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1224 - Cranley Gardens - DoC

Reference

1224-12.04-REP-013 DoC

Date

29 July 2015

Issue

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1.0 Executive Summary

Following a detailed design process with the new owners of the property, this document has been produced to describe the information being issued to discharge conditions associated to the planning permission granted for the property at 112 Cranley Gardens, London, N10 3AH (planning permission reference - HGY/2014/1847).

Property
Existing three storey town house.

Scope
The scope of works agreed with the planning permission:
- Whole demolition of the house.
- Rebuild of the existing house like for like with approved additions.
- Basement with sub basement plant room.
- Ground floor rear extension.
- First floor level side extension.
- Roof level rear dormer modifications.
- Full rebuild to modern standards internally.

2.0 Permission
2.1 Condition 4

Planning permission reference - HGY/2014/1847)

Condition 4:
No development shall take place, including any works of demolition, until a Construction Management Plan has been submitted to and approved in writing by the Local Planning Authority. The approved plan shall include potential impacts of basement developments methods of mitigation of such impacts and details of ongoing monitoring of the actions being taken. The approved plans should be adhered to throughout the construction period and shall provide details on

- The phasing programming and timing of the works.

- The steps taken to consider the cumulative impact of existing and additional basement development in the neighbourhood on hydrology.

- Site management and access, including the storage of plant and materials used in constructing the development.

- Details of the excavation and the construction of the basement.

- Measures to ensure the stability of adjoining properties.

- Vehicle and machinery specifications.

We consider the Information we have attached to this report discharges this condition in the full. However, should you have any concerns over the information supplied please contact us.

112 CRANLEY GARDENS

OUTLINE PROGRAMME - 2/6/15

Week 1 - ????????	Duration Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Site Set Up																													
Hoarding	)																												
	)																												
Office	) Concurrent																												
	) one week																												
Temporary toilet & water	)																												
	)																												
Divert Stats for temp services	)																												
Demolitions & Site Clearance																													
Demolish sufficient of Ground Floor to enable underpinning																													
After underpinning, complete demolitions																													
Substructure																													
Underpinning	4																												
Excavate preliminary trench	1																												
Underpins sequence 1	1																												
Underpins sequence 2	1																												
Underpins sequence 3	1																												
Piling mat/Piling/Sheet piling																													
Place piling mat	0.3																												

NOTE The two spare weeks at end represent Christmas Break which cannot be placed until start date know

Week 1 - ????????	Duration Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Piling to Spa area	1																												
Sheet piling to detail	0.2																												
Basement dig																													
Excavate Basement, cart away arisings	5																												
Temporary works																													
Insert temporary works as excavation continues	As and when																												
Drainage																													
Provide drainage to detail under slab	3																												
Concrete box																													
Prepare bottom of excavation, lay insulation etc	0.2																												
Reinforcement	1																												
Concrete	0.3																												
Insulation to concrete walls	0.2																												

2.0 Permission
2.1 Condition 4

Planning permission reference - HGY/2014/1847)

Condition 4:
- The phasing programming and timing of the works.

The following pages are a programme of events to take place on site during the construction of the works and gives the necessary sequencing itemised by the Contractor.

(i) PHASING PROGRAMME AND TIMING OF THE WORKS

The works are programmed to take 70 working weeks.

The first 28 weeks will be taken up with demolition and forming the Basement up to and including the ground floor slab.

Over the period of the next 20 weeks the Superstructure will be completed including roof and windows, and the remainder of the time will be taken up with fitting out the project internally and the ancillary extra works.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Reinforcement	1																												
Formwork	1																												
Concrete walls	0.3																												
Structural formwork	1																												
	Duration																												
Week 1 - ????????	Weeks																												
Waterproofing																													
Insert waterproofing within concrete box after formwork removal	2																												
Ground Floor Slab																													
Insert steelwork	0.3																												
Formwork for in situ areas	0.3																												
Reinforcement for in situ areas	0.2																												
Concrete for in situ areas	0.2																												
Insert precast slab units	0.1																												
Structural formwork	1																												
Garden Office slab																													
Excavation, cart away for slab	1																												
Insulation under slab	0.1																												
Reinforcement	0.2																												
Concrete slab	0.2																												

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	Duration																									
Week 1 - ????????	Weeks																									
Superstructure																										
External and Internal Walls Up to 1st Floor																										
Erect scaffold	0.2																									
Brick and block walls with insulation up to First Floor Level including treatment at window openings etc	) 3.3)																									
	) Concurrent																									
Internal blockwork as work proceeds	) 3																									
Ist Floor steel & timber joists																										
Insert steelwork	0.2																									
Insert timber joists	0.3																									
External and Internal Walls																										

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
Up to 2nd Floor																											
Erect scaffold	0.2																										
Brick and block walls with insulation up to Second Floor Level including treatment at window openings etc	)) 3.3)																										
	) Concurrent																										
Internal blockwork as work proceeds	)) 3																										
2nd Floor steel & timber joists																											
Insert steelwork	0.2																										
Insert timber joists	0.3																										
Roof Structure including Steelwork and Dormers																											
Scaffold	0.2																										
Erect steelwork	1																										
	Duration																										
Week 1 - ????????	Weeks																										
Fit timber joists and rafters and sundry timberwork to form roof structure	1																										
Timberwork to dormers	0.3																										
Cover all in plywood	1																										
Roof coverings																											
Felt batten and roof coverings	3																										
Timber fascias and soffits	1	)																									
		) Concurrent																									
Rainwater goods	0.3	)																									
Pool First Fix																											
Sub Contractor to bring in plant and construct pool box ready for finishes	2																										
Stairs																											
Fit staircase and protect	????																										
Windows & External Doors																											
Provide and fit windows and external doors	2.3																										
Strike scaffolding	0.2																										
Garden building superstructure																											
Construct superstructure to garden building roof, windows, doors etc	4																										
(As and when to tie in wih Main House trades)																											
	Duration																										
Week 1 - ????????	Weeks																										
Internal partitions																											
Fix internal partitions from top to bottom	3																										
Floor Screed																											
Lay screed and insulation to lower floors	2																										

| | | |

SITE MANAGEMENT AND ACCESS

1 – Site Management

A competent Health and Safety Supervisor (Site Manager) will be on site at all times while construction work is being carried out. A competent deputy must be appointed in the absence of the Site Manager.

2 – Arrangements for Passing Information to Contractors

Contractors/Sub-Contractors are required to provide the Principal Contractor with specific written risk/work method statements. The method will have been discussed beforehand to ensure that both the Contractor and Sub-Contractor are agreed on the work method to be used throughout the operation and that each is fully aware of the dangers involved and the safe working practices which are to be followed.

During the construction phase, information is passed to and from the contractor and operatives via induction briefings, tool-box talks and contractor co-ordination meetings.

Liaison/Consultation meetings with site contractors will be held at regular intervals.

Any alternations to the specified design must be discussed and approved by all parties.

3 – Site Meetings

Meetings will take place regularly and will be attended by the Principal Contractor, the CDM Co-ordinator, The Client (or representative) and Designers and others relevant to the project. Minutes will be taken and distributed.

4 – Control and Monitoring of Contractors Method Statements and Risk Assessments

Upon Appointment, the contractor is required to provide risk assessments. Method Statements will be required for those activities that present heightened risks to Health & Safety, and for any activity involving the use of highly flammable materials, or hot work inside the structure. If they are satisfactory, they are forwarded to the site and the Site Manager checks for site specific items before completing the Risk Assessment/Method Statement Log. The Contractor is then allowed to commence work as agreed. A hot works system will be in operation.

If the information is not satisfactory, the details are returned to the Project Manager in order for him to act accordingly, i.e. request a review of the information from the Contractor, complete the Contractor Assessment Sheet and return all information to site prior to commencement of the works.

The Site Manager will keep all Risk Assessments and Method Statements in his office on site. The Site Manager will not allow any works to commence until all relevant information is in position. Contractors are to be briefed before starting work on their Method Statements/Risk Assessments. Risk Assessments and Method Statements are to be updated to incorporate changes of design and any relevant information identified by any party during the construction stage.

All Contractors are required to work within the site rules and client requirements set out in the attached appendices, please refer to index.

2.0 Permission
2.1 Condition 4

Planning permission reference - HGY/2014/1847)

Condition 4:
- The steps taken to consider the cumulative impact of existing and additional basement development in the neighbourhood on hydrology.

Refer to Condition 5 for this element as there is an overlap in the content of both conditions.

- Site management and access, including the storage of plant and materials used in constructing the development.

- Details of the excavation and the construction of the basement.

- Measures to ensure the stability of adjoining properties.

The following documents are supplied by the Contractor to give an understanding of how they are looknig to approach this scheme.

COSHH Data Sheets and COSHH Assessments are required for the use of all hazardous substances as they are identified.

The Contractor will assess all manual handling for risk of injury. Contractors are to ensure that where there are significant risks of injury from manual handling, the assessment is in writing. (These should be attached to the Method Statement).

5 – Arrangements for Controlling Significant Site Risks

5.1 – Work Beyond Site Boundary

Works beyond the site boundary are not anticipated, however should the need arise, the Principal Contractor must inform the Client and/or adjacent land owners in writing prior to commencement.

5.2 – Temporary Electrical Distribution/Management, And Portable Electrical Equipment

All electrical equipment on Company sites or other workplaces will be supplied, installed, maintained or used in accordance with the approved standards.

The Contracts Manager: in conjunction with the Site Manager will plan the temporary electricity supply and distribution on site in accordance with the above standards. All temporary supplies are to be installed by competent electricians and tested in accordance with the statutory regulations.

The Site Manager will ensure that the temporary electrical supply is installed and tested as planned – records will be kept on site.

The Site Manager will ensure that all power cables are installed clear of passageways and preferably above head height.

The Contracts Manager and Site Manager will ensure that all power tools provided for use on site or other workplace are in accordance with the relevant British Standards.

No power tools or electrical equipment of greater voltage than 110 volt (CTE) shall be used on site unless special arrangements are made and discussed with management. Where the use of 240 volt power and equipment is considered essential and unavoidable such action shall only be with the express permission of the Site Manager. If the Site Manager makes the decision to allow the use of 240 volt power and equipment then he must ensure that a Method Statement is produced together with a Proper and Efficient Risk Assessment. All such works will be conducted under the permit to work system. RCD must be in place.

Lower voltage tools, lighting etc. may be required in damp, potentially flammable or confined situations. All sub-contractors will be informed of the Company Policy on the use of electricity on site and will be expected to comply with these requirements.

The Site Manager will ensure that all sub-contractors' equipment is in good condition and in accordance with the relevant British Standards before permitted for use on site.

Immediate action will be taken against any person or sub-contractor abusing or incorrectly using electrical equipment on site.

Festoon lighting equipment will be securely placed above head height. Where festoon lighting equipment is installed, it must not be of the screw-on-pin contact type. Only properly constructed sets with moulded-on fittings will be used.

The Site Manager will ensure that all portable generator or other electrical equipment fitted with an earth rod has the earth rod and connection maintained in good condition.

Only authorised persons are permitted to repair or alter electrical equipment. Any defects noted in electrical equipment must be reported to the Site Manager so those immediate steps can be taken to have defects remedied by site electrician or Hire Company.

All cable connections must be properly used. Under no circumstances is insulation tape to be used for any repair or joint in extension cables.

On festoon lighting, all bulb sockets are live. Steps are therefore to be taken to protect open sockets when bulb is not fitted. As well as the fragments of glass of broken bulbs being a hazard it must be remembered that the protruding filament wires would still be live.

Power tools must be maintained in good condition with casting intact and label fitted showing voltage and other information.

5.3 – Working at Height

All working platforms and loading areas where there is a perceived risk of injury from a fall will be fitted with double guardrails and toe-boards. This includes MEWPs and tower scaffolds.

Any operative using MEWP will be expected to provide proof of training/competence. MEWPs will be inspected prior to first use and at regular intervals thereafter.

Any operative erecting a tower scaffold must produce proof of competence to the site manager before work commences. The Risk Assessment/Method Statement is to reflect these arrangements.

Scaffolds will be inspected before being taken into first use, after any event that is likely to affect stability (weather/impact/alteration etc.) and every seven days thereafter. The Inspection report is to be completed by the Site Manager.

5.4 – Electrical

No electrical tools, equipment or appliances will be used until proof of inspection during the first 3 months is obtained (visual or otherwise). This includes hired equipment and cabin appliances etc. Documentation is to be provided to the Site Manager upon arrival on site.

No power tools or electrical equipment of greater voltage than 110 volt (CTE) shall be used on site unless special arrangements are made and discussed with management. Where the use of 240 volt power and equipment is considered essential and unavoidable such action shall only be with the express permission of the Site Manager. If the Site Manager makes the decision to allow the use of 240 volt power and equipment then he must ensure that a Method Statement is produced together with a proper and efficient Risk Assessment. All such works will be conducted under the permit to work system.

Lower voltage tools, lighting etc. may be required in damp, potentially flammable or confined situations. All sub-contractors will be informed of the Company Policy on the use of electricity on site and will be expected to comply with these requirements.

Access to areas where there are live installations will be strictly controlled. Access will be locked off and signs indicating the danger will be displayed.

Immediate action will be taken against any person or sub-contractor abusing or incorrectly using electrical equipment on site.

5.5 – Services

This information must be forwarded from the Architect/Designer/CDM Co-ordinator to the Principal Contractor, who will then determine the accurate line and state of the services. Where service location cannot be accurately stated, locating devices must be utilized.

5.6 – Personal Protective Equipment (PPE)

All operatives are to wear the following:

- Head Protection is a requirement by the Principal Contractor.
- Safety Footwear is a requirement of the Principal Contractor and MUST be worn by everyone who enters the site for whatever purpose. This must be monitored by the Site Manager.
- Hi-Vis Clothing is a requirement of the Principal Contractor and will be worn at all times by everyone on the site. THIS INCLUDES VISITORS.

Other PPE is to be worn as indicated in Risk Assessments and Method Statements. PPE should be suitable for the task. Respiratory protection must be capable of protecting the operative against the substance the operative is exposed to.

5.7 – Plant and Work Equipment

All plant and work equipment must be assessed for risks before use. Information should be on site (noise levels, data sheets, electrical information, operator's handbooks etc.). All relevant Risk Assessments for the use of plant are to be submitted by the contractor wishing to use the equipment.

Test and thorough examination reports and operators certification for all plant and equipment are to be produced for the Site Manager's inspection on arrival on site and kept on site.

Weekly inspection reports are to be recorded before lifting commences thereafter every 7 days. These reports are to be made available for the Site Manager's inspection.

5.8 – Waste

The Site Manager will control the removal of waste from site. Waste transfer notes will be kept in the site office.

Contractors are to inform the Site Manager of the name of their waste. A registered waste carrier will remove waste. Waste transfer notes will be kept on site and forwarded to the principal contractor on a weekly basis. Random checks on end use will be made by the Site Manager.

A site waste management plan indicating reuse and recycling is to be implemented and adhered to.

5.9 – Heath and Environment

Contractors are to recover any spillages of hazardous substances in accordance with the COSHH Safety Data Sheets. If there is any risk of contaminants getting into the watercourse or drains, the Site Manager is to be informed immediately.

Temporary bunding must be used in all situations where contentious liquids are being stored.

Care will be taken to minimise dust, noise and fumes that may affect the surrounding properties. Contractors will be required to identify any dust hazards, which are created by the use of equipment and processes (e.g. chasing). Water fed equipment or dust extraction systems will be required under such circumstances. All such control measures must be identified in the Risk Assessment/Method Statement process.

5.10 – Manual Handling

Movement of materials through the site should be addressed in the Risk Assessments.
The Site Manager will ensure that materials are handled as far as possible by machine. Where the use of a machine is impracticable, sufficient labour must be available to handle any heavy or awkward loads and instructions must be issued to site on the handling of these loads.

Specific arrangements will be required for:

- Heavy timbers and finished joinery items.
- Heavy machinery and tools.
- Pre-packed materials such as screed, cement and sand etc.
- Brickwork/Blockwork including lintels.

Emergency Procedures

The Principal Contractor will ensure that all operatives are familiar with the client's emergency procedures and precautions. Fire detection systems or alarms must not be disabled or interfered with. A permit to work will be required for all hot works.

Smoking is strictly limited to outdoor designated smoking areas close to the construction site and away from all flammable substances.

The following emergency procedures have been considered:

- Explosion
  In the event of an explosion, the site fire alarm will be sounded and operatives will evacuate the work place in accordance with the fire evacuation plan.
- Gas Release
  In the event of a release of gas, the site fire alarm will be sounded and operatives will evacuate the work place in accordance with the fire evacuation plan.
- Collapse
  In the event of a collapse of an element of the building, works to the area will cease immediately and the area will be cordoned off. A role call will commence to determine if any personnel are missing and the necessary emergency services will be called out immediately. If applicable the incident will be notified in accordance with RIDDOR and the Principal Contractor will carry out a full investigation.
- Chemicals
  In the event of a release of chemicals, the site fire alarm will be sounded and all operatives will evacuate the work place in accordance with the fire evacuation plan.

6 – Site Elements

6.1 – Welfare

EXPECTED NUMBERS OF PEOPLE ON SITE

Peak: 15

Minimum: 3

All welfare facilities will be located within the unit as agreed on site walkabout. Electrical and water services will be taken from existing supplies.
All facilities will be located within the unit as agreed on site walkabout. Electrical and water services will be taken from existing supplies.

All facilities will be provided for the use of all contractors and visitors.

Canteen facilities will cater for a maximum of 15. The canteen will be cleaned at the end of each day. A bin will be provided for rubbish and food. Smoking will not be allowed and a 'No Smoking' sign will be displayed. A designated smoking area will be allocated by the Site Manager.

A drying room should be provided if necessary for drying wet clothing (wet work) next to the canteen. Pegs for clothing will be provided. Heaters will be provided – there will be no naked flames.

A means of heating food will be provided. An electric kettle/urn will be provided for making hot drinks.

Sufficient toilets and basins will be provided. The sinks will be large enough to enable decontamination of arms, hands and face. Waste from these facilities will flow directly into the main drainage system for the development.

The welfare facilities will remain in place until project handover.

6.2 – Site Access, Pedestrians and Vehicles

Access to the site will be via Cecile Park across a pedestrian pavement.

The Principal Contractor will maintain pedestrian access and control vehicle movements with regard to public safety. Fire and emergency access routes must be kept free and uninterrupted at all times.

7 – Training

7.1 – Induction Training

The Site Manager is responsible for inducting all personnel operating on the site. Briefs will be provided by the principal contractor. Induction's must be recorded and kept in the Induction Training Register.

7.2 – Training Certificates

Copies of training certificates etc. for all plant operators, abrasive wheel operators and scaffold erectors, etc. will be kept on site and further copies must be attached to Risk Assessment/Method Statements.

7.3 – Tool Box Talks

Tool box talks will be held as determined by changing site conditions. Talks will be arranged by the Site Manager and details of attendance kept in the Tool Box Talk Register.

7.4 – Information and Signs

A Health and Safety Information Board is to be displayed in the welfare facility. It contains information on the evacuation plan, site risks, details on first aid and resuscitation and the Health and Safety Law Poster etc.

All signs are to comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.

8 – Site Rules

All operatives are to follow any site rules imposed by the Principal Contractor and the client.

All operatives are to complete the attendance register on a daily basis.

All visitors are to complete the visitor's book whenever they attend.

9 – Deliveries and Storage

Construction materials and equipment will be delivered to the site using contractor/delivery vehicles. Materials will then be manhandled on materials bogies or similar to the area of work. All materials will be stored securely within the site boundary. Materials will be delivered on a 'just-in-time' basis.

10 – Permits to Work

Permits to work will be used where identified in the site specific Risk Assessment/Method Statement. At this stage the following permits are expected on this site:

- Work at height (includes roof work)
- Electricals
- Hot Works

Unless noted otherwise, the permit to work system will be operated and maintained by the Site Manger.

11 – Emergencies

11.1 – General Evacuation Plans

Refer to section 5.12 for evacuation plan. The Principal Contractor will conform to the client's emergency procedures.

11.2 – Emergency Services

The Site Manager will alert the emergency services in the event of an emergency.

11.3 – Accidents

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) requires the reporting of specified accidents, ill health and dangerous occurrences to the enforcing authorities. The events all arise out of or in connection with work activities covered by the HSW Act. They include death, major injury and more than three-day lost time accidents. Schedules to the Regulations specify the details of cases of ill health and dangerous occurrences.

For most circumstances reportable events will be quite rare and so there is little for them to do under these Regulations apart from keeping the guidance and forms available and being aware of the general requirements.

The Site Manager is responsible to ensure that all responsible incidents are correctly reported to the Authorities. See the Advice Centre section on RIDDOR for details of what has to be reported.

Incidents can be reported directly to the RIDDOR Incident Centre as follows:

BY POST TO: Incident Contact Centre
By Internet: www.riddor.gov.uk
By Telephone: 0845 300 9923

11.4 – First Aid

A list of trained first aiders will be displayed on the Site office door. Sub-contractors are to notify names of first aiders to the Site Manager. First Aid kits stocked according to site risks will be maintained at the Site Office.

12 – Security/Public Danger

12.1 – Security and Trespass

The works will be kept secure at all times.

Entrance to the site will be controlled and all visitors will be directed to the Site Office where they must sign the visitor's book.

12.2 – Access Hours

Hours of work are to be agreed in advance with the client. Lone working will not be permitted

13 – Liaison

The Site Manager will carry out liaison with the following:

- Emergency Services (including Fire Services Advisory Officer where necessary)
- The Client and tenants
- Other Contractors/Site Managers where applicable.

14 – Monitoring

The Site Manager inspects the works on a daily basis and completes a daily diary that is kept in the site office. Inspection reports for scaffolding, including mobile towers, are completed before use, upon modification and at least every 7 days. The diary and inspection reports form the basis for tool box talks.

Formal inspections may be carried out by our safety consultants on a regular basis. The report they leave is to be actioned immediately. The reports identify individual risks. The Site Manager notes the action he has taken against each risk on the report and submits the report to the Project Manager on the same day.

The Managing Director will ensure that the action taken by the Site Manager is in line with the Safety Advisors recommendations and discuss any long term or global implications with the Health and Safety Manger.

A Health and Safety Review will be carried out by the Project Manager, Quantity Surveyor and Site Manager on a monthly basis that includes a Health and Safety Checklist. This review is documented and copied to the Managing Director who will ensure that outstanding actions are carried out. Long term or company wide implications are discussed with the Health and Safety Manger.

Inspections carried out in accordance with Regulation 33 of the CDM Regulations 2007, reports will be retained on site.

15 – Workforce/Management Communication

The entire workforce should be encouraged to communicate daily to any supervisory staff details of any hazards they have seen, or to make any suggestions that will make conditions safer.
Any such contribution must be recorded in the site diary and raised in the next safety meeting, or earlier if appropriate. The Site Manager operates an 'Open Door' policy.

16 – Health and Safety File

All contractors are reminded of their statutory duty to contribute, where appropriate, to the Health and Safety File. Information for the file will be held on behalf of the CDM Co-ordinator at the Principal Contractor's office pending collection and collation. Information should be given to the Site Manager for forwarding on.

Report 07-07-2015

112 Cranley Gardens, London. N10 3AH

Party Wall Conditions

rjg/cranley/pwcondtions/07-07-2015 - rev A

Monitoring and Predicted Category of Damage

In order to safeguard the existing structures during underpinning and new basement construction movement monitoring is to be undertaken. Surveying studs are to be attached to the adjacent structures at ground, first and second floor levels at front, side and rear. The surveying points on the adjacent structures are to be set up using a Total Station reference point prior to the commencement of works and to be read weekly and reported against the following control values.

Extract from The Institution of Structural Engineers "Subsidence of Low-Rise Buildings"

Classification of visible damage to walls with reference to ease of repair

Category of Damage	Approximate crack width (mm)	Description of typical damage Ease of repair in italic type
0	Up to 0.1*	Hairline cracks of less than about 0.1mm width are classed as negligible
1	Up to 1*	Fine cracks which can easily be treated during normal decoration. Perhaps isolated slight fracturing in building. Cracks rarely visible in external brickwork.
2	Up to 5*	Cracks easily filled. Re-decoration probably required. Recurrent cracks can be masked by suitable linings. Cracks not necessarily visible externally, some external repointing may be required to ensure weathertightness. Doors and windows may stick slightly.
3	5 to 15 (or a number of cracks up to 3)	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Weathertightness often impaired.
4	15 to 25* but also depends on number of cracks	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distorted, floors sloping noticeably (1). Walls leaning (1) or bulging noticeably some loss of bearing in beams. Service pipes disrupted.
5	Usually greater than 25* but depends on number of cracks	This requires a major repair job involving partial or complete re-building. Beams lose bearing, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.

The Limits on ground and adjacent structures movement during underpinning and throughout the construction works shall be :

Movement of survey points must not exceed:
Settlement: Action values : 5mm (stop work)
Trigger values: 65% of action values (submit proposals for ensuring action values are not exceeded)
Lateral displacement: Action values : 6mm (stop work)
Trigger values: 65% of action values (submit proposals for ensuring action values are not exceeded)
Movement approaching critical values:
Trigger: Submit proposals for ensuring action values are not exceeded
Action: Stop work
The reporting format will be in the form of a table as attached.

Predicted Category of Damage
The predicted category of damage is likely to be within BRE Category Slight, with possible localised crack widths 2mm to 5mm Classification Aesthetic.

Potential Impact on Existing and Surrounding Utilities and Infrastructure

All services, electrical mains, gas and water are to be maintained during construction. A survey will be undertaken before construction starts on site at which time the routes of the various services will be determined and mapped out. A temporary electrical power board and water water point will be established. Any necessary diversions will be agreed between the contractor and the design team and will be by prior agreement with the Utility Authority concerned.

Potential Impact on Drainage, Sewage, Surface and Ground Water.

All existing drainage and sewerage connections will be maintained throughout the construction process. By design and method of working, there will be no impact on these systems. Albeit the property is being extended, the household occupancy will remain the same and therefore there should be no significant increase on the existing drainage and sewerage systems. Surface water run off will be similar to as before and the borehole results indicate that the basement, being above the water table, there should not be any impact on the underground water flows and levels.

The existing internal drainage system will be diverted in the temporary condition whilst the excavation works continue. In its final condition the existing and new drainage will be taken below the basement slab level and run at a gradient of 1 : 40 for a 110mm diameter underground pipe to a chamber where a 'Bulldog' pump, back up pump and battery alarm system will be installed to raise the water to the existing drain height to run by gravity in to the existing mains system.

The property will also be lined with a 'Delta / Newton Membrane' proprietary waterproofing system and floor membrane to run to a separate chamber where a 'Titon' pump, back up pump and alarm system will be installed. This system will be installed by an approved contractor under an insurance backed guarantee.

A sustainable, environmentally friendly and responsible approach will be taken in the design of the surface water and cavity drainage systems for the development, which will also be in accordance with the SuDS and Water Framework Directive.

Temporary Weathering to Party Walls

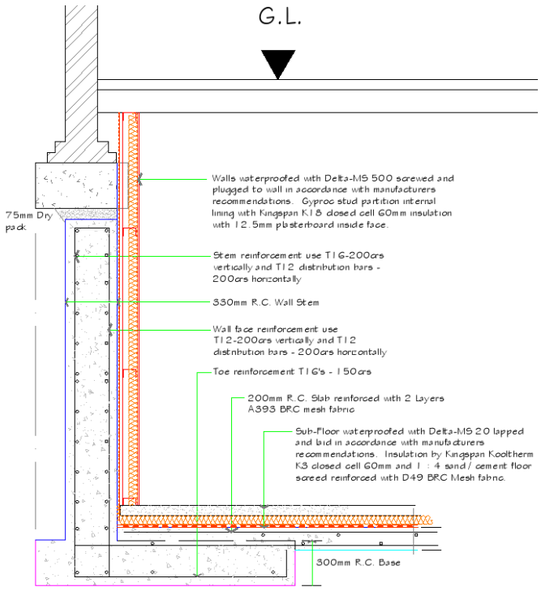
The exposed party walls shall be temporarily weathered by the use of Polythene or roofing felts secured by 50 x 25mm battens affixed to the party wall.

POTENTIAL IMPACT ON ADJOINING OWNER'S PROPERTIES

The proposed method of construction will not affect the neighbouring structure as support is maintained at all times. The segmental retaining wall cast under the existing party walls is designed as a free standing cantilever and as such does not rely upon any lateral restraint or propping in the temporary or permanent conditions.

The works are subject to a Party Wall Award to be agreed between the adjoining neighbours under The Party Wall etc Act 1996. A schedule of condition for the Party Wall and its adjacent walls, ceiling and floors will be recorded before the works commence. This will be used as an aid memoir to establish if any damage has been caused to either of the neighbouring properties, such this it can be established and corrected by the building contractor.

The proposed basement under the existing property will be formed by an underpinning method, constructed in section of 1.0m. wide.



Detailed Section
Party Basement Wall

The construction sequence is such that the retaining wall /underpinning segments will be separated by a minimum distance of 2000mm, or two fully completed retaining wall /underpinning segments.

The segmental retaining wall /underpinning segments will be excavated by hand using pneumatic equipment and spades and utilising any support-work necessary to prevent collapse of the excavation.

Reinforcement is to be fixed in accordance with the Structural Engineer's detail. Reinforcement is to be lapped with the adjoining segmental retaining wall /underpinning segment, by embedding the lap bar in the subsoil adjacent to the reveal. The front shutter to form the base/kicker detail will be erected into which C35 Class 2 concrete will be placed and allowed to part cure.

The front shutter forms the stem of the segmental retaining wall/underpinning segment and will be erected flush with the front face of the kicker and filled with C35 Class 2 concrete.

No segmental retaining wall /underpinning segments are to be left unconcreted overnight. Before any adjacent segment can be excavated, 48 hours must elapse after completion of the adjacent segment.

The Building Inspector will be informed when the segmental retaining wall operation is underway and will be expected to visit the site as frequently as deemed necessary.

This method of construction reduces the amount of potential ground movement and so minimises the effects of settlement of adjacent structures. The contractor will be required to follow this CMS and also to produce his own method statements and temporary support details for approval.

Furthermore the new basement will be set within the relatively permeable GRAVEL Formation and therefore it is considered unlikely that the new basement will create a significant 'cut off' obstruction to groundwater flow beneath the site.

The new basement is therefore expected to have a relatively limited effect on the hydrological flows and hydrogeology below this site and the adjacent properties.

In conclusion, the geology at the depth of the proposed basement will be capable of supporting the new imposed loads and should have relatively little effect on the neighbouring properties.

Dust and noise impacts to neighbours will be monitored throughout the building process ensuring that the property is hoarded at the front and any scaffolds are netted to prevent dust outside the site. All operations will be strictly in accordance with the Council's requirements of 8.00am to 6.00pm weekdays and 8.00am - 1.00pm on Saturdays. No Sundays or Bank holidays working will be allowed. All mechanical tools will be muffled and plant fitted with silencers and the use of hand tools are encouraged.

Control of Noise, Vibration and Dust

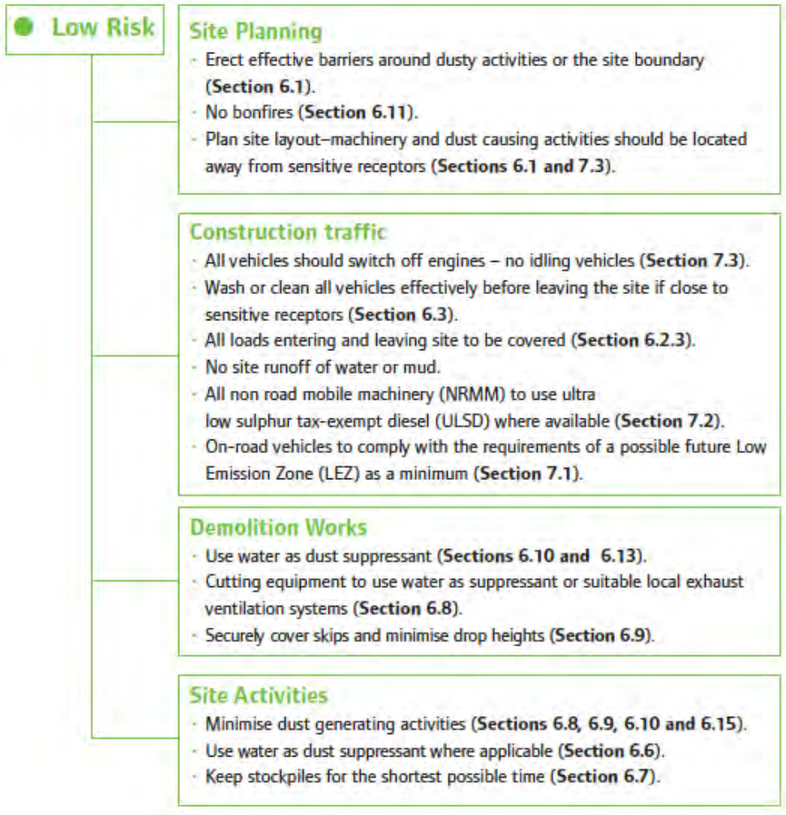
From the Mayor's Best Practice Guidance, this site is 'Low Risk'

Site Evaluation Guidelines

Low risk sites
- Development of up to 1,000 square metres of land and;
- Development of one property and up to a maximum of ten and;
- Potential for emissions and dust to have an infrequent impact on sensitive receptors

4.2 Mitigation Measures for Low Risk sites

These sites will be small developments on land with an area of up to 1,000 square metres with the potential for an infrequent impact on sensitive receptors. The following Best Practice Measures should be used:



Noise and vibration

1. Noise will be kept within the legal limits as defined in the Environmental Protection Act 1990.
2. Noisy operations will only take place during the following site working hours:
   - Monday to Friday - 8am to 6pm
   - Saturdays - 8am to 1pm
3. All work will be carried out in accordance with BS 5228-1:2009 and BS 5228-2:2009. All works will employ Best Practicable Means as defined by Section 72 of the Control of Pollution Act 1972 to minimise the effects of noise and vibration. All means of managing and reducing noise and vibration which can be practicably applied at reasonable cost will be implemented.
4. The following measures will be taken:
   a. Consultation / communication with neighbours / affected others prior to the start of the works.
   b. Use only of modern, quiet and well maintained equipment, all of which will comply with the EC Directives and UK regulations set out in BS 5228-1:2009.
   c. Use of electrically powered hand tools rather than air powered tools that require a compressor unless particularly hard concrete or other ground obstructions are encountered. If used air powered tools and a compressor will be used for to the minimum extent practicable.
   d. Operating the site as a closed site, that is:
      i. Leaving the building facade and roof in place during the work.
      ii. Having all windows and door closed during noisy operations within the building (the basement is being built only within the footprint of the existing building).
      iii. Installing insulation in the windows and other openings at ground floor to reduce noise escaping the site.
      iv. Closing openings in the building / hoarding with timber and lining insulation.
   e. Avoidance of unnecessary noise (such as engines idling between operations or excessive engine revving, no radios no shouting)
   f. Use of screws and drills rather than nails for fixing the hoarding.
   g. Careful handling of materials, so no dropping of materials from height into skip etc. Spoil will be deposited into the skip from approximately two metres height but this does not cause unreasonable noise.
   h. Ensuring that the conveyor is well maintained with rollers in good working order and well oiled.
   i. Isolating the neighbouring properties from vibration / breaking out work where practicable. In particular the edges of the existing concrete slab at ground floor will be broken out first (this isolating the remaining slab at ground floor) before the main part of the existing ground slab is removed.
   j. Collection / delivery times will be as given in the CTMP.
   k. Collection / delivery vehicles will not loiter / wait in the area before the allowed times.
5. Vibration will be kept well below the levels that may damage buildings, given in BS 7385-2:1993.

Dust

1. The site has been assessed using the Mayor of London's Best Practice Guidance on The control of dust and emissions from construction and demolition, November 2006, section 4.1 as a Low risk site as it is:
   - Under 1,000 square metres of land.
   - Development of between one and ten properties.
   - Has potential for emissions and dust to have an infrequent impact on sensitive receptors. This is based on the site being within the enclosure of the existing building.
2. In accordance with the guidance the following actions will be taken:
   a. Barriers will be erected / maintained around dusty activities and the site boundary.

b. The site will be planned so that dusty activities are kept within the protected site boundaries where practicable.

c. Delivery / collection vehicles will switch off engines where possible.

d. The onsite mini-digger will be thoroughly cleaned before being moved from site.

e. All materials will be supplied covered including all cement and ballast that will be supplied in closed bags and covered in shrink wrapped plastic sheeting. No materials will be supplied in loose form.

f. No site run off of water or mud until the water has been left to settle and is free from particles (as explained in the CTMP).

g. During demolition:

    i. Special care to ensure that the site is closed.

    ii. Water to be used as a dust suppressant if appropriate / needed.

    iii. Cutting equipment to use water as a suppressant or to have a local extraction ventilation system.

h. The skip will be fully covered during normal operations.

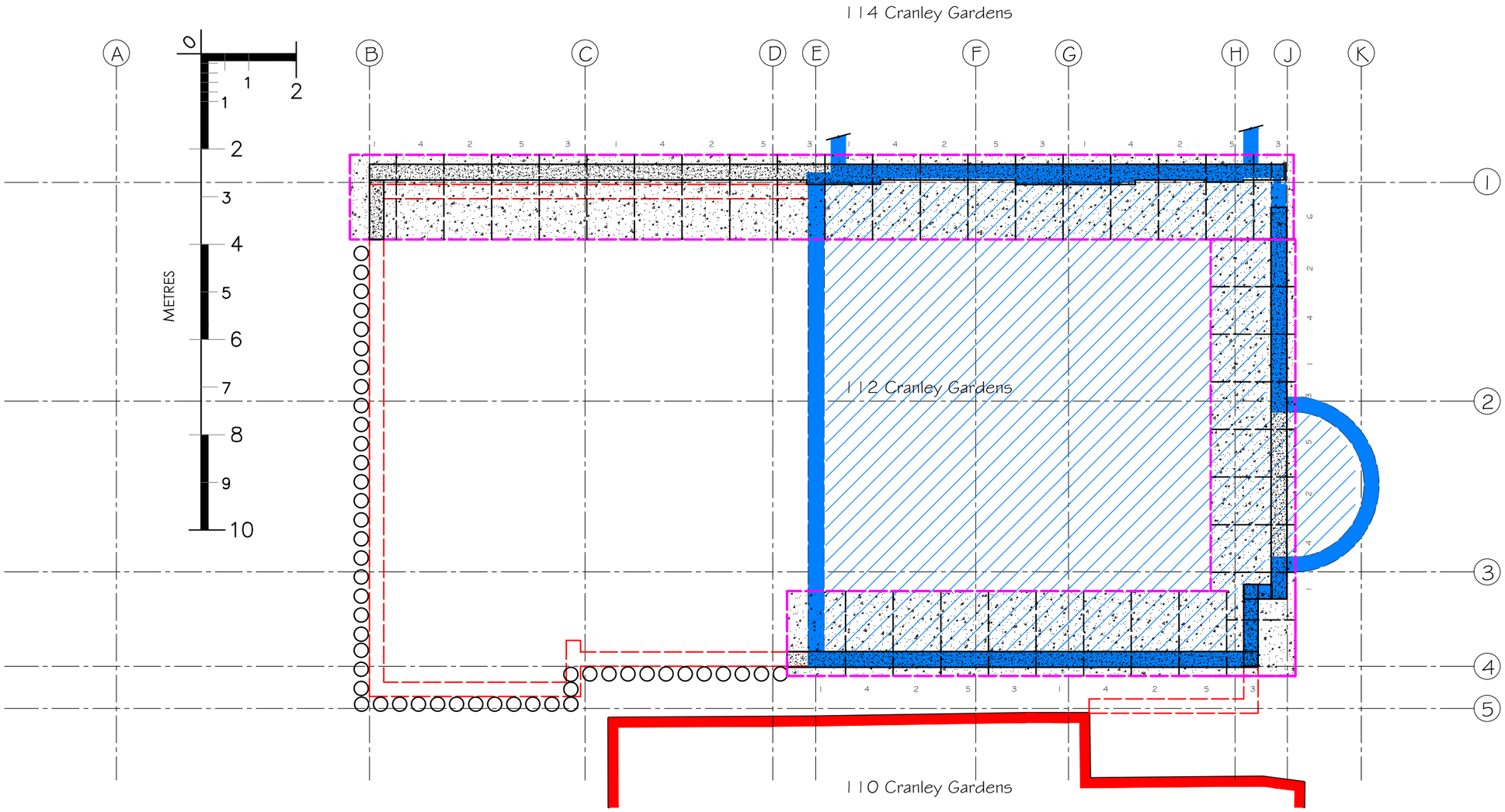
i. The skip will be damped down before the grab removes the spoil if appropriate / needed.

If measures to control dust are unsuccessful work will stop and alternative methods will be devised.

Control of Dust - Impact on Adjoining Owners

Before any work is carried out on the Party Wall, the fire places to the chimney breasts on each level shall be effectively sealed to prevent pargetting and dust entering the rooms. This shall be carried out using polythene and 12mm plywood with all edges taped to the satisfaction of the Party Wall Surveyors.

R J Groves Associates Ltd
For RVS Construction
7th July 2015
(am'd 20th July 2015)



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Temporary Works Design

112 Cranley Gardens, London. N10 3AH

Stage 1 - Demolition of Rear and Side Extension to House

R.C. Concrete Underpinning to Party Wall & Party Flank Wall in sequence shown.

Backfill to Retaining Walls in temporary condition

Contiguous Piling to remaining perimeters

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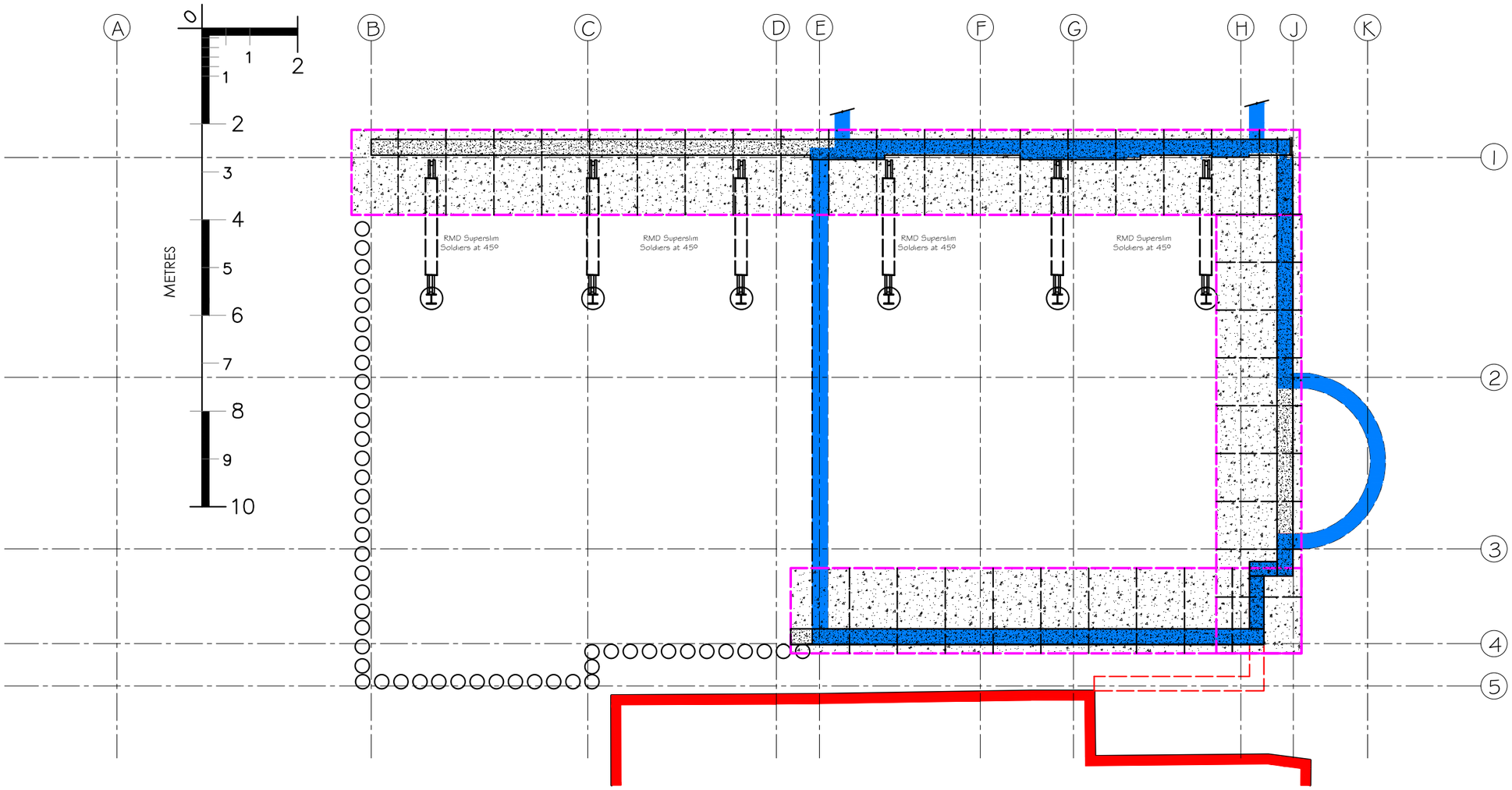

Stage 2 - Auger 450mm pile shaft, insert 203 UC Column and concrete with Grade 35 DS1

Prop Foundation top using RMD Super slim soldiers

Place 203 UC 46 wailer against party wall at 450mm above 1st floor and 450mm above 2nd floor and use RMD Super slim soldiers as raking shores.

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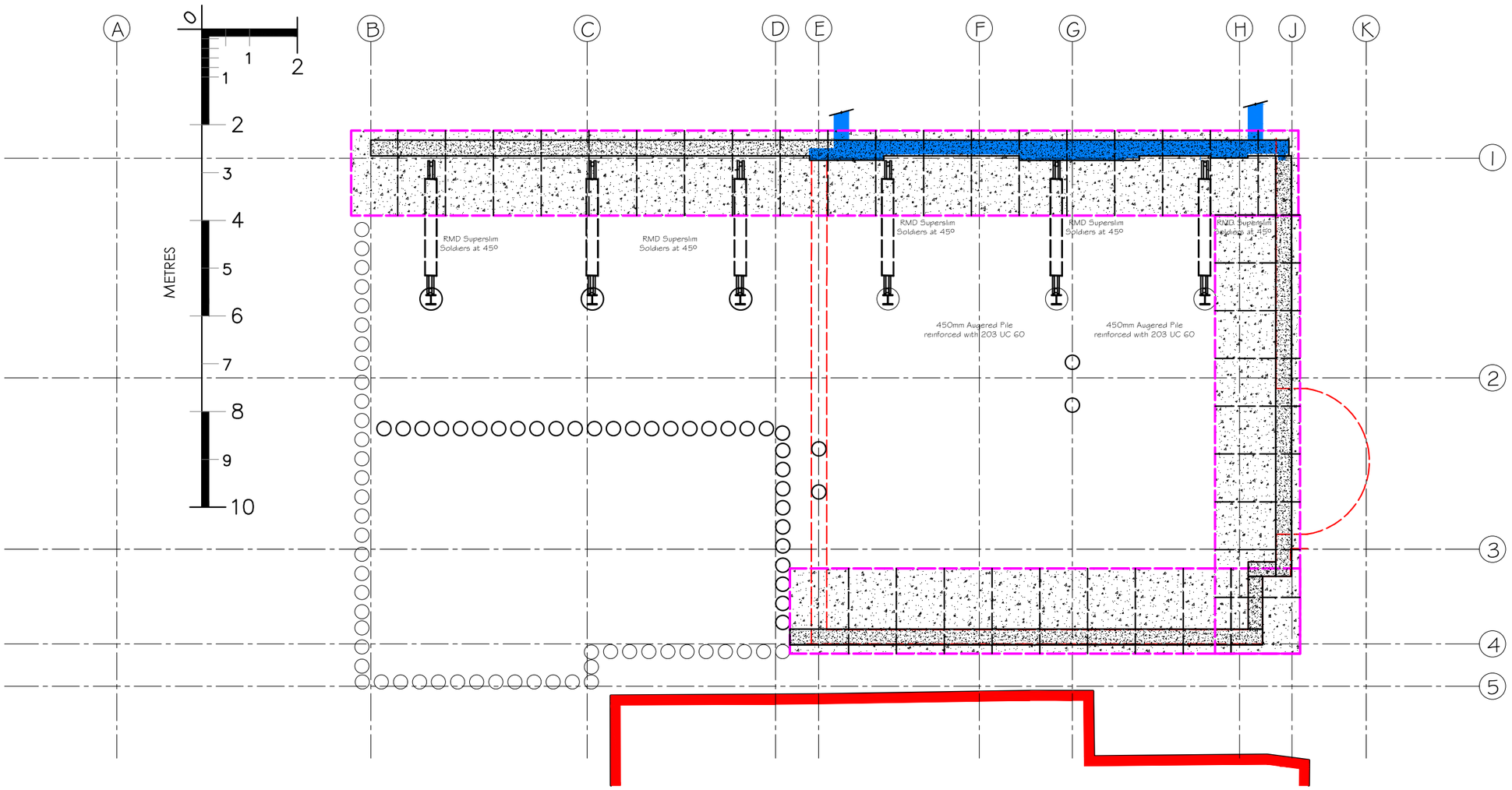

Stage 3 - Demolish remainder of the House

Carry out remainder of temporary bored temporary piling

Carry out Level 2 piling from ground level (to be cut down later)

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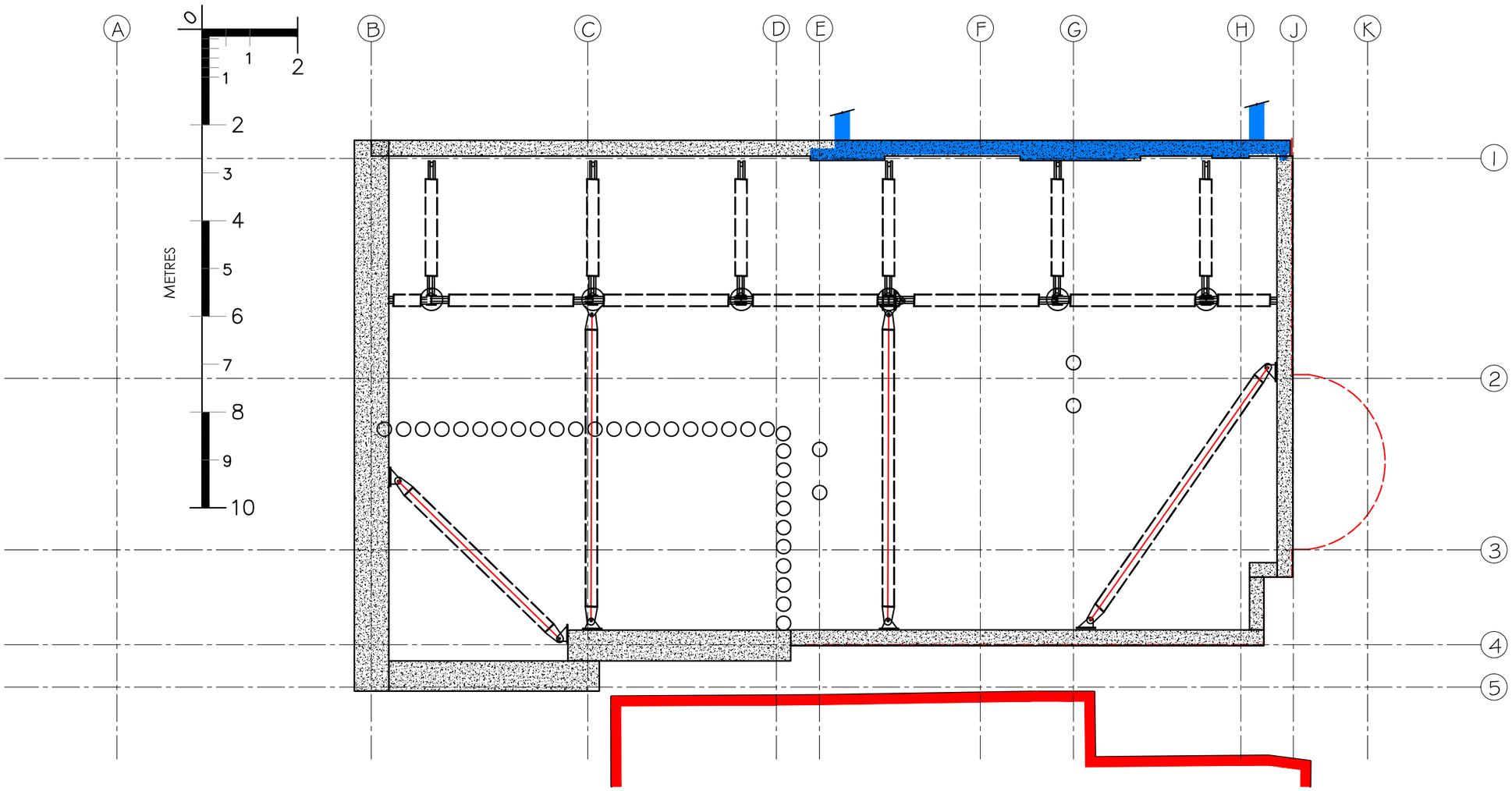

Stage 4 - Form Pile capping Beam to the top of the Contig Piles Wall

Provide shoring to Contig Pile walls

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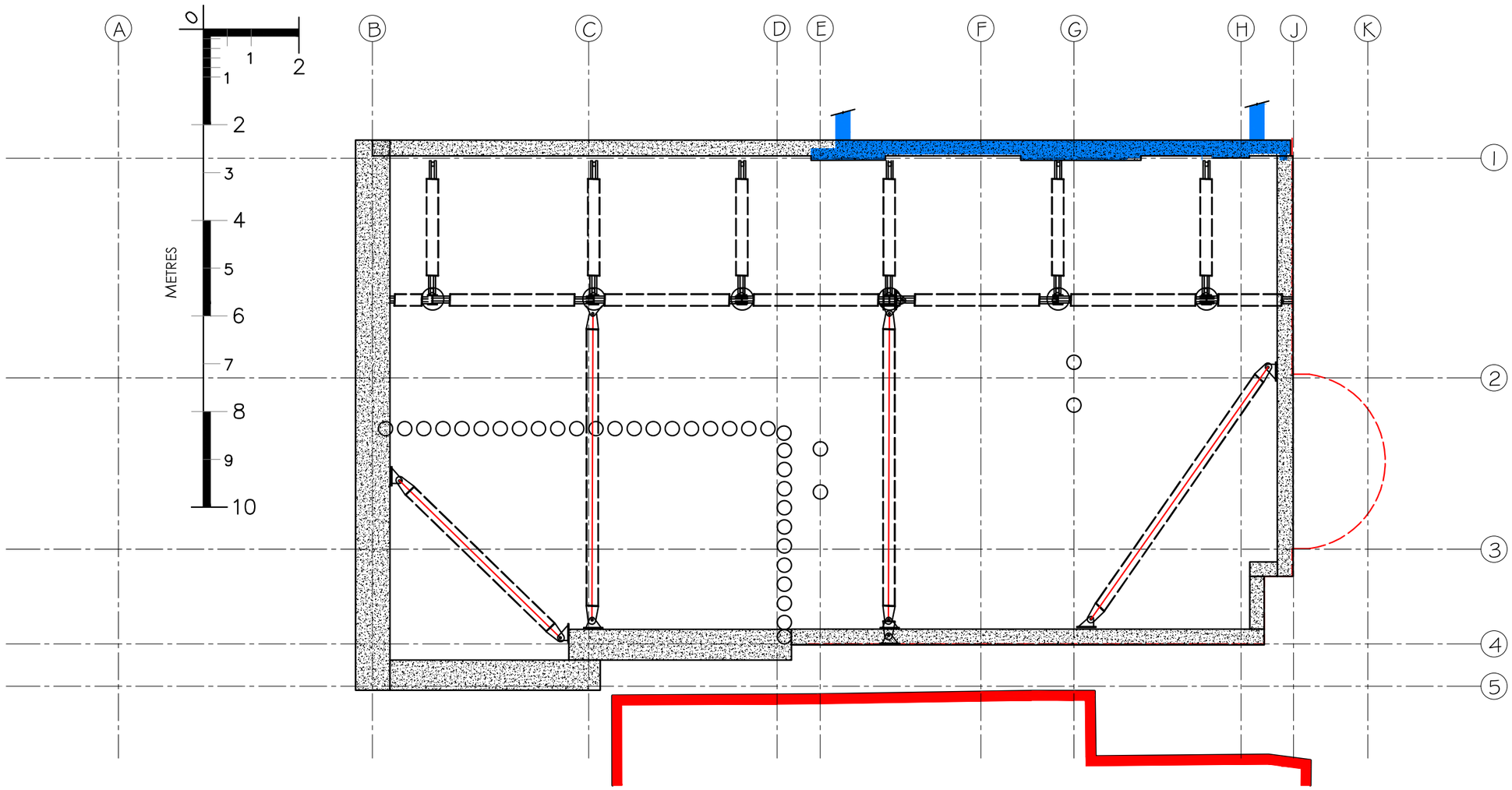

Stage 5 - Excavate down to Basement Level 1

Cut down Contig Piles to perimeter of Level 2

Cut down satelite piles

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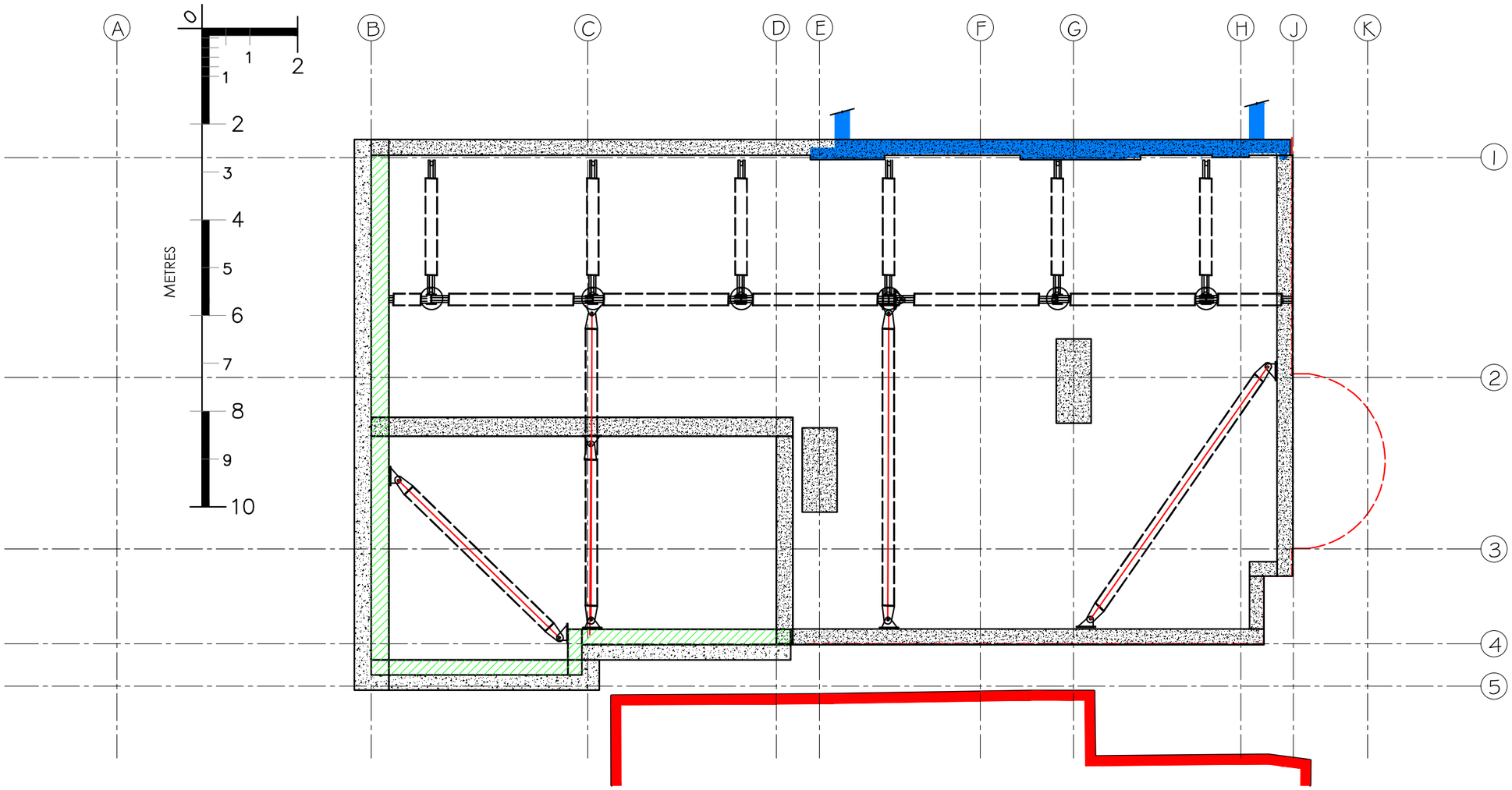

Stage 6 - Form Capping beams and pile caps to Pile Heads

Form R.C. Retaining Walls in front of Contig Piles to level 1

and provide additional shoring to cente of new capping beam

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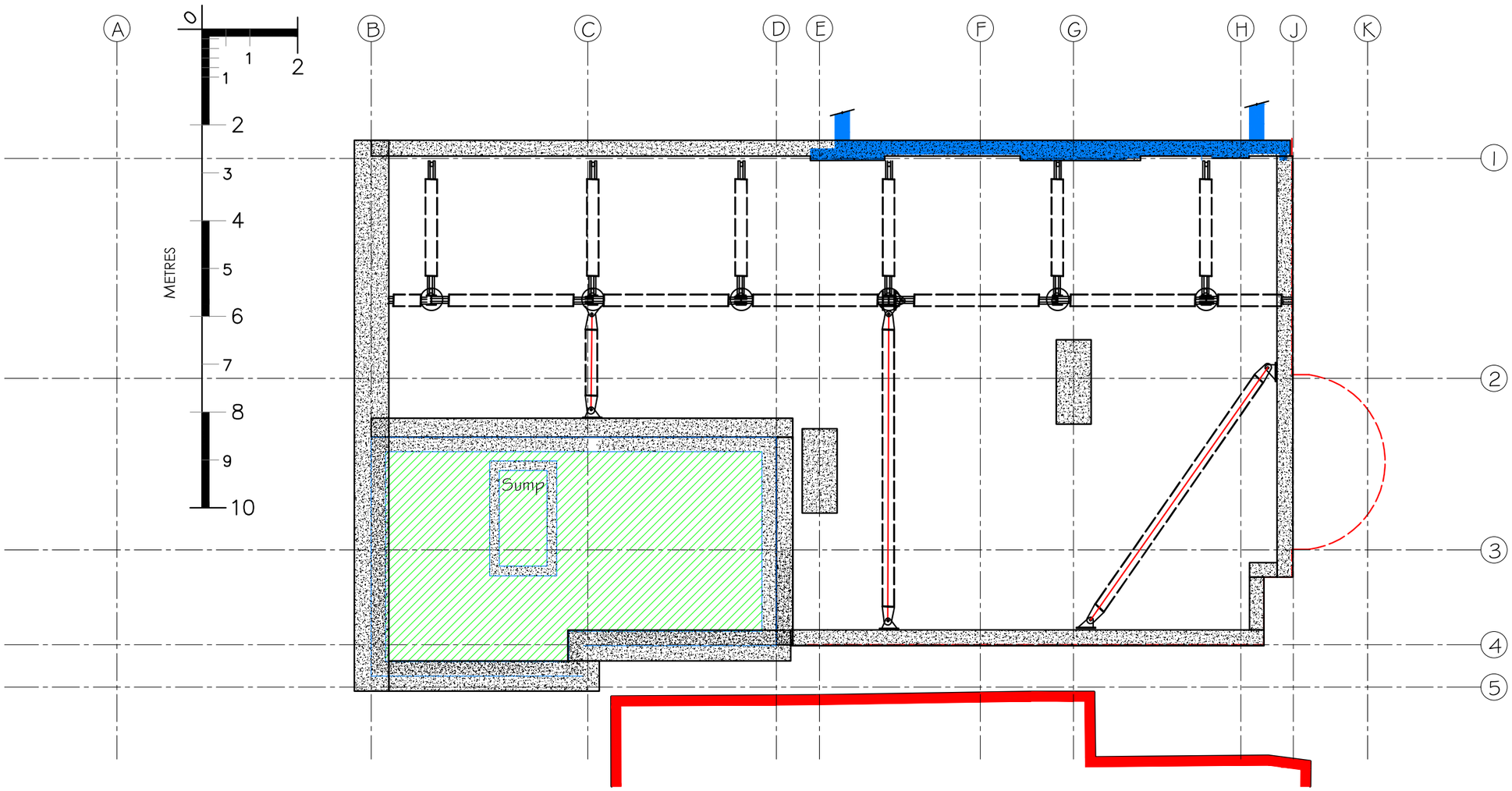

Stage 7 - Excavate to Level 2

Form Base Slab and Sump Chamber

Form R.C. Retaining Walls to Level 2

When concrete cured for 7 days, remove props to level 2

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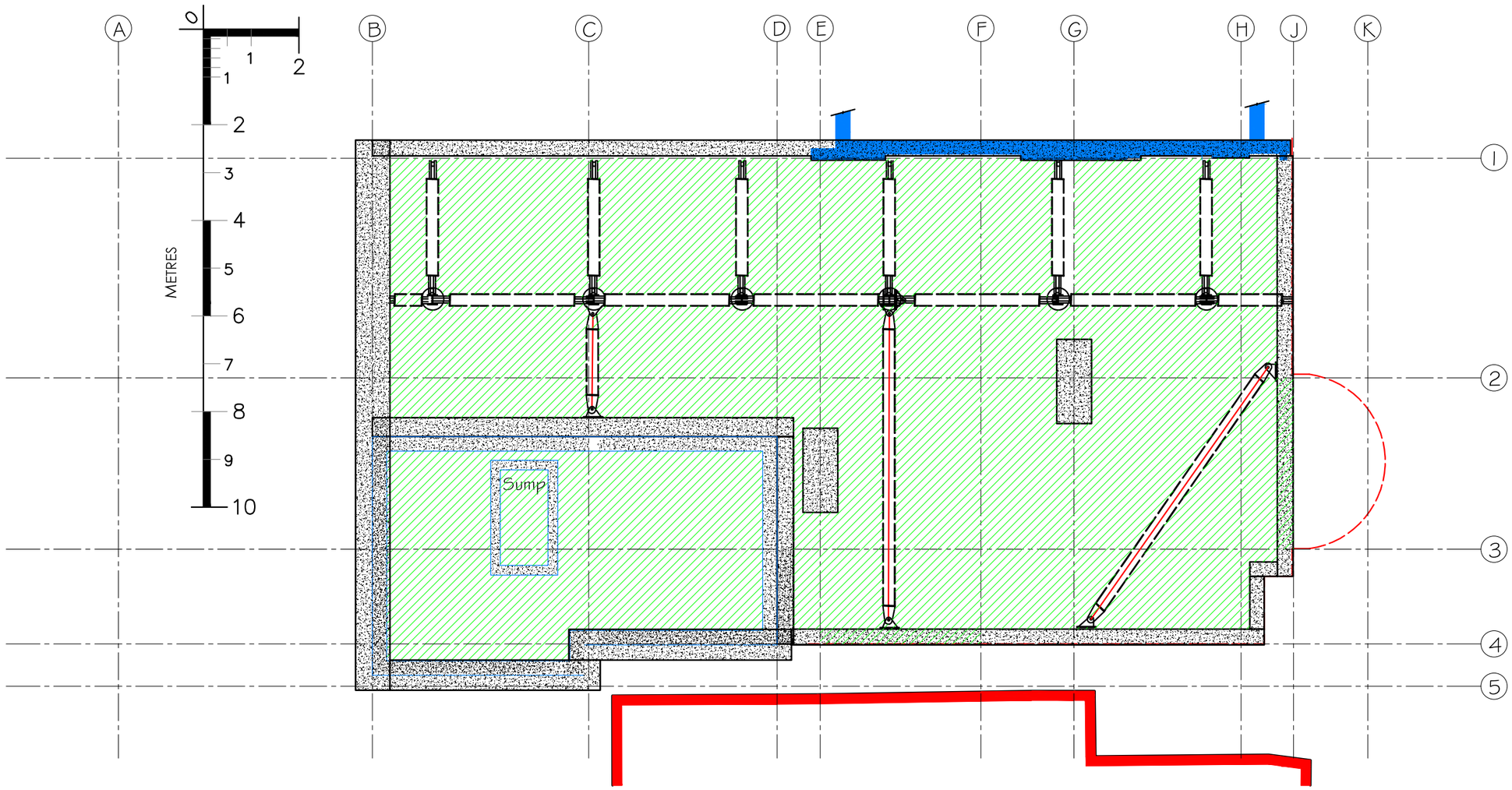

Stage 8 - Form Base Slab for Level 1

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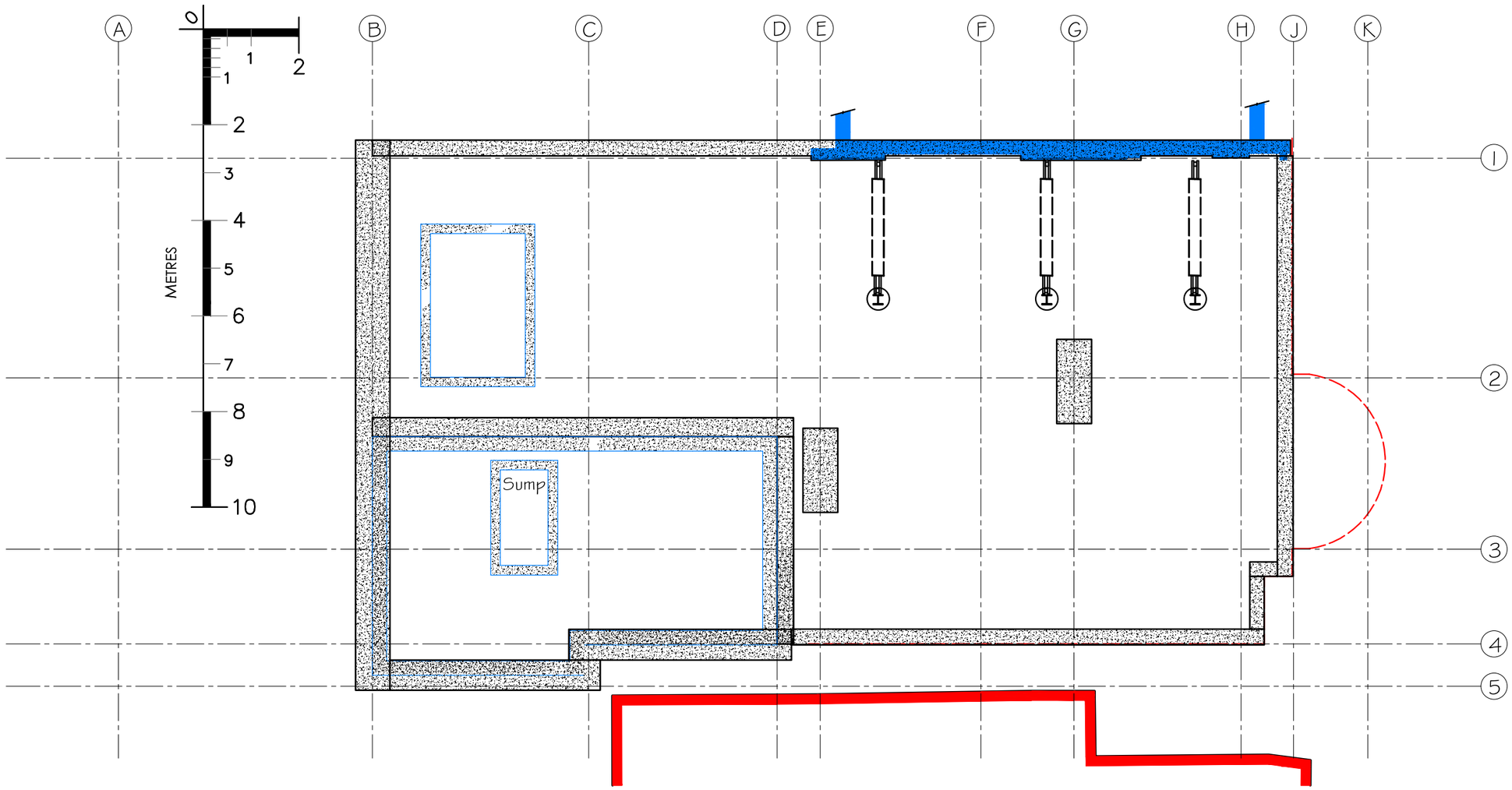

Stage 9 - After 7 days curing, Remove Props from Retaining Walls

Retain Props for Party Wall until new Super-structure is built

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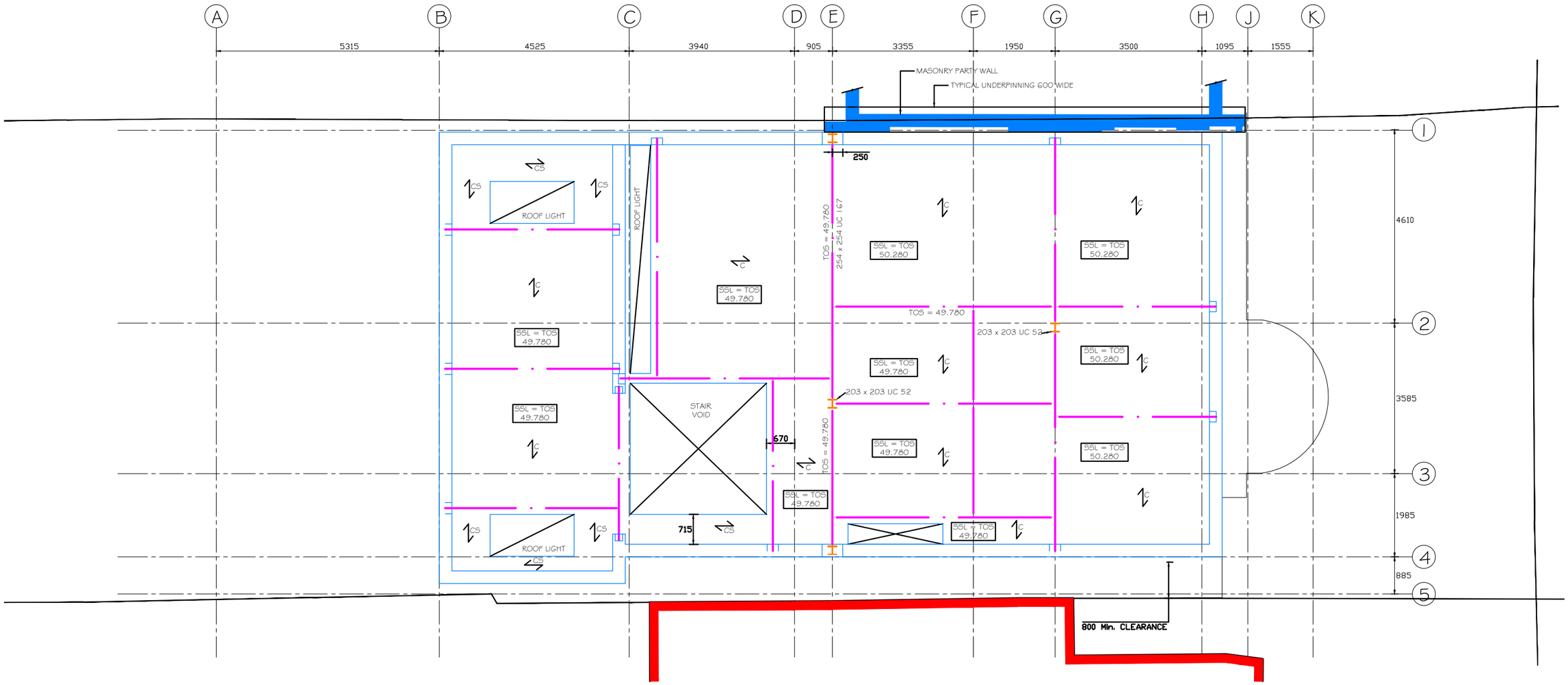

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Temporary Works Design

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Stage 10 - Build structural steelwork supporting and restraining 1st floor and 2nd floors and roof level.

Carefully dismantle propping to Party Wall

Cut down Reinforced Temporary Piles and make good basement floor as prescribed

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6. The demolitions, due to the sensitive nature, will be executed largely using hand tools.

The excavation will be done by an 8 tonne excavator and removal of spoil will be with 8-wheeled tipper lorries using grabbers.

Concrete will be delivered by Readymix lorry.

The Superstructure element will be done by normal vehicle deliveries which will be commensurate with the surroundings.

2.0 Permission
2.1 Condition 4

Planning permission reference - HGY/2014/1847)

Condition 4:
- Vehicle and machinery specifications.

The following is a statement from the contractor about the machinery and methodology of forming the basement in relation to the types and specificiations.

Document Control

Project title	112 Cranley Gardens, Muswell Hill, London N10 3AH	**Project ref**	J13269
Report prepared by	Sophie Koprowski BSc MSc FGS		
With input from	Martin Cooper BSc CEng MICE		
Report checked and approved for issue by	Steve Branch BSc MSc CGeol FGS FRGS MIEnvSc		

Issue No	Status	Date	Approved for Issue
1	Draft	15 November 2013	
2	Final	5 December 2013	

This report has been issued by the GEA office indicated below. Any enquiries regarding the report should be directed to the office indicated or to Steve Branch in our Herts office.

☐	Hertfordshire	tel 01727 824666	mail@gea-ltd.co.uk
☐	Nottinghamshire	tel 01509 674888	midlands@gea-ltd.co.uk

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2.0 Permission
2.2 Condition 5

Planning permission reference - HGY/2014/1847)

Condition 5:
Prior to the commencement of the development hereby permitted an assessment of the hydrological and hydro-geological impacts of the development and any necessary mitigation measures found to be necessary shall be submitted to and approved in writing by the Local Planning Authority. Thereafter the development shall be carried out in accordance with the details approved.

We attach a report undertaken by GEA in order to discharge this condition. We consider this report sufficient to discharge this condition and will adhere to its findings during the construction of the building.

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112 Cranley Gardens, Muswell Hill, London N10 3AH
Evie Demosthenous
Desk Study and Ground Investigation Report

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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA), on the instructions of Calder Latif Associates LLP, on behalf of Evie Demosthenous, with respect to the construction of a 6 m deep basement below the existing house. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions and hydrogeology, to assess the extent of any contamination and to provide information to assist with the design of the basement support and new foundations. The report also includes information required to comply with the Haringey Council Draft Basement Development Guidance Note relating to basements.

DESK STUDY FINDINGS

The earliest map studied, dated 1864, indicates the site to be undeveloped within a tree bordered field around 200 m south of the residential area of Muswell Hill. The site was developed through the construction of the existing house at some time between 1896 and 1913, and the surrounding area has remained a predominantly residential area from 1896 to the present day.

GROUND CONDITIONS

The investigation generally encountered the expected ground conditions in that, below a limited thickness of made ground, London Clay was encountered and was proved to the full depth investigated. The made ground was encountered to depths of between 0.30 m and 1.10 m within the boreholes, but the base was not reached in the trial pits. Within the boreholes the made ground comprised brown silty sand with some flint below the garden, and brown sandy clay with brick fragments below the driveway area. In the trial pits the made ground initially typically consisted of brown gravelly sand with fragments of brick, glass, ash, clinker, concrete and wood to a maximum depth of 1.15 m, over orange brown slightly sandy clay which was encountered to the maximum depth of the trial pits of 2.30 m. The London Clay initially comprised firm brown fissured silty slightly sandy clay to a maximum depth of 11.30 m, whereupon stiff dark grey fissured silty slightly sandy clay was proved to the maximum depth investigated of 15.00 m. Monitoring of the standpipes has measured groundwater at depths of between 1.82 m and 5.69 m.

Trial pits have indicated that the existing buildings are supported by spread foundations bearing on made ground at depths of between 1.07 m and 1.30 m.

Contamination testing has revealed elevated concentrations of lead and arsenic in some samples of the made ground.

RECOMMENDATIONS

The investigation has indicated that formation level of the proposed 6 m deep basement will be within the London Clay. Shallow groundwater has been encountered and some form of groundwater control will be necessary for the construction of the basement. It is understood that a basement raft foundation is the preferred foundation solution, although piled foundations would be a suitable alternative.

The made ground is likely to be removed by the basement excavation and there will therefore be no risk to end users from the measured elevated contaminant concentrations, unless the excavated material is to be re-used in a reinstated garden above the basement. It is assumed that imported soil will be used to reinstate the garden above the basement and any imported soil should be certified as clean with appropriate documentation. On this basis end-users are unlikely to come into contact with the contaminated soils and thus no remedial measures are deemed necessary.

112 Cranley Gardens, Muswell Hill, London N10 3AH
Evie Demosthenous
Desk Study and Ground Investigation Report

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates Limited (GEA) has been commissioned by Calder Latif Associates, on behalf of Evie Demosthenous, to carry out a desk study and ground investigation at 112 Cranley Gardens, Muswell Hill, London N10 3AH. This report also forms part of a Basement Impact Assessment (BIA), which has been carried out in support of a planning application.

1.1 Proposed Development

Consideration is being given to the construction of a single level basement beneath the rear garden, which is planned to have a swimming pool and it is assumed that the basement formation will be around 6 m below existing ground level.

This report is specific to the proposed development and the advice herein should be reviewed if the proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- to check the history of the site and surrounding areas with respect to previous contaminative uses;
- to determine the ground conditions and their engineering properties;
- to investigate the configuration of existing foundations;
- to assess the possible impact of the proposed development on the local hydrogeology;
- to provide information for the design of suitable foundations;
- to provide advice with respect to the design of retaining walls;
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

- a review of readily available geological and hydrogeological maps;
- a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database; and
- a walkover survey of the site carried out in conjunction with the fieldwork.

In light of the desk study, an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- two cable percussion boreholes, advanced to a depth of 15.00 m, by means of a standard cable percussion drilling rig;
- standard penetration tests (SPTs), carried out at regular intervals in the boreholes, to provide quantitative data on the strength of the soils;
- the installation of two groundwater monitoring standpipes to a depth of 8.00 m and three subsequent monitoring visits;
- five trial pits excavated by hand to depths of between 1.10 m and 2.30 m to investigate the existing foundations;
- laboratory testing of selected soil samples for geotechnical purposes and for the presence of contamination; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11[1] and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. The risk assessment is thus divided into three stages comprising Preliminary Risk Assessment, Generic Quantitative Risk Assessment, and Site-Specific Risk Assessment.

1.3.1 Basement Impact Assessment (BIA)

The site lies within the London Borough of Haringey and a Draft Basement Development Guidance Note has been produced to assist any future basement developments within the borough. The Haringey guidance has been referred to, along with the London Borough of Camden (LBC) Planning Guidance CPG4[2] and their Guidance for Subterranean Development[3]

[1] *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004
[2] London Borough of Camden Planning Guidance CPG4 *Basements and lightwells*

prepared by Arup, in the preparation of a Hydrological and Hydrogeological Assessment and Land Stability Assessment (also referred to as Slope Stability Assessment) which is included herein. The aim of this work is to provide information on the groundwater conditions specific to this site and land stability, in particular to assess whether the development will affect the stability of neighbouring properties or the local groundwater regime and whether any identified impacts can be appropriately mitigated.

The BIA elements of the work have been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng) and member of the Institution of Civil Engineers (MICE), who has over 20 years specialist experience in ground engineering. The assessment has been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with 25 years' experience in geotechnical engineering, engineering geology and hydrogeology. Both assessors meet the Geotechnical Adviser criteria of the Site Investigation Steering Group and satisfy the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

2.1 Site Description

The site is located about 1.8 km west of Hornsey Railway station and 1 km northeast of Highgate London Underground station, in a residential area of Muswell Hill.

The site is bounded to the east and west by houses and associated gardens, to the north by the houses on Etheledene Avenue and to the south by Cranley Gardens. The neighbouring properties to the west and east are both two storeys, and it is not known whether or not the properties have basements.

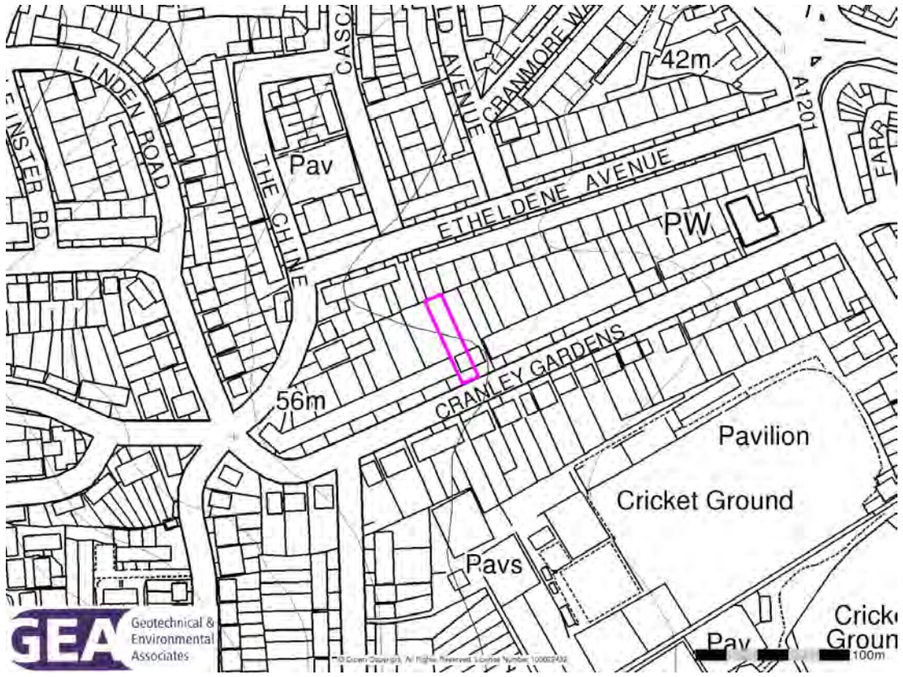
The site is rectangular in shape, measuring approximately 60 m north-south by 10 m east-west, and is occupied by 112 Cranley Gardens, a two-storey semi-detached house that is located in the southern side of the site, fronting Cranley Gardens. The garden area at the rear of the property is bordered to the east and west by the rear gardens of properties that also front

[3] Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010

onto Cranley Gardens. The site may additionally be located by National Grid Reference 529150, 189090 and is shown on the map overleaf.

The front of the site is paved and used for car parking, and there is a grassed garden area to the north of the site. There are a number of trees within the garden area which are around 20 m in height.

The local topography is relatively level at around 50 m OD, although there is a slight slope down to the north within the garden area. There is a relatively steep gradient in the wider area down towards the southeast.



2.2 Site History

The history of the site and surrounding area has been researched by reference to historical Ordnance Survey (OS) maps sourced from the Envirocheck database.

The earliest map studied, dated 1864, shows the site to be undeveloped within a tree bordered field around 200 m south of the residential area of Muswell Hill. There was a small river channel at this time along the northern edge of the site which flowed eastwards to a lake around 200 m from the site. By 1896 the tree lined road of Cranley Gardens had been constructed.

At some time between 1896 and 1913 residential structures along the northern side of Cranley Gardens were constructed, and the neighbouring Etheledene Avenue with associated houses was built. By the next available mapping, 1935, the surrounding area was developed with terraced houses, and other municipal facilities such as tennis court. By 1953 the area around 100 m to the southeast was developed as a sporting grounds, and labelled as cricket grounds, bowling green and tennis courts.

The site and surrounding area have remained essentially unchanged from this time to the present day.

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

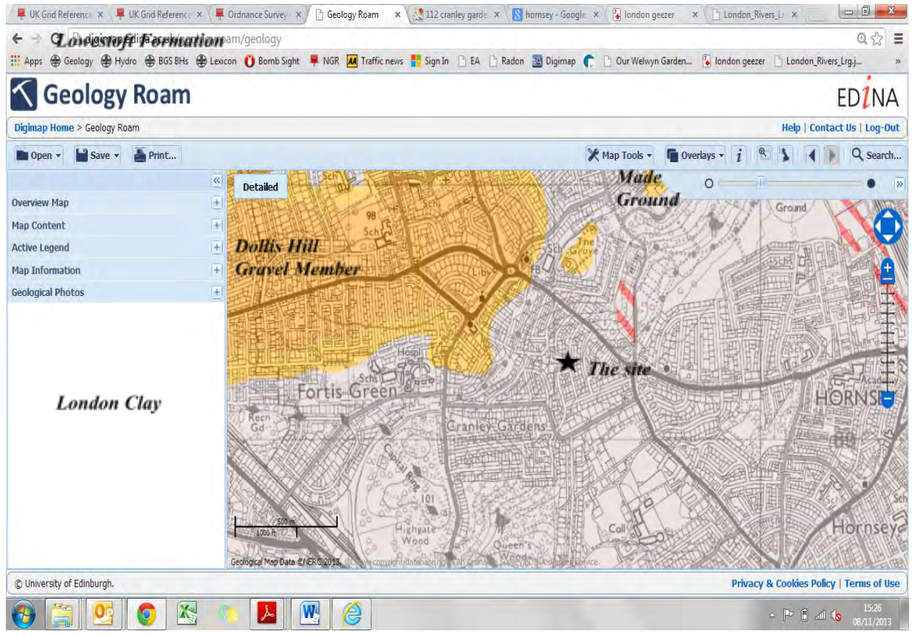
The desk study research has indicated that there are no registered landfills, historic landfills, registered waste transfer sites or waste management facilities within 1 km of the site.

There have been no pollution incidents recorded within 250 m of the site.

The search has indicated that the site is located in an area where less than 1% of homes are affected by radon emissions; which is the lowest classification given by the Health Protection Agency (HPA) and therefore no radon protective measures will be necessary.

The site is not located within a nitrate vulnerable zone or any other sensitive land use.

2.4 Geology



The British Geological Survey (BGS) map of the area (Sheet 256) indicates the site to be underlain by London Clay.

2.5 Hydrology and Hydrogeology

The London Clay is classified as an Unproductive Stratum, as defined by the Environment Agency as rock or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Any groundwater flow within the London Clay will be at a very slow rate, due to its negligible permeability; the permeability will be predominantly secondary, through fissures in the clay. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10^{-11} m/s and 1 x 10^{-9} m/s, with a lower vertical permeability.

There are no Environment Agency designated Groundwater Source Protection Zones (SPZs) on the site and there are no list water abstraction points within 500 km of the site.
The nearest listed surface water feature is a pond located 439 m to the southwest of the site within Queens Wood.

The direction of groundwater flow within the London Clay beneath the site is likely to be controlled by the local topography and therefore generally in a westerly direction.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency.

2.6 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.6.1 Source

The desk study does not indicate any potentially contaminative history of the site, having been occupied by a residential building for the entirety of its developed history.

There are no historical or existing landfill sites within 1 km of the site and therefore there is not a risk to the site from landfill gas.

2.6.2 Receptor

The site will continue to have a residential end use following the development and no new receptors will result. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into direct contact with any contaminants present in the soil and through inhalation of vapours during basement excavation and construction. Being underlain by unproductive strata groundwater is not considered to be a receptor.

2.6.3 Pathway

Within the site, end users will be isolated from direct contact with any contaminants present within the near surface soils by the presence of the building and the extent of the hardstanding, thus limiting potential contaminant exposure pathways. The construction will not create any new pathways for existing contaminants in the ground to reach end users.

The presence of negligibly permeable London Clay beneath the site will limit the potential for groundwater percolation into the underlying chalk, and thus a pathway is not considered likely to exist to the principal aquifer. There will be limited potential for contaminants to move on or off the site, except horizontally within any made ground, in association with perched groundwater movements; this pathway is also already in existence. A pathway for ground workers to come into contact with any contamination will exist during demolition and construction work and services will come into contact with any contamination within the soils in which they are laid. There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.6.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a VERY LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. Furthermore as there is no evidence of filled ground within the vicinity of the site and no landfill sites, there is not considered to be a significant potential for hazardous soil gas to be present on or migrating towards the site: there should thus be no need to consider landfill gas exclusion systems.

3.0 SCREENING

The Council's guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full BIA is required.

3.1 Screening Assessment

The proposed basement should at most fall under a category Type 2 development as detailed in Haringey Council Draft Basement Development Guidance Note, and as such no specific information on the development is required at the validation stage.

The Draft Basement Development Guidance Note outlines that the following issues as a minimum should be considered in the BIA:

- Groundwater flow
- Surface flow and flooding
- Land stability
- Cumulative development
- Construction management

The guidance note does not give details on how these issues should be addressed so the screening tools outlined in the London Borough of Camden, Guidance for Subterranean Development by Arup[4] have been used. This includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow. These questions have been adapted to the purpose of this report and responses to the questions are tabulated below.

3.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for 112 Cranley Gardens
1a. Is the site located directly above an aquifer?	No
1b. Will the proposed basement extend beneath the water table surface?	No - groundwater is unlikely to be encountered in the London Clay.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential springline?	No

4 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development. For London Borough of Camden* November 2010

3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	Yes
4. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No
5. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	No

The above assessment has identified the following potential issues that need to be assessed:

Q3 The proposed extension at ground level will replace the existing extension at the rear and will be a slightly larger footprint resulting in a greater proportion of hard cover than at present.

3.1.2 Land Stability Screening Assessment

Question	Response for 112 Cranley Gardens
1. Does the existing site include slopes, natural or manmade, greater than 7°?	No
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No
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. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	No
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	No
8. Is the site within 100 m of a watercourse or potential spring line?	No
9. Is the site within an area of previously worked ground?	No
10. Is the site within an aquifer?	No
11. Is the site within 5 m of a highway or pedestrian right of way?	Yes - the site fronts onto a public road
12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes - The depth of foundations of the neighbouring properties is unknown but the proposed development is likely to increase the differential depth.
13. Is the site over (or within the exclusion zone of) any tunnels, eg railway lines?	No

The above assessment has identified the following potential issues that need to be assessed:

Q5 London Clay is the shallowest strata at the site.
Q11 The site is within 5 m of a public highway.
Q12 The development will probably increase the differential depth of foundations relative to neighbouring properties.

3.1.3 Surface Flow and Flooding Screening Assessment

This element of the BIA is provided for guidance only and should be confirmed by a suitably qualified hydrologist experienced in carrying out surface water assessments.

Question	Response for 112 Cranley Gardens
1. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No
2. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	Yes
3. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No
4. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	No
5. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	No

The above assessment has identified the following potential issues that need to be assessed:

Q2 The proposed extension at ground level will replace the existing extension at the rear and will be a slightly larger footprint resulting in a greater proportion of hard cover than at present.

3.1.4 Cumulative Development

The proposed basement will not be part of a cumulative development.

3.1.5 Construction Management

The proposed development will include retaining walls that will be designed to maintain the stability of the surrounding ground. The construction of the basement and extension will be managed through the careful selection of contractors who will carry out the work in accordance with the approved design. There is nothing unusual or exceptional in the proposed development that gives rise to any concerns with regard to stability over and above any development of this nature.

4.0 SCOPING AND SITE INVESTIGATION

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified potential impact factors. An investigation has not been carried out to date.

4.1 Potential Impacts

The following potential impacts have been identified:

- The construction of an extension at ground level will result in a greater proportion of hard cover than at present.
- The site is underlain by London Clay and is at risk of shrink / swell potential.
- The location of the public highway.
- Founding depths relative to neighbours.

These potential impacts have been further assessed through the ground investigation, as detailed below.

4.2 Exploratory Work

In order to meet the objectives described in Section 1.2 and to assess the potential impacts identified in the screening exercise of the BIA, two cable percussion boreholes were advanced to a depth of 15.0 m. Standard Penetration Tests (SPTs) were carried out at regular intervals in the cable percussion boreholes to provide quantitative data on the strength of soils encountered and disturbed and undisturbed samples were recovered for subsequent laboratory examination and testing.

A groundwater monitoring standpipe was installed in each borehole to a depth of 8.0 m, and the pipes have been monitored on two occasions to date, over a period of roughly two weeks.

In addition to the boreholes, five trial pits were manually excavated to investigate the foundations of the existing building.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA.

A selection of the disturbed and undisturbed samples recovered from the boreholes and trial pits was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

The borehole and trial pit records and results of the laboratory analyses are appended together with a site plan indicating the exploratory positions.

4.3 Sampling Strategy

The trial pit locations were specified by the consulting engineers, to investigate the existing foundations and walls within the structure. Positions were confirmed on site between GEA and the consulting engineers.

Laboratory geotechnical classification and strength tests were undertaken on samples of the natural soil.

Four samples of the made ground were subjected to analysis for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and total monohydric phenols. The soil samples were selected to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure or groundwater pathway and to provide advice in respect of re-use or for waste disposal classification.

The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

5.0 GROUND CONDITIONS

The investigation encountered the expected ground conditions in that, below a limited thickness of made ground, the London Clay Formation was encountered and was proved to the full depth investigated.

5.1 Made Ground

The made ground was encountered to depths of 0.30 m and 1.10 m in Boreholes No 1 and 2 respectively, and the base of the made ground was not reached within the trial pits, excavated to a maximum depth of 2.30 m within the house. Within the boreholes the made ground comprised brown silty sand with some flint gravel in the garden, and comprised brown sandy clay with brick fragments in the drive area. In the trial pits the made ground initially typically consisted of brown gravelly sand with fragments of brick, glass, ash, clinker, concrete and wood to a maximum depth of 1.15 m, over orange brown slightly sandy clay which was encountered to the maximum depth of the trial pits, 2.30 m.

No visual or olfactory evidence of contamination was noted in the made ground. Four samples of the made ground have been sent for contamination testing as a precautionary measure and the results are presented in Section 4.5.

5.2 London Clay

This stratum initially comprised firm brown fissured silty slightly sandy clay to a maximum

depth of 11.30 m, whereupon stiff dark grey fissured silty slightly sandy clay was proved to the full depth investigated of 15 m..

The results from the laboratory undrained triaxial compression tests indicate the clay to be initially of medium strength, with undrained shear strengths ranging from 55 kN/m² and 73 kN/m² , becoming high strength below about 6 m, with undrained shear strengths generally ranging from 110 kN/m² and 200 kN/m².

Laboratory plasticity index test results indicate the clay to be of high volume change potential, with plasticity indices ranging from 44 % to 47 %.

No evidence of contamination was noted in these soils.

5.3 Groundwater

Groundwater was not encountered during drilling either of the boreholes or in any of the trial pits. Groundwater monitoring standpipes have been monitored on two occasions and the results are shown in the table below.

Date	Borehole No	Depth to groundwater (m)
18 October 2013	1	2.60
	2	5.69
24 October 2013	1	1.82
	2	3.69

Monitoring of the standpipes should be continued to allow equilibrium levels and the extent of seasonal fluctuations to be established.

5.4 Soil Contamination

The table below sets out the values measured within four samples of made ground analysed. All concentrations are in mg/kg unless otherwise stated.

Determinant	TP3a 0.3m	TP1 0.1m	TP4 0.3m	TP2 0.3m
Arsenic	78	110	92	48
Cadmium	2.6	2.6	3.0	1.6
Chromium	44	34	44	39
Copper	250	1300	780	330
Mercury	1.1	0.49	0.50	1.5
Nickel	75	110	81	61
Lead	1500	1300	1800	730
Selenium	1.1	0.51	0.43	0.41
Zinc	530	450	580	390

Total Cyanide	<0.50	<0.50	<0.50	<0.50
Total Phenols	<0.3	<0.3	<0.3	<0.3
Sulphide	21	19	20	19
TPH	<0.1	<0.1	<0.1	<0.1
Total PAH	<2	<2	<2	<2
Benzo(a)pyrene	<0.1	<0.1	<0.1	<0.1
Naphthalene	<0.1	<0.1	<0.1	<0.1
Total organic carbon %	3.1	4.6	2.9	3.2
Note: Figures in bold indicates concentration in excess of risk-based soil guideline values, as discussed below				

5.5.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. To this end contaminants of concern are those that have values in excess of a generic human health risk based guideline values which are either that of the CLEA[5] Soil Guideline Value where available, or is a Generic Guideline Value calculated using the CLEA UK Version 1.06 software assuming a residential end use. The key generic assumptions for this end use are as follows:

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be young female children aged zero to six years old;
- that the exposure duration will be six years;
- that the critical exposure pathways will be direct soil and indoor dust ingestion, consumption of homegrown produce, consumption of soil adhering to homegrown produce, skin contact with soils and indoor dust, and inhalation of indoor and outdoor dust and vapours; and
- that the building type equates to a two-storey small terraced house.

It is considered that these assumptions are acceptable for this generic assessment of this site. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to

5 *Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009* and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

a degree that it poses an acceptable risk.

This assessment is based upon the potential for risk to human health, which at this site is considered to be the critical risk receptor. The concentration ranges of the contaminants of concern highlighted by a comparison of the measured concentrations against the risk-based soil guideline values and maximum values are tabulated below. Maximum values are most appropriate for this dataset due to the number of samples tested.

Contaminant of Concern	Maximum concentration recorded (mg/kg)	Location(s) of elevated concentration(s)	Generic Risk-Based Screening Value
Arsenic	110	All	32
Lead	1800	All	450
**Threshold values marked thus are for compounds with a limited human toxicity hence the threshold values adopted are not derived on a risk based methodology. Justification for all of the values quoted is provided in the appended table of Generic Risk Based Threshold Soil Guideline Values*			

Elevated maximum concentrations of lead and arsenic have been measured. These concentrations could thus pose a potentially unacceptable risk to human health through direct contact, accidental ingestion or inhalation of soil or soil derived dust.

No maximum values for any other contaminants were found to be elevated above their respective guideline values and no elevated concentrations of any other contaminants were measured in excess of the generic risk based screening values for a residential end-use with plant uptake.

The significance of these results is considered further in Part 2 of the report.

5.5 Existing Foundations

The trial pits indicate that the existing buildings are probably supported by spread foundations.

The foundations of 112 Cranley Gardens were found to be bearing on made ground comprising orange-brown slightly sandy clay at depths ranging from 1.07 to 2.27 m below the existing floorboards.

The trial pit records are included in the Appendix.

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to foundation options and contamination issues.

6.0 INTRODUCTION

It is understood that it is proposed to construct a basement in the rear garden of 112 Cranley Gardens, extending to approximately 6 m below the existing ground surface.

7.0 GROUND MODEL

The desk study has revealed that the site and surrounding area have not had a potentially contaminative history, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- below a variable thickness of made ground, the London Clay Formation is present and was proved to 15.0 m, the full depth investigated;
- the made ground extends to depths of 0.30 and 1.10 m, in the garden and driveway areas respectively, but the base of the made ground was not encountered within the footprint of the existing house, investigated to a maximum of 2.30 m below the floorboards;
- the made ground comprises brown silty sand with flint fragments in the garden area, brown sandy silty clay with brick fragments in the driveway area, and brown sand with fragments of brick, glass, ash, clinker and wood overlying orange-brown slightly sandy clay in the existing house area;
- the London Clay initially firm brown fissured silty slightly sandy clay to a maximum depth of 11.30 m, where upon stiff grey fissured silty slightly sandy clay was proven to 15.0 m, the maximum depth of the boreholes;
- groundwater was has been measured at a minimum depth of 1.82 m in the standpipes; and
- the chemical analyses have revealed elevated arsenic and lead.

8.0 ADVICE AND RECOMMENDATIONS

The proposed basement is assumed to extend to a depth of around 6 m and formation level will be within the London Clay. The results of the investigation indicate that it is unlikely that it will be possible to construct the basement without some form of groundwater control.

The London Clay should provide a suitable bearing stratum for a shallow foundation constructed from basement level and it is understood that a basement raft is the preferred foundation solution.

The depth of excavation will protect against any tree root effects and no special precautions should therefore be required in this respect.

8.1 Basement Construction

8.1.1 Basement Excavation

Groundwater was not encountered in the trial pits excavated to investigate the existing foundations or in the boreholes during drilling. Subsequent groundwater monitoring has however measured groundwater at depths of between 1.82 m and 5.69 m. This water may represent perched pockets of groundwater or surface water, or may reflect the presence of groundwater within the London Clay. It would therefore be prudent to conduct a simple rising head test to determine the rate at which the water recharges after being pumped out of the standpipe.

Whilst monitoring should be continued, it is not possible to draw entirely meaningful conclusions from the measurements made in the standpipes, as the level of the water table is not necessarily as significant as the volume of water that may flow into the excavation. For example, a high level of water measured in a standpipe may not be significant if this represents only a small volume of water. Ideally trial excavations should be carried out, to as close to the proposed depth of the basement as possible, although this may not be feasible at this site; at this stage it can be noted that the permeability of the London Clay is low, such that any inflows into the excavation should generally occur at a relatively slow rate.

The design of basement support in the temporary and permanent conditions needs to take account of the need to maintain the stability of the excavation and surrounding structures and to protect against groundwater inflows from fissured within the London Clay. There are a number of methods by which the sides of the basement excavations could be supported in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load-bearing function, and the extent to which groundwater inflows need to be prevented.

A sheet piled wall would provide an appropriate temporary measure to ensure the stability of the basement and overcome the need for groundwater control, prior to the construction of a permanent structure following the completion of the basement excavation. The noise and vibrations associated with the installation of sheet piles may however not be acceptable,

unless a “silent” installation method is adopted. Care should be taken if water jetting is to be considered to assist in installing the piles, as this could lead to ground movements that may affect the existing buildings.

Consideration could also be given to the use of a bored pile wall, which would have the advantage of being incorporated into the permanent works and will be able to provide support for structural loads. At this stage it is considered that a contiguous bored pile wall should provide adequate protection against inflows, with localised grouting between piles if necessary, although additional monitoring and investigation of groundwater levels should be carried out.

The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements. Consideration will need to be given to a retention system that maintains the stability of the excavation and neighbouring structures to the north and south and remaining buildings on site to the east.

There are no significant slopes on site thus it is not considered that the slope stability is a concern.

8.1.2 Basement Retaining Walls

The following parameters are suggested for the design of the new retaining walls.

Stratum	Bulk Density (kg/m^3)	Effective Cohesion (c’ – kN/m^2)	Effective Friction Angle (φ’ – degrees)
Made Ground	1800	Zero	20
London Clay	1950	Zero	25

Groundwater has been measured at depths of between 1.82 m and 5.69 m to date and further monitoring should be carried out to determine the design water level. The advice in BS8102:2009[6] should also be followed in this respect, and at this stage it would be prudent to design on the basis of the most shallow measured depth.

8.1.3 Basement Heave

The proposed construction of the approximately 6 m deep basement will result in an unloading of the London Clay at formation level. The excavations will result in an unloading of about 110 kN/m^2, which will result in an elastic heave and long term swelling of the London Clay.

This movement will be resisted to some extent by the weight of the existing building that will be retained, but this is unlikely to be of sufficient magnitude to counteract the unloading. These movements may be relatively significant and should therefore be considered in more

[6] BS8102 (2009) *Code of practice for protection of below ground structures against water from the ground*

detail once the levels and loads have been finalised; tension piles may be required to resist the resulting uplift.

In order to provide a preliminary indication of the likely movement that will result from the basement excavation, an analysis of potential ground movements has been carried out on the basis of assuming that the soils behave elastically, which provides a reasonable approximation to soil behaviour at small strains. A Boussinesq analysis is used to determine stresses at depth as a result of the removal of the overlying soil. Values of stiffness for the soils at this site have been based on the parameters established from the ground investigation and we have used a well-established method to provide our estimates. This relates values of Eu and E', the undrained and drained stiffness respectively and the following relationship has been adopted:

$$Eu = 500C_u \qquad E' = 300C_u$$

The unloading of the area as a result of the basement excavation equates to 110 kN/m^2, which will result in a net unloading and therefore heave of the underlying soil.

Based on the proposed rectangular basement area measuring roughly 10 m east-west by 30 m north-south, with a 6 m deep excavation the results have indicated that at the centre of the excavation, total heave movements would be expected to be in the region of 30 mm to 35 mm, which reduces to approximately 10 mm at the edges of the excavation. These total movements will theoretically take many years to complete, although approximately 50% of the total movements should be completed during the construction period.

A reasonable assumption is that there is a linear relationship between heave movement and pressure, such that the maximum heave pressure for a very stiff rigid slab or raft could be about 55 kN/m^2 at the centre of the basement for a fully constrained condition. However, the pressure below a more flexible slab would be reduced by the deflection of the slab and it might be more realistic to assume that a heave pressure of about 30 kN/m^2 may arise at the centre of the slab.

It should be noted that the heave pressure is not additional to any pressure that needs to be taken into account due to the water level assumed in the design. The water pressure will be the minimum uplift pressure for design purposes, but depending on the final water pressure used in the design the heave pressure due to excavation may be more critical than the hydrostatic uplift pressure. The design water level will need to be determined on the basis of continued groundwater monitoring.

8.2 Spread Foundations

The proposed basement extends to a depth of 6 m and formation level will be within the London Clay. Groundwater has been measured at depths of between 1.82 m and 5.69 m and groundwater will need to be suitably controlled.

It may be possible to construct spread foundations from basement formation level provided that a dry excavation can be maintained. Moderate width pad or strip foundations may be designed to apply a net allowable bearing pressure of 175 kN/m² within the stiff silty clay of

the London Clay below the basement level. This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

There are two trees present on site reaching a maximum height of roughly 20 m. Moisture content tests from Borehole No 1 do not indicate desiccation. Therefore, as a minimum requirement, foundations will need to be deepened in the vicinity of existing and proposed trees and National House Building Council (NHBC) guidelines should be followed in this respect. High shrinkability clays should be assumed. Where trees are to be removed the required founding depth should be determined on the basis of the existing tree height if it is less than 50% of the mature height and on the basis of full mature height if the current height is more than 50% of the mature height. Where a tree is to be retained the final mature height should be adopted.

The requirement for compressible material alongside foundations should be determined by reference to the NHBC guidelines.

8.3 Basement Raft Foundation

It is understood that a basement raft is currently the preferred foundation solution. The use of a raft will depend on being able to distribute the loads to achieve a relatively uniform pressure and the magnitude of resulting ground movement. At this site it is considered unlikely that the load applied by the building will be sufficient to counteract the heave and consideration will need to be given to potential heave movements, which could continue for many years after construction. The raft could be constructed so that it forms a rigid box with the retaining walls such that differential movements are minimised and, if the raft is sufficiently stiff it may therefore be able to distribute the upward pressure into the retaining walls.

Analysis of the likely movements is outside the scope of this report, but will be required in due course once the loads and levels have been finalised.

8.4 Piled Foundations

In view of the relatively high groundwater monitored on site, and subjects to the outcome of additional monitoring, piled foundations may be the most economic foundation solution.

For the ground conditions at this site some form of bored pile is likely to be the most appropriate. A conventional rotary augered pile may be suitable but consideration will need to be given to water ingress from within any silty or sandy zones within the London Clay. The use of bored piles installed using continuous flight auger (cfa) techniques may therefore be the most appropriate.

The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the measured SPT and cohesion / level graph in the appendix.

Ultimate Skin Friction		***kN/m²***
All soils	GL to 6 m	Ignore (basement excavation)
London Clay ($\alpha = 0.5$)	6 m to 15 m	Increasing linearly from 50 to 100
Ultimate End Bearing		***kN/m²***
London Clay	10 m to 15 m	Increasing linearly from 1350 to 1800

In the absence of pile tests, guidance from the London District Surveyors Association[7] (LDSA) suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe working loads. On this basis, it has been estimated that an 9 m long

[7] LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA Publications

300 mm diameter pile extending to a depth of 15.0 m below a 6 m deep basement should provide a safe working load of about 300 kN and a 450 mm pile to the same depth should provide a safe working load of about 475 kN.

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of an appropriate piling scheme and their attention should be drawn to the possible presence of groundwater inflows from within the sand or silt partings within and London Clay.

8.5 Basement Floor Slab

Following the excavation of the basement, it is likely that the floor slab for the proposed basement will need to be suspended over a void or layer of suitable compressible material to accommodate the anticipated heave unless the slab can be suitably reinforced to cope with these movements. In addition, consideration may also need to be given to designing the basement to cope with water pressure below the slab. The comments noted previously in Section 8.1.3 need to be taken into account.

8.6 Shallow Excavations

On the basis of the borehole and trial pit findings it is considered that shallow excavations for foundations and services that extend through the made ground London Clay are likely to remain relatively stable in the short term without the requirement for lateral support, although localised instabilities may occur.

However, should deeper excavations be considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

The investigation has indicated that groundwater inflows might be encountered in shallow excavations, particularly in the vicinity of existing foundations and other buried structures. Any such occurrences should be readily dealt with using sump pumping.

8.7 Effect of Sulphates

Chemical analyses carried out on two samples have revealed concentrations of soluble sulphate and pH in accordance with Class DS-1 conditions of Table C2 of BRE Special Digest 1 Part C (2005). The measured pH value of the samples show that a ACEC class of AC-1s of Table C2 would be appropriate for the site. This assumes a static water condition at the site. The guidelines contained in the above digest should be followed in the design of foundation concrete.

8.8 Site Specific Risk Assessment

The desk study does not indicate any potentially contaminative history of the site, as it has been occupied by the existing building for the entirety of its developed history. Elevated maximum concentrations of arsenic and lead have however been measured. These concentrations could thus pose a potentially unacceptable risk to human health through direct contact, accidental ingestion or inhalation of soil or soil derived dust.

No maximum values for any other contaminants were found to be elevated above their respective guideline values and no elevated concentrations of any other contaminants were measured in excess of the generic risk based screening values for a residential end-use with plant uptake.

The arsenic concentration was elevated above the guideline value, of 32 mg/kg, in all of the four samples of made ground tested at a maximum of 110 mg/kg. Lead was also noted to be elevated in all of the samples tested above the guideline value of 450 mg/kg at a maximum of 1800 mg/kg. The identified contaminants within the made ground are considered to be of low solubility and a risk to groundwater has not been identified.

It is recommended that additional sampling and testing is carried out in areas to remain as soft landscaped areas to confirm the absence of other contamination.

Site workers will be protected from the contamination through adherence to normal high standards of site safety but there may be a requirement for protection of buried plastic services laid within the made ground. The made ground will be removed by the basement construction and there will therefore be no risk to end users unless the excavated material is to be re-used in a reinstated garden above the basement. If this is proposed there is likely to be a requirement for testing of the retained soil. It is assumed that imported soil will be used to reinstate the garden above the basement and any imported soil should be certified as clean with appropriate documentation.

8.8.1 Site Workers

Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE[8] and CIRIA[9] and the requirements of the Local Authority Environmental Health Officer.

8.8.2 Plastic Services

Elevated concentrations of arsenic and lead have been measured in the made ground and consideration will, therefore, need to be given to the protection of buried plastic services laid within the made ground. Details of the proposed protection measures for buried plastic services will in any case need to be approved by the EHO and the relevant service authority prior to the adoption of any scheme. It is possible that barrier pipe will be required or additional testing will need to be carried out.

[8] HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO

[9] CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

8.9 Waste Disposal

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE guidance[10], will need to be disposed of to a licensed tip. Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste going to landfill is subject to landfill tax at either the standard rate of £64 per tonne (about £120 per m^3) or at the lower rate of £2.50 per tonne (roughly £5 per m^3). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring rocks and soils, which are accurately described as such in terms of the 2011 Order[11], would qualify for the 'lower rate' of landfill tax.

Based upon on the technical guidance provided by the Environment Agency[12] it is considered likely that the made ground from this site, as represented by the four chemical analyses carried out, would be classified as NON-HAZARDOUS waste under the waste code 17 05 04 (soils and stones not containing dangerous substances) and would be taxable at the standard rate. It is likely that the natural soils, if separated out, could be classified as an INERT waste also under the waste code 17 05 04. This material would be taxable at the lower rate, if accurately described as naturally occurring clay in terms of the 2011 Order on the waste transfer note. As the site has never been used for the storage of potentially hazardous materials, it is likely that WAC leaching tests would not be required for such inert waste going to landfill. This would however need to be confirmed by the receiving landfill site.

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper[13] which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be "segregated" onsite by sufficiently characterising the soils in-situ prior to excavation.

The above opinion with regard to the classification of the excavated soils and its likely landfill taxable rate is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

The local waste regulation department of the Environment Agency (EA) should be contacted

[10] CL:AIRE (2011) *The Definition of Waste: Development Industry Code of Practice* Version 2, March 2011

[11] *Landfill Tax (Qualifying Material) Order 2011*

[12] Environment Agency (2008) *Hazardous Waste: Interpretation of the definition and classification of hazardous waste. Technical Guidance* WM2 Second Edition Version 2.2, May 2008

[13] Regulatory Position Statement (2007) *Treating non-hazardous waste for landfill - Enforcing the new requirement* Environment Agency 23 Oct 2007

to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

If consideration were to be given to the re-use of the soil as a structural fill on this or another site, in accordance with the Code of Practice for the definition of waste, it would be necessary to confirm its suitability for use, its certainty of use and to confirm that only as much material is to be used as is required for the specific purpose for which it was being used. A materials management plan could then be formulated and a tracking system put in place such that once placed the material would no longer be regarded as being a waste and thus waste management licensing and landfill tax would not apply.

9.0 BASEMENT IMPACT ASSESSMENT

The screening identified a number of potential impacts. The desk study and ground investigation information has been used to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

Increase in footprint above ground

The construction of the extension will marginally increase the potential surface water runoff but the remainder of the garden will remain soft covered and the effects of the extension will be minimal.

London Clay is the shallowest strata

The London Clay is prone to seasonal shrink / swell (subsidence and heave) and as a result the underlying soil may result in structural damage of the property or adjacent house. However, the basement level will be beneath the zone of potential desiccation and this is therefore not considered to be of concern.

Location of public highway

Although the site boundary is within 5 m of the highway, the basement excavation is at least 5 m away, such that the excavation should not affect the highway. In addition, the proposed development will include retaining walls that will be designed to maintain the stability of the surrounding ground, thus protecting the adjacent road, and associated infrastructure beyond. There is nothing unusual or exceptional in the proposed development or the findings of the investigation that give rise to any concerns with regard to stability over and above any development of this nature.

Founding depths relative to neighbours

The foundations depths of neighbouring properties are not known, however in any case, the basement excavation can be readily managed using standard engineering solutions to ensure that the stability of the adjacent foundations is maintained. These solutions could include

preventing excavation within a zone that would lead to instability, or designing the new retaining walls to carry the load of the adjacent foundations. The nearby investigation has not highlighted any issues that give rise to concerns regarding the effectiveness of these normal engineering solutions at this particular site.

10.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work is considered to be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

Further groundwater monitoring should be carried out to establish equilibrium levels and the extent of any seasonal fluctuations. It would be prudent to carry out a number of trial excavations, to depths as close to the full basement depth to provide an indication of the likely groundwater conditions. It is recommended that heave movements are checked by further analysis once the loadings and final levels are known.

If during ground works any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out and that the risk assessment is reviewed. These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.

APPENDIX

Borehole Records

Trial Pit Records

SPT & Cohesion / Depth Graph

SPT Results Summary Sheet

Laboratory Test Results
:Geotechnical Results Summary
:Chemical Analyses (Soil)

Generic Risk Based Screening Values

Envirocheck Report and Extracts

Historical Maps

Site Plan

Calder Latif Associates LLP
Unit 10 Unity Wharf
13 Mill Street
London SE1 2BH

Evie Demosthenous
Planet International
42 Park Road
Crouch End
London N8 8TD

28th November 2014

Dear Evie,
112 Cranley Gardens, London N10 3AH
Appointment of Structural Engineering Services

Thank you for asking us to continue to provide structural engineering services for the above development now to include the rebuilding of the original house and with changes to the originally proposed basements. We have reviewed the drawings and are pleased to confirm structural and engineering consultancy services, quoted to Joe Fraher some months ago, remain unchanged.

We propose that our Appointment be in accordance with the Association of Consulting Engineers Conditions of Engagement Agreement (1) 2009 edition where we are appointed by the client but not as lead consultant. Our liability for any claim or claims for pollution and/or contamination is excluded.

We have compiled our fee based on this document and on the services described therein. Our fee of £10,000 excluding vat but including reasonable disbursements is given on a lump sum basis and includes additional structural engineering services covering the provision of full reinforcement drawings and associated schedules. Payment is to be made in equal monthly instalments over a four month period commencing this month. We understand this fee proposal is acceptable to you and we note that we have already commenced the re-design to meet the architect's programme.

We have allowed in our fee for four meetings once the contractor is appointed and on site but there will be additional fees for further meetings and inspections during construction which will be charged at the rate of £350 per day or part thereof.

We trust the above adequately covers the services that you require and would welcome the opportunity to discuss any matters with you should you require further clarification or amplification. We carry £3million Professional Indemnity Insurance and are able to enter into collateral warranties if required.

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Kent: 51 High Street Newington, Kent, ME9 7JR

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2.0 Permission
2.3 Condition 6

Planning permission reference - HGY/2014/1847)

Condition 6:
Monitoring by engineer. The development hereby approved shall not commence until such time as a suitably qualified chartered engineer with membership of the appropriate professional body has been appointed to inspect, approve and monitor the critical elements of both permanent and temporary basement construction works throughout their duration to ensure compliance with the design which has been checked and approved by a building control body. Details of the appointment and the appointee's responsibilities shall be submitted to and approved in writing by the Council prior to the commencement of development. Any subsequent change or reappointment shall be confirmed forthwith for the duration of the construction works.

We attach the CV's of both engineers from the appointed structural engineer firm - Calder Latif. Both of these engineers have been working closely with Fraher Architects during the duration of the detailed design stage to ensure the building is fully compliant with building regulations and fully coordinated between both companies.

We also attach the appointment documents for the engineers - the original appointment and the updated site supervision appointment.

We hope the above is acceptable and would suggest that it is not necessary for this project to execute a formal Memorandum of Agreement; an acknowledgement of the above terms will suffice to constitute the Agreement between us. If you require any additional information or clarification then please do not hesitate to contact me at anytime.

Yours sincerely,

ICCalder

Iain Calder
BSc; MSc; DIC; FICE
Chartered Engineer

Partner
Calder Latif Associates LLP

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Evie Demosthenous
Planet International
42 Park Road
Crouch End
London N8 8TD

29th July 2015

Dear Evie,

112 CRANLEY GARDENS, LONDON N10 3AH
Appointment of Structural Site Supervision Services

Thank you for asking us to continue to provide structural site supervision services for the above development.

We propose that our Appointment be in accordance with the Association of Consulting Engineers Conditions of Engagement Agreement (1) 2009 edition where we are appointed by the client but not as lead consultant. Our liability for any claim or claims for pollution and/or contamination is excluded.

We have compiled our fee based on a maximum number of 25 (twenty five) visits to site during the construction phase. Our fee for this is £10,000 excluding VAT, but including reasonable disbursements, is given on a lump sum basis.

Payment is to be made in equal monthly instalments over a twelve month period commencing September 2015.

We understand this fee proposal is acceptable to you and would request a written acknowledgement of the above terms in order to constitute the Agreement between us.

If you require any additional information or clarification then please do not hesitate to contact me at anytime.

Yours sincerely,

Najeeb Latif
BEng(Hons); CEng; MICE; EurIng; FFB
Calder Latif Associates LLP

London: Unit 10 Unity Wharf, 13 Mill Street, London, SE1 2BH
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Personal Profile

Iain Calder BSc, MSc, DIC, FICE, CEng
Partner

Specialist Experience

Iain's experience includes major New Build and Refurbishment Structural works, whilst also acting as a reviewer of technical documents produced by British Standards, European Committees and the Steel Construction Institute.

He has been involved in the investigation and subsequent repair of a number of multi-storey buildings damaged by bomb blasts, this work also entails advice on Disaster Recovery Planning and contingency measures.

He acts as an Expert Witness on a number of varied commissions including structures, build-ability and glass cladding.
His current portfolio exceeds £2 billion construction cost of Commercial, Governmental & Private developments.

Career Development

Calder Latif Associates 2004 to Present
Partner responsible for Structural Design. Iain has a 'handson' approach and has a key involvement on all stages of projects, ensuring successful completion and value for Clients.

He is also frequently involved in expert witness work, providing independent and valuable expertise for Clients and the legal profession

Scott Wilson Group1973 to 2004
Various positions in the civil/structural divisions. Experience included the design of airports,power stations, commercial buildings and large retail schemes.

As Group Director of Structures. Built a formidable client base with innovative award winning solutions for projects both Internationally and within Europe.

Project Experience

This is a summary of experience and is not intended as a complete list of projects.

Martineau Galleries,Retail,UK
Director responsible for the design of this £220 million scheme for new build and refurbishment work, in mostly structural steelwork for a high quality retail area in the heart of Birmingham, UK.

Dubai International Airport,T2,UAE
A major airport extension. Responsible for the seismic analysis and implementation of the design during construction. Value £1.6 billion

Grand Mosalla,Tehran
Providing expert advice to the chief executive of the Imam Khomeini Mosalla complex under construction but stopped pending clarification on certain issues.
Advice included the cladding support to the two minorettes and design philosophy of the 90m high arch. Value £1 billion

Spinnaker Tower,Portsmouth,UK
Director, responsible for review and sign off design of Spinnaker Tower, Portsmouth. A 185m high structure in reinforced concrete and steel with observation decks and telecom masts. Value £50 million

Crown Estate
Various commissions for The Crown Estate including the modernisation of the southern end of Regent Street, Metropole Hotel and refurbishment of Gerrards Jewellers. Value in excess of £200 million

Publications

Design of haunched composite beams - Inst.Struct. Eng.
Design of Multi-storey Buildings - Dundee University
New methods in Design & Construction - Inst. Civil Engineers
Grand Buildings, Trafalgar Square - Proc. Inst. Civil Engineers
Design of Haunched Composite Beams in Buildings
Design of Stub Girders
Concise Eurocode 3 for the Design of Steel

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Personal Profile

Najeeb Latif BEng(Hons), CEng, MICE, FFB, EUR ING
Partner

Specialist Experience

Najeeb Latif has extensive experience in the Management of projects, Business Development and overall financial control of projects.

He has a strong ability to communicate and successfully meet the needs of a range of external clients and has a proven record of procuring work from new and existing clients and maintaining high level contacts.

He has experience in working with a variety of Clients including Public Sector, Private & Commercial Organisations, Overseas Clients and Design & Build Contractors.

Ambitious, highly motivated team player with a wide understanding of Management, Financial, Design and Business Development issues. This is combined with excellent communication and presentation skills.

Career Development

Calder Latif Associates - 2004 to present
Partner responsible for managing and supervising projects within the UK. He is also responsible for Business Development and marketing of Calder Latif Associates.

Scott Wilson Group - 1989 to 2006
Worked on several European and International projects within the structures group. Responsible for the management of projects, liaison with Clients and Design Team members, progress monitoring and technical advice.

Project Experience

This is a summary of experience and is not intended as a complete list of projects.

Dubai Airport , UAE
The project consisted of the construction of a new terminal. CLA werte appointed to carry out detailed seismic analysis and construction supervision.
Value £500 million

Mandarin Oriental Hotel, London
Refurbishment of the existing listed building. Project Director for the structural design, which included management and co-ordination with the M&E design consultant.
Value £12 million

Al-Yamamah Air Base, Saudi Arabia
The project consisted of the construction of a major Airforce Base in the Kingdom of Saudi Arabia. Services included deatiled design of runways, aircraft hangars, power plant enclosures and terminal buildings
Value £5 Billion

Harmsworth Quays Press, London
Refurbishment and extension of the "Daily Mail & Evening Standard" Printing Works. Project Director responsible for the design & management of the project.
Value £30 million

Clarendon Court, London
A new build of luxury apartments within a retained facade in the heart of prestigious "Maida Vale". Project Director responsible for the overall profitability of the project, ensuring programme and budget were achieved in accordance with the Client's requirements.
Value £20 million

Other Key Clients and Projects

BAA - Manchester Airport, Terminal 2
Al-Ain Airport (UAE) - Detailed Design
Amerada Hess - Oil related projects
Network Rail - Various developments & stations
PACE (Property Advisor Civil Estate) - Various

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3.0 Summary

We consider the attached documentation sufficient to discharge the conditions 4 / 5 / 6 in full. If you require any further information please contact us and we will coordinate any further issue.