construction Management Plan – Paul Mew Associates

Appendix F - Flood Risk Assessment – Base Energy