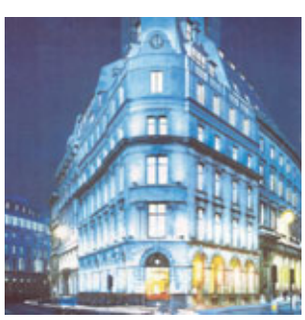
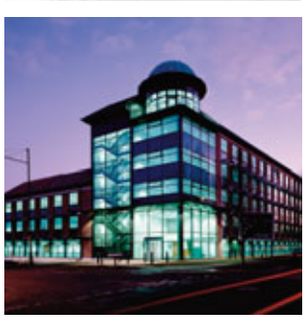
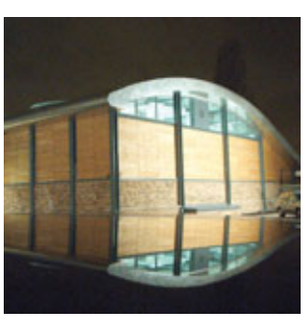
SINCLAIRJOHNSTON

CONSULTING CIVIL AND STRUCTURAL ENGINEERS







STRUCTURAL ENGINEER'S REPORT AND BASEMENT IMPACT ASSESSMENT (BIA) IN SUPPORT OF THE PLANNING APPLICATION FOR THE RESIDENTIAL REDEVELOPMENT AT

143 ADELAIDE ROAD
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NW3 3NL

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7837 / TM **July 2012**

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APPENDICES

1.0 INTRODUCTION

1.1 This report has been prepared to support the planning application being submitted by KSR Architects for the residential redevelopment at 143 Adelaide Road, London, NW3 3NL.

1.2 It has been prepared by Thomas Musson BEng CEng MIStructE.

1.3 Sinclair Johnston & Partners have considerable experience of subterranean developments within Central London and within the London Borough of Camden.

1.4 The report describes the structural design and construction methodology proposed for the development. It presents information relating to the existing site and surrounding area, the local geology and hydrology of the site, the envisaged construction techniques and temporary works required to execute the proposals, and details the potential impact of the redevelopment to subterranean (groundwater) flow, slope stability, and surface flow and flooding.

1.5 The report is intended to demonstrate that the proposed development is in compliance with Camden Development Policies DP22 'Promoting sustainable design and construction' and DP27 'Basements & Lightwells'. It is also constitutes a Basement Impact Assessment (BIA) as defined in Camden Planning Guidance Basements and Lightwells CPG4.

1.6 This report is to be read in conjunction with all Architects' and other Consultant's drawings and reports submitted with the Planning Application.

1.7 All directions left and right are taken as standing in Adelaide Road facing the existing property.

2.0 OVERVIEW OF PROPOSED REDEVELOPMENT

2.1 The following is an overview of the proposed redevelopment. It is provided to give context to the later sections of the report. Reference should be made to the Architect's and other Consultant's reports and drawings for a detailed description of the various disciplines proposals.

2.2 The proposed redevelopment comprises the:

- Demolition the existing public house.

- Construction of a row of five, 3 storey terrace houses with part basement parking.

3.0 EXISTING SITE AND SURROUNDING AREA

3.1 143 Adelaide Road is located on the southern side of Adelaide Road on the corner of the Elsworthy Rise junction. It is located in Camden Council within the Belsize Ward. The site sits between Chalk Farm and Swiss Cottage underground stations.

3.2 The local area is predominantly residential in nature comprising multi-storey housing blocks immediately to the north of the site and three storey 1970's housing to the west, east and south of the site.

3.3 The site comprises a substantial, three-storey plus basement detached Victorian property previously used as a public house. The property is arranged over basement, ground, first and second floors. The property has a beer garden to the rear comprising perimeter planting and central hard paved area.

3.4 The rear garden contains a low level paved patio area at lower ground floor level with steps up to a small raised grass lawn area at the rear.

3.5 The existing property is not listed nor does the development sit within a conservation area.

3.6 The construction of the existing property is not known but is believed to be of 'traditional' construction comprising load bearing solid rendered masonry external walls with internal suspended timber floors and timber partitions. The flat roof is concealed from view at ground level behind a rendered masonry parapet.

3.7 The site is bounded to the north by Adelaide Road, to east by Elsworty Rise, to the south by No. 3 & 4 Elsworthy Rise and to the west by 15 Elliott Square.

3.8 The site gently slopes down Elsworthy Rise. Adelaide Road is generally flat and level.

3.9 Network Rail tunnels are understood to run below Adelaide Road to the north and immediately to the south of the side across Elsworthy Rise.

4.0 LOCAL GEOLOGY AND HYDROLOGY

4.1 The published 1:50,000 geological maps indicate that the site geology comprises the London Clay Formation to considerable depth with no superficial deposits.

4.2 A site specific ground investigation has been undertaken by Soil Consultants Ltd and is provided in Appendix D. The findings of this report confirm that the site ground conditions comprise a shallow depth of man ground and topsoil overlying London Clay to depth.

4.3 The Environment Agency defines the London Clay as 'an unproductive aquifer having low permeability and negligible significance for water supply or river base flow'.

4.4 As the London Clay is a relatively impermeable soil there is no specific standing water table. However, water can become perched within the permeable made ground and/or topsoil. Experience shows that this form of ground water is not likely to cause difficulties during construction and can be readily removed.

4.5 There are no ponds, streams or other surface water features on or in the immediate vicinity of the site.

4.6 The site is located in a Flood Risk Zone 1, as defined by the Environment Agency. The site is therefore is at little or no risk from fluvial flooding.

4.7 The Camden Geological, Hydrogeological and Hydrological Study Flood Map Figure 15 'identifies the site, and immediate area, as not historical being, or likely to be in the future, susceptible to surface water flooding.

4.8 'The Lost Rivers of London' by Nicholas Barton shows that the site is located well away from the Fleet and Tyburn subterranean rivers.

4.9 The site is not located in a radon affected area.

4.10 The site investigation undertaken by Soil Consultants Ltd indicates that the site is considered to be at 'low risk' with respect to soil and groundwater contamination resulting from known past and current activities.

5.0 STRUCTURAL PROPOSALS

5.1 Detailed structural drawings showing the proposed structure for the new development are provided in Appendix A.

5.2 The new basement is to be formed by adopting a contiguous bored piled perimeter wall with a reinforced concrete lining wall inboard of the piling. The basement slab is to comprise a reinforced concrete suspended slab spanning onto reinforced concrete pile cap/ground beam foundations.

5.3 All new foundations will be founded within the natural London Clay.

5.4 The setting out and method of piling will be agreed with Network Rail during the detailed design stage of the project to ensure that the below ground infrastructure is not adversely affected by the development.

5.5 A suspended reinforced concrete ground floor is to be adopted supported on internal reinforced concrete walls and columns and supported on the reinforced concrete and piled perimeter walls. This slab is to laterally prop the perimeter structural walls.

5.6 The above ground structure is to comprise a reinforced concrete 'tunnel form' structure or reinforced concrete frame structure, to be developed in the detailed design stages.

5.7 The contiguous bored piled walls are to be laterally propped during construction. These temporary works will be designed to withstand all earth pressures, surcharge pressures and hydrostatic pressures.

5.8 All retaining substructures will be designed to withstand all earth pressures, surcharge pressure and hydrostatic pressures in the permanent case.

5.9 The stiffness of the below ground retaining structures and temporary propping systems will be designed to ensure that lateral deflections are kept within acceptable limits.

5.10 The basement grade to be provided is a 'class 3 basement' as defined in BS 8102:2009 'Code of Practice for Protection of Below Ground Structures'.

5.11 Swelling of the clay due to relief of overburden pressure, commonly called 'heave', will be resisted by providing a suitable heave protection system such as Cordek Cellcore.

5.12 Flotation of the new basement, due to a hypothetical raised ground water level, will be resisted by the piled foundations.

5.13 Root protection measures are to be implemented as outlined in ACS Consulting's report reference ha/aiams/adelaideph/e and dated 4th October 2010..

5.14 All temporary works are to be designed, coordinated and monitored by a qualified and suitably experienced 'Temporary Works Designer / Coordinator' appointed under the main contract. All temporary works are to be designed in accordance with the British Standards and other established industry standard guidance.

5.15 The permanent works are to be designed by a qualified and suitably experienced Chartered Engineer in accordance with The Building Regulations and all relevant British Standards and other established industry standard guidance.

6.0 CONSTRUCTION METHODOLGY

6.1 The anticipated construction sequence for the basement construction works is outlined in the Construction Method Statement in Appendix C. The following section discusses the various site-specific construction activities that have been addressed at the planning stage to ensure compliance with Camden Planning Guidance Basements and Lightwells CPG4.

6.2 Piling is to be undertaken using rotary bored techniques to reduce vibration and noise issues. Network Rail will be consulted during the detailed design stage of the project to ensure that the piling is set out and undertaken in order to ensure that the proposals do not adversely affect the below ground infrastructure.

6.3 Network Rail have been contacted with regards the proposals and a line, level and dilapidation survey is currently being organised in order to facilitate agreement for the proposals.

6.4 The spoil created through the excavation of the basement would be taken off site to a licensed landfill. Material would be transported to waiting lorries on site or on Elsworthy Rise, refer to Indicative Site Set Up Sketch in Appendix A.

6.5 Temporary works will be installed to support the contiguous piled walls during construction. This is likely to take the form of structural steel corner braces, flying shores and heavy duty needle beams. An indicative scheme for this work is provided in Appendix A.

6.6 The site is to be fully enclosed behind suitable timber hoarding.

6.7 Access to site will be directly off Elsworthy Rise. The construction is to be programmed such that the site space can be utilised as much as possible in lieu of off street site traffic parking.

6.8 The site is located in a predominantly residential area; therefore peak volumes of traffic are likely to be during the early mornings and early evenings.

6.9 Concrete is to be delivered from a third party accredited concrete plant by concrete trucks and is to be skipped or pumped into position.

6.10 All site traffic movements would be planned and organised by the Contractor, who would be required to provide and submit a detailed transport plan for the works.

6.11 The Contractor would be required to provide trained and experienced banksmen to direct and control vehicle movement on and around the immediate area of the site.

6.12 All work is to be undertaken by a competent Contractor with experience in the proposed form of construction and working on restricted sites. All construction processes are to be undertaken in accordance with the Considerate Constructors Scheme.

6.13 The Contractor is to manage construction waste in accordance with 'The Site Waste Management Plans Regulations 2008' and other relevant legislation. As such the Client/Contractor will be required to provide a site waste management plan identifying how waste will be managed and reduced during construction.

7.0 ADJOINING PROPERTIES AND PARTY WALL MATTERS

7.1 The site shares a boundary with 3 & 4 Elsworthy Rise and 15, 16 & 17 Elliott Square. Therefore, procedures under the Party Wall etc. Act 1996 will be required.

7.2 The proposals comprise the excavation for a new basement adjacent to and in close proximity to the surrounding buildings. The reinforced concrete substructures are to be designed to resist all lateral earth, surcharge and ground water pressures. The proposed structure is to be sufficiently stiff to ensure that lateral deflections are kept within acceptable limits. The form of construction adopted is well established and has been used successfully on many similar developments in similar ground conditions.

7.3 Full procedures under the Party Wall etc Act 1996 will be put in place to safeguard the interests of all parties.

8.0 SUSTAINABLE URBAN DRAINAGE

8.1 The feasibility of adopting various sustainable urban drainage systems (SUDS) on the proposed development has been undertaken by Barry Griffin Associates. A copy of the feasibility report is provided in Appendix E.

8.2 It was found that living roofs, recycling/rainwater harvesting and online storage are feasible SUD's technologies for this development.

8.3 During detailed design the above technologies should, were practical, be adopted in order to reduce and delay water run-off from hard surfaces of the development to the public surface water sewer and to reduce the surface water discharge to the local surface water sewer.

9.0 CONCLUSIONS

9.1 It is proposed to demolish the existing public house and 143 Adelaide Road. NW3 and construct a new row of five, 3 store houses with basement parking.

9.2 A basement impact assessment screening study has been undertaken to identify matters relating to the basement development that have been taken into consideration when developing the structural proposals.

9.3 The basement is to be formed using contiguous bored piled walls with an integral reinforced concrete wall. The basement is to be supported on new piled foundations. The superstructure is to comprise a reinforced concrete 'tunnel form' structure or reinforced concrete frame structure. Refer to Appendix A for structural drawings of the proposals.

9.4 The structural proposals and method of construction have been selected with due consideration to the likely ground conditions and hydrology of the site and surrounding area and to ensure that the structural integrity of the existing building, neighbouring properties and surrounding land is maintained during and post construction.

9.5 Network Rail will are being consulted to ensure that the proposals do not adversely affect their below ground infrastructure. A line, level and dilapidation survey is being organised with Network Rail to aid the discussions and agreement to the scheme.

9.6 All retaining substructures and associated temporary works are to be designed to resist all lateral earth, surcharge and hydrostatic pressures and are to be sufficiently stiff to ensure that lateral deflections are kept within acceptable limits.

9.7 A site specific ground investigation has been undertaken by Soil Consultants Ltd reference 9206/AW/OT, dated July 2012 and is included in Appendix D.

9.8 The location, geology and topography of the site and surrounding area are well known. Land instability problems are unlikely to be of significance.

9.9 The proposed basement sits within London Clay, an unproductive aquifer. There are no streams, ponds or other surface water features on or adjacent to the site. Effects on ground water flow are therefore considered not to be detrimental.

9.10 The site is not located in a fluvial flood plain as dictated by the Environment Agency, nor has the site previously been, or is likely to be, subject to surface water flooding. The present risk of the site flooding is therefore considered not significant.

9.11 The existing pathway for surface water runoff would not be significantly altered by the proposed development. The basement is to be formed wholly within the existing impervious London Clay stratum. It is proposed that the new development has green roofs. Therefore, in effect the area of hard standing/impervious ground will be reduced by the proposals.

9.12 Living roofs, rainwater harvesting and recycling/rainwater harvesting have been identified as feasible sustainable urban drainage systems for adoption on the proposed development. During the detailed design stage these systems should be integrated into the design, where practical.

9.13 The construction method statement, presented in detail in Appendix B of this report, shows that the works can proceed in a safe manner while attempting to reduce nuisance and disturbance to the surrounding neighbourhood.

9.14 A screening study has been undertaken using the information obtained from the site specific ground investigation and publicly available information. Completed copies of the CPG4 Screening Flow Charts are included in Appendix B. This screening process has highlighted that the proposals are of low risk with regards to land stability issues and that the proposed development is considered to have negligible impact on groundwater and surface water. The presence of the London Clay strata has been considered when developing the structural proposals.

9.15 Site traffic movement will be strictly controlled and organised to minimise congestion and nuisance within the surrounding area. Traffic movements to site can be adequately organised and controlled to adhere to the existing one way road system.

9.16 The design and works will be developed and executed in accordance with the Building Regulations, Party Wall etc, Act 1996, CDM Regulations 2007 and all other Health & Safety legislation.

9.17 All work is to be undertaken by a competent Contractor with experience in the proposed form of construction and working on restricted sites. All construction processes are to be undertaken in accordance with the Considerate Constructors Scheme.

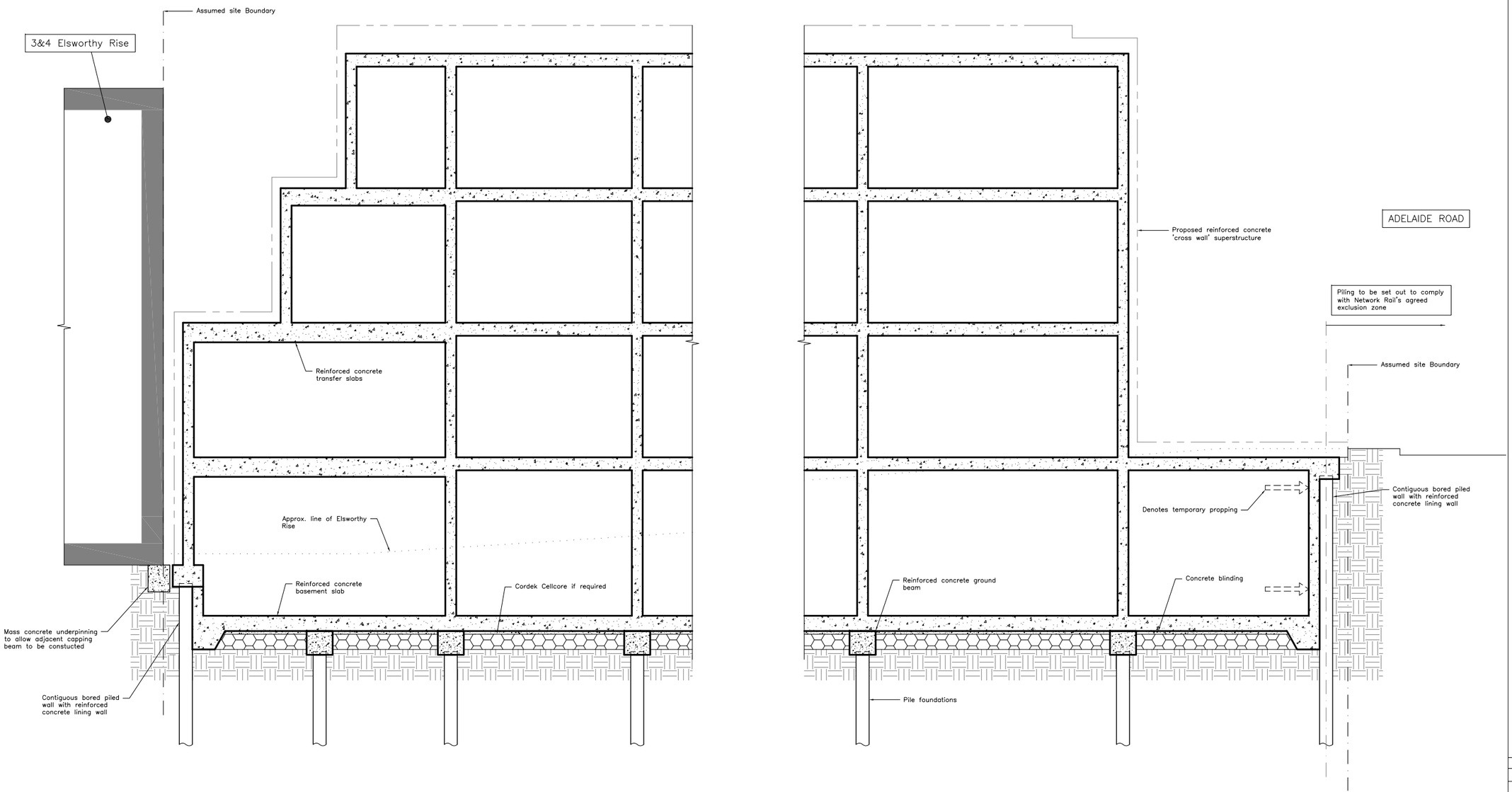
9.18 All temporary works are to be designed, coordinated and monitored by a qualified and suitably experienced ‘Temporary Works Designer / Coordinator’ appointed under the main contract. All temporary works are to be designed in accordance with the British Standards and other established industry standard guidance.

9.19 A Chartered Structural Engineer will supervise the execution of the works.

Thomas Musson BEng CEng MIStructE

APPENDIX A

7837/SK001	**Indicative Long Section**
7837/SK002	**Indicative Cross Section**
7837/SK003	**Indicative Site Set Up**
7837/SK004	**Indicative Temporary Works**



INDICATIVE LONG SECTION

NOTES:

1. All structural engineering drawings are to be read with the specification and with all relevant Architect's and Service Engineer's drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to intended scale this bar should be 50mm long @ A1 or 25mm long @ A3:
3. All dimensions are in millimetres and levels in metres.

Rev	Date	Issued	Amendment
–	13.07.12	TJM	Issued for planning.

Status: *PLANNING*

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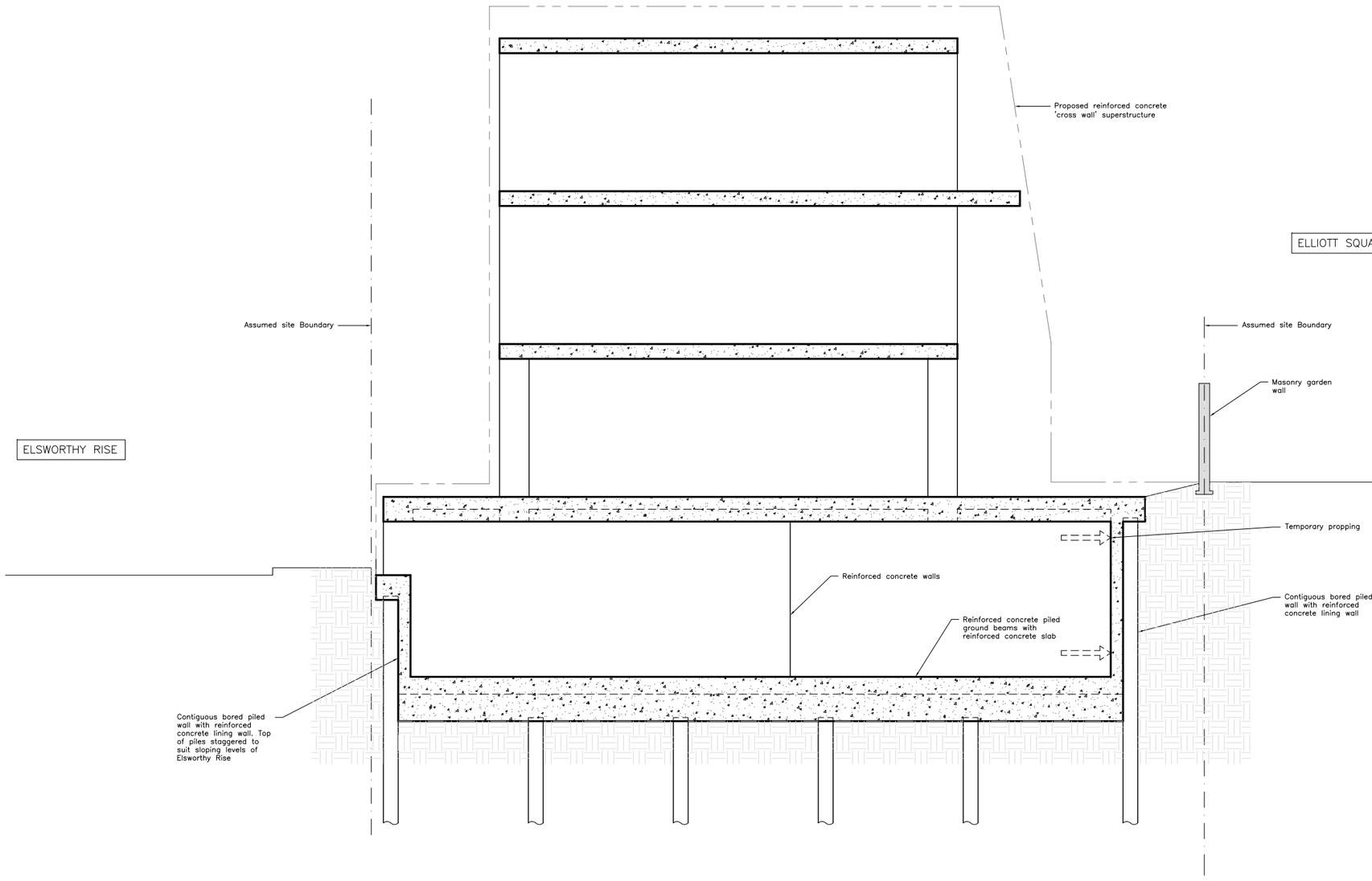
143 ADELAIDE ROAD, NW3

INDICATIVE LONG SECTION

Drawn T Musson | Scale 1:50 at A1

Project No./Drawing No. 7837/SK001 | Rev –



NOTES:

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2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to intended scale this bar should be 50mm long @ A1 or 25mm long @ A3:
3. All dimensions are in millimetres and levels in metres.

Rev	Date	Issued	Amendment
–	16.07.12	TJM	Issued for planning.

Status *PLANNING*

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INDICATIVE CROSS SECTION

Drawn T Musson Scale 1:50 at A1

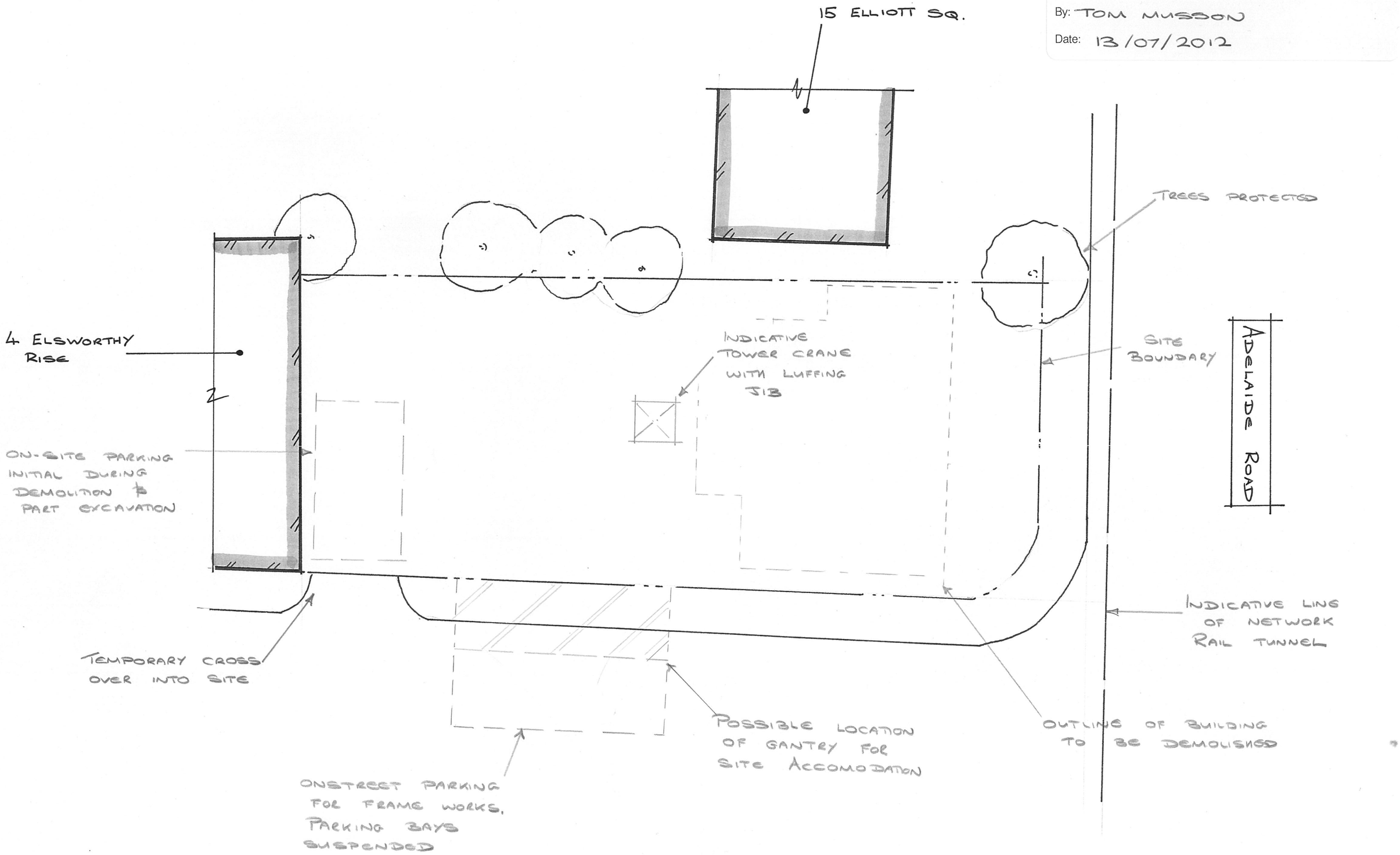
Project No./Drawing No. 7358/SK002 Rev –

SINCLAIRJOHNSTON
93 Great Suffolk St, London, SE1 0BX. T: 020 7593 1900

Project No: 7837 Ref: SK003

By: TOM MUSSON

Date: 13/07/2012



INDICATIVE SITE SET UP

(TO BE DEVELOPED WITH CONTRACTOR)

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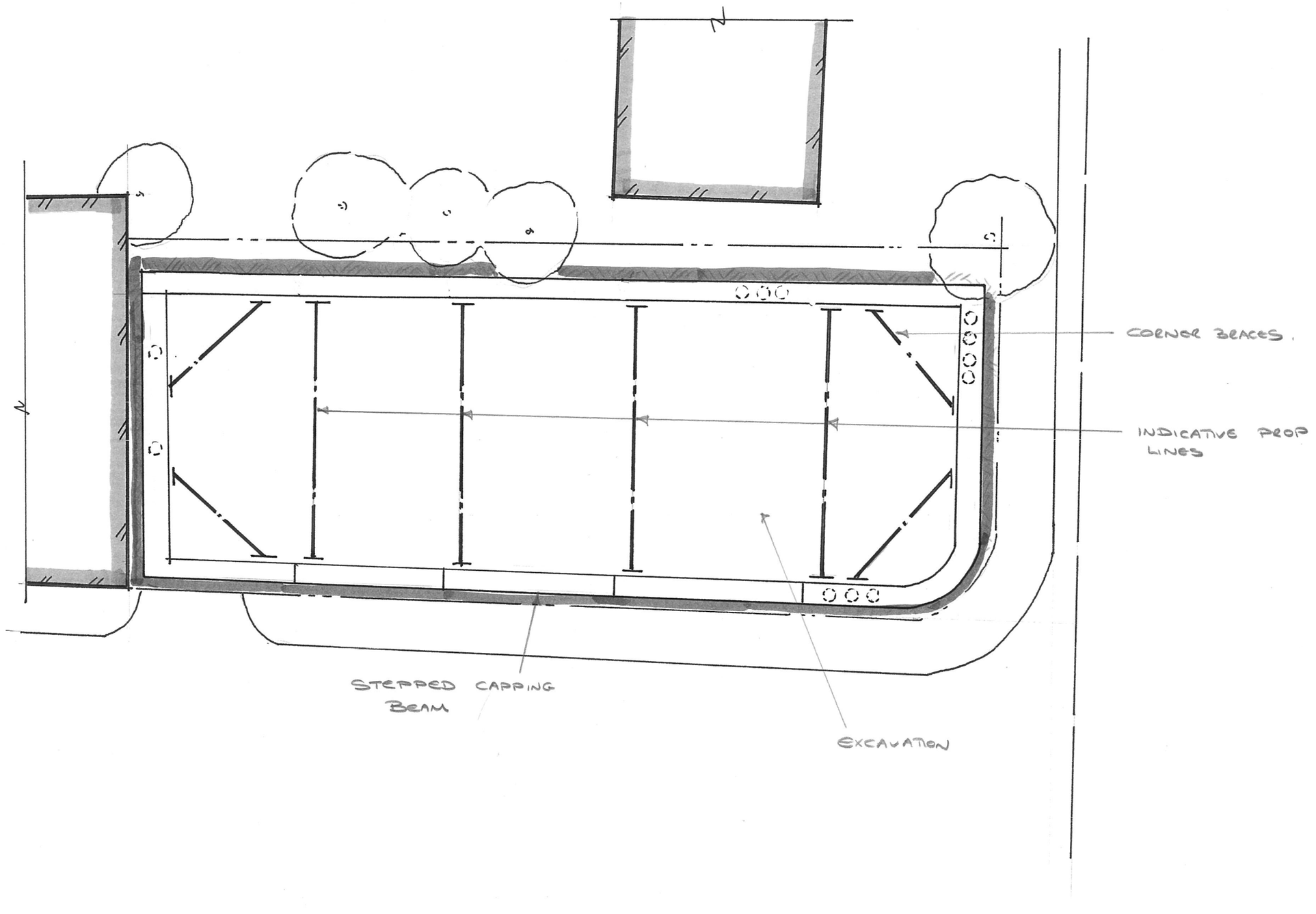
93 Great Suffolk St, London, SE1 0BX. T: 020 7593 1900

Project No: 7837 Ref: SK004

By: TOM MUSSON

Date: 13/07/2012



INDICATIVE TEMPORARY WORKS

APPENDIX B

BASEMENT IMPACT ASSESSMENT (BIA)

APPENDIX B: CPG4 SCREENING FLOW CHARTS

SUBTERRANEAN (GROUND WATER) FLOW SCREENING FLOWCHART (FIGURE 1.)

Ref.	*CPG4 Question*	*Supporting information*	*Response*
Q1a.	Is the site located directly above an aquifer?	The site ground conditions comprise London Clay to depth. Refer to Soil Consultant's Ground Investigation Report in Appendix D.	No.
Q1b.	Will the proposed basement extend beneath the water table surface?	There is no specific water table due to the London Clay being the shallowest ground. Refer to Soil Consultant's Investigation Report in Appendix D	No.
Q2.	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	Refer to historic maps within Soil Consultant's Investigation Report in Appendix D	No.
Q3.	Is the site within the catchment of the pond chains on Hampstead Heath?	Refer to Soil Consultant's Investigation Report in Appendix D	No.
Q4.	Will the proposed basement development result in a change in the proportion of hard surfaced/paved area?	The proportion of hard surfaced/paved area would be reduced due to the proposed extensive roofs.	**Yes.**
Q5.	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)?	The existing site comprises a public house with rear paved garden. The new proposals comprise new residential development across the full site. The proposals therefore result in less surface water being discharged to the ground.	No.
Q6.	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 (not just the pond chains on Hampstead Heath) or spring line?	Refer to Soil Consultant's Investigation Report in Appendix D.	No.

SUMMARY

The new proposed scheme should attempt to minimise the surface water run-off rates by adopting sustainable urban drainage systems (SUD’s).

SLOPE STABILITY SCREENING FLOWCHART (FIGURE 2.)

Ref.	*CPG4 Question*	*Supporting information*	*Response*
Q1.	Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	Refer to Soil Consultant's site investigation report included in Appendix D.	No.
Q2.	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°? (approximately 1 in 8)	There are no planned alterations to the site levels.	No
Q3.	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? (approximately 1 in 8)	Refer to Soil Consultant's site investigation report included in Appendix D.	No
Q4.	Is the site within a wider hillside setting in which the general slope is greater than 7°? (approximately 1 in 8)	Refer to Soil Consultant's site investigation report included in Appendix D.	No.
Q5.	Is the London Clay the shallowest strata at the site?	Refer to Soil Consultant's site investigation report included in Appendix D.	No.
Q6.	Will any tree/s 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?	Refer to ACS Consulting Arboriculture report.	No.
Q7.	Is there history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	Refer to Soil Consultant's site investigation report included in Appendix D.	**Yes.**
Q8.	Is the site within 100m of a watercourse or a potential spring line?	Refer to Soil Consultant's site investigation report included in Appendix D.	No.
Q9.	Is the site within an area of previously worked ground?	Refer to Soil Consultant's site investigation report included in Appendix D.	No
Q10.	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	The site is not located within an aquifer. London Clay being the shallowest strata.	No.

Q11.	Is the site within 50m of the Hampstead Heath Ponds?		No.
Q12.	Is the site within 5m of a highway or pedestrian right of way?	The site is bounded to the north by Adelaide Road and to the east by Elsworthy Rise. As confirmed from OS maps and site walk over.	**Yes.**
Q13.	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	The proposed basement will be approximately 1.0m lower than the existing lowest ground level along Elsworthy Rise.	**Yes.**
Q14.	Is the site over (or within exclusion zone of) any tunnels, e.g. railway lines?	Network Rail tunnels run to the north and to the south of the site.	**Yes.**

SUMMARY

The basement foundation scheme should take account of the London Clay ground, the proximity of the adjacent highways and Network Rail tunnels and the proximity of the adjoining properties.

SURFACE FLOW AND FLOODING SCREENING FLOWCHART (FIGURE 3.)

Ref.	*CPG4 Question*	*Supporting information*	*Response*
Q1.	Is the site within the catchment of the pond chains on Hampstead Heath?		No.
Q2.	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?	The proposed development extents to the full extent of the site and comprises extensive green roofs draining into the existing sewer system. The surface flows will therefore not be materially changed from the existing route.	No.
Q3.	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	The proportion of had surfaced / paved area will be reduced by the introduction of extensive roofs and private gardens in the proposed redevelopment.	**Yes.**
Q4.	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	There are no existing surface water features on the property or nearby.	No.
Q5.	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	There are no existing surface water features on the property or nearby.	No.
Q6.	Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby water feature?	The site is not in an area with the potential to bat risk of surface water flooding.	No.

SUMMARY

The new proposed scheme should attempt to minimise the surface water run-off rates by adopting sustainable urban drainage systems (SUD’s).

APPENDIX C

CONSTRUCTION METHOD STATEMENT

CONSTRUCTION METHOD STATEMENT (CMS)

This CMS is to be read in conjunction with Sinclair Johnston and Partner's 'Structural Engineer's report in support of the planning application for the residential redevelopment at 143 Adelaide Road, London, NW3 dated July 2012.

The construction method statement outlined below is to be developed with the appointed Contractor.

1) Demolition Contractor to undertake tree protection works as required and specified by the Arboriculturist to ensure that neighbouring trees are not adversely affected by the works.

2) Demolition Contractor to erect suitable hoarding around the site and to form new site access including temporary cross over on Elsworthy Rise.

3) Existing building to be demolished from top down using light machinery and hand tools. Material to be loaded onto trucks parked in existing rear garden.

4) Existing building to be taken down to existing basement slab level. Temporary lateral propping to be provided to existing basement retaining walls either as raking shores or corner braces. Drainage holes to be broken out into basement slab.

5) Main Contractor to take possession of site. Contractor to inspect tree protection works and, if required, modify as instructed by Arboriculturist.

6) Main Contractor to install site accommodation and welfare. Parking bays on Elsworthy Road to be suspended as required.

7) Main Contractor to agree and set out on site line of Network Rail exclusion zone. Once established contiguous bored piled wall and piles to be installed using rotary bore techniques.

8) Once piling is complete excavate and construct the reinforced concrete capping beam to perimeter, stepping capping beam as required to suit Elsworthy Rise levels.

9) Excavate approximately 1.0m of earth to the front of the site and install lateral hydraulic props and corner braces.

10) Continue excavation from front of site back to rear of site. Spoil to be deposited into trucks parked on site until such time as required to park trucks on Elsworthy Rise.

11) Lateral propping to be installed as works proceed. Internal piles to be broken down as work proceeds.

12) Once levels are reduced to correct basement level, Contractor to trim piles to final cut off level and construct reinforced concrete ground beams and crane base.

13) Contractor to erect tower crane.

14) Over site blinding to be cast and basement ground bearing slab constructed. Once slab has reached specified 28 day strength Contractor to remove low level props.

15) Reinforced concrete lining walls and internal walls/columns from basement to ground to be cast.

16) Ground floor slab to be constructed. Once concrete has reached its specified 28 day strength Contractor to remove high level props.

17) Above ground structure to constructed in traditional concrete frame manner.

APPENDIX D

SITE INVESTIGATION REPORT

APPENDIX E

SUSTAINABLE URBAN DRAINAGE STATEMENT

B a r r y G r i f f i n A s s o c i a t e s

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OUTLINE SUSTAINABLE URBAN DRAINAGE (SUDs) STATEMENT
FOR ADOPTION/CONSIDERATION
AT
143 ADELAIDE ROAD NW3 3NL
HAMPSTEAD
LONDON

B a r r y G r i f f i n A s s o c i a t e s

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CONTENTS

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INTRODUCTION

This document has been prepared on behalf of Mr Thomas Musson, Technical Director of Sinclair Johnston & Partners Limited. The terms of reference were set out in an email dated 5th July 2012.

BRIEF

To prepare a sustainable urban drainage (SUDs) strategy report for the discharge of conditions of the Planning Approval Document.

LIMITATIONS

It should be emphasised that this report is based on the current proposed use of the site to erect 5 No town houses.

SCOPE

This document contains the strategy for the sustainable urban drainage (suds) design aspects for the new development. The design criteria and references are provided, along with outline and indicative proposals.

B a r r y G r i f f i n A s s o c i a t e s

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DOCUMENTIONS

Principles and aspects of SUDs are also contained within the following documents:

1. Building Regulations.
2. Local Authority Requirements.
3. Environment Agency SUDS- A Practical Guide
4. OPDM, 2001. Planning Policy Guidance Note 25: Development and Flood Risk
5. CIRIA 522 (SUDS Design manual for England and Wales)
6. CIRIA 523 (SUDS Best practice manual)
7. CIRIA 609 (SUDS – hydraulic, structural and water quality advice)
8. EA/DEFRA, 2004. R&D Technical Report W5-074/A/TR/1. Preliminary rainfall runoff management for developments.
9. National SUDS Working Group, 2004. Interim Code of Practice for Sustainable Drainage Systems.

OBJECTIVES FOR SUSTAINABLE URBAN DRAINAGE

1. Maintenance of an effective public health barrier
2. Avoidance of local or distant flooding
3. Avoidance of local or distant degradation / pollution of the environment (e.g. water, soil and air)
4. Minimisation of the utilisation of natural resources
5. Reliability in the long term and adaptability to future (as yet unknown) requirements
6. Community affordability
7. Social acceptability
8. Usability

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BACKGROUND INFORMATION

The roof areas and surrounding paving and hard standing for our assessment have been taken from the Architects drawings.

The assessment of the present building, surrounding paved areas and hard standing (the hard standing will be replaced by the new development) has been assumed to be a combined drainage system and that the surface water discharge eventually flows into the Local Authority surface water sewer.

THE DEVELOPMENT

It is proposed to demolish an existing public house (the Adelaide) and construction 5 new town houses with car parking below and landscaped areas.

AIM

1. To reduce and delay water run-off form hard surfaces of the development to the public surface water sewer, thus reducing the risk of localized flood and other environmental damage.
2. To provide rainwater harvesting for toilet flushing, laundry and garden irrigation, thus reducing the surface water storage and discharge to the local surface water sewer.

SITE CONDITIONS

The site slopes from the front to the rear of the property approximate datum of 9.95m falling to 8.00m.

There is a Network Rail tunnel in the adjacent road. As such we would want to minimise excavation depths, therefore, below ground tanks are unlikely to be feasible.

FLOOD ZONE CATEGORY

The lowest part of the site 8.00m datum falls outside of any flood risk as defined by the Environment Agency flood zone.

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THE DIFFERENT SUDs TECHNOLOGIES

Technologies	Description	Advantage	Disadvantage	Feasibility	Potential
LIVING ROOFS (GREEN ROOFS)	A living roof is a multi-layered system covering the tops of buildings with vegetation. These roofs can be designed to be extensive and covered with low-growing low-maintenance plants.	Attenuate the rainwater run-off. Visual enhancement of the building. Reduces pollution. Introduces more wild life to the urban environment.	Can be high maintenance. Can look unsightly if plant colonisation has not been design properly. Roof pitch may be compromised.	Living roofs are considered a feasible option for these buildings.	☺
RECYCLING/ RAINWATER HARVESTING (BELOW GROUND)	These are package tank filtration units below ground.	Recycling of the rainwater for flushing toilets, laundry use and for watering the landscape areas. Simple water butts are inexpensive. Convenience - Rainwater collection provides a convenient source of water at the immediate place where it will be used or consumed. Systems are Flexible and Adaptable - Rainwater collection systems can be adapted to suit most individual circumstances and to fit most developments.	High capital investment required for packaged filtration units. Water Supply is Climate Dependent - Droughts or long periods of time with little or no rain can cause serious problems with your supply of water Storage Capacity Limits Supply - The supply of water from a rainwater collection system is not only limited by the amount of rainfall but also by the size of the collection area and your storage facilities.	Below ground storage is not suitable for this development due to Network Rail tunnel in the adjacent road. .	☹

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RECYCLING/ RAINWATER HARVESTING (ABOVE GROUND)	These are above ground simple water butts or package tank filtration units.	Recycling of the rainwater for flushing toilets, laundry use and for watering the landscape areas. Simple water butts are inexpensive. Convenience - Rainwater collection provides a convenient source of water at the immediate place where it will be used or consumed. Systems are Flexible and Adaptable - Rainwater collection systems can be adapted to suit most individual circumstances and to fit most developments.	High capital investment required for packaged filtration units. Water Supply is Climate Dependent - Droughts or long periods of time with little or no rain can cause serious problems with your supply of water Storage Capacity Limits Supply - The supply of water from a rainwater collection system is not only limited by the amount of rainfall but also by the size of the collection area and your storage facilities.	Above ground rainwater storage is considered to be a feasible option for these buildings.	☺
PERMEABLE PAVING & HARD STANDING SYSTEMS	Porous pavements and hard standings are a load bearing structures that are permeable to water. Systems Types: POROUS CONCRETE PERVIOUS ASPHALT BLOCK PAVERS	Reduce storm water runoff velocity and volume by: • limiting the amount of impervious surface area on a site • encouraging infiltration of surface runoff • detaining and slowly releasing water from a site. Water quality improvement is achieved through: • filtering through the pavement media and underlying material • potential biological activity within the base and sub-media • reduction of pollutants through reduced runoff volumes.	Permeable paving/hard standing is not ideal for high traffic/high speed areas because it has lower load-bearing capacity than conventional pavement. Nor should it be used on storm water "hotspots" with high pollutant loads because storm water cannot be pre-treated prior to infiltration. Limitation on where these systems can be used: high water tables, saline soils, acid sulphate soils and runoff from areas expected to have a high sediment load. Prone to clogging if not maintain.	This option needs further investigation as to the nature of the sub-soil, site contours and existing sewer connections and inverts.	😐

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SOAKAWAY SYSTEMS	The purpose of a soak away system is to separate the foul and storm water. The soak away collects and stores the storm water using either perforated concrete rings or a series of durable crates that interlock and surrounded by a membrane and sunk in the ground. They can be installed under drive ways or in the garden, once connected the soak away is covered with aggregate, backfilled with spoil and re-turfed. Following a downpour and over a number of hours the contained water will efficiently disperse into the adjacent soil	Reduce storm water runoff velocity and volume by: • encouraging infiltration of surface runoff • detaining and slowly releasing water from a site. Prevent flash floods from blocking and overflowing the foul drains on a one pipe (combined drains) system property	Limitation on where these systems can be used: high water tables and runoff from areas expected to have a high sediment load. Prone to clogging and slitting up.	Soak ways may not be suitable for this development due to the sub-soil conditions and Network Rail tunnel in the adjacent road.	☹
ON-/OFF-LINE STORAGE	Tanked storage is provided to detain runoff on site and release it at the required rate into the receiving watercourse or sewer, thus reducing peak storm flows from a site. The tanks can take the form of oversized pipes, concrete tanks, corrugated steel pipes and plastic cellular tank systems, among others.	Reduce storm water runoff velocity and volume by detaining and slowly releasing water from a site. Well understood both in design and construction terms. Does not take up large amounts of site area and can be located under most areas of a site. Can be combined with porous pavements and hard standings systems.	Does not provide any treatment of runoff. Can require deep excavations if a large storage volume is necessary. Requires slit removal.	This option needs further investigation as to the nature of the sub-soil, site contours and existing sewer connections and inverts.	☺

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PERMEABLE CONVEYANCE SYSTEMS	These systems allow storm water to move slowly towards a receiving watercourse, allowing storage, filtering and some loss of water before the outfall. French drains are underground examples of this technique, in which a trench is filled with gravel and often wrapped in geotextile membrane into which runoff is led either directly from the drained surface or via a perforated pipe system.	Runoff velocity is slowed and infiltration into the ground can occur. The granular material surrounding the pipe serves to filter the runoff, removing some of the organic matter and oils, which can then be broken down by bacterial action over a period of time.	Limitation on where these systems can be used: high water tables and runoff from areas expected to have a high sediment load. Prone to clogging and slitting up.	This option needs further investigation as to the nature of the sub-soil, site contours and existing sewer connections and inverts.	
SWALES AND INFILTRATION BASINS	Swales are grass lined ditches which are used for the conveyance, storage and infiltration of surface runoff. Infiltration basins are dry retention ponds within landscaped areas, which are usually grass lined and regularly mown	Maintenance is at the ground surface (i.e. grass cutting). Can be included in landscaping features so as to minimise their visual intrusion.	UK sewerage undertakers do not favour infiltration basins because they lack positive outfalls. Maintenance access and safety against public risk of drowning are a concern. Can take up large areas of development land.	This particular development does not lend its self to this system of sustainable drainage and therefore will not be considered.	
PASSIVE TREATMENT SYSTEMS **BIORETENTION AND BIOFILTRATION**	The principle here is to utilise natural processes to remove pollutants from storm water, either in filter strips upstream of other source control techniques or in constructed lagoons at the end of the pipe system. Dry ponds are designed to temporarily store storm water for a few hours to allow for the settlement of solids	Ideal for larger landscaped drainage systems, for dealing with the quantity of storm water from developments and also filtering runoff through an aerobic plant, soil and microbe complex to capture, remove and cycle pollutants.	All these systems will require maintenance and the periodic removal of silts. Maintenance access and safety against public risk of drowning are a concern. Can take up large areas of development land.	This particular development does not lend its self to this system of sustainable drainage and therefore will not be considered.	

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APPRAISAL

 **Considered**  **Investigation required**  **Not considered**

There are three potential options, LIVING ROOFS (GREEN ROOFS), RECYCLING/RAINWATER HARVESTING (ABOVE GROUND) and ON LINE STORAGE, to reduce and delay water run-off form hard surfaces of the development to the public surface water sewer, thus reducing the risk of localized flood and other environmental damage. Also to provide rainwater harvesting for toilet flushing, laundry and garden irrigation, thus reducing the on line surface water storage and discharge to the local surface water sewer.

PROPOSED DRAINAGE STRATEGY

Living roofs surface water run-off, plus a percentage of the permeable surface run-offs will be stored within above ground individual rainwater harvesting tanks in each garage. The water stored will be used for toilet flushing, laundry and garden irrigation.

Overflows from the rainwater harvesting tanks and hard standing surface water run-off, plus a percentage of the permeable surface run-offs will be stored within storage blocks, with a restricted flow outlet (pumping) to the existing combined manhole at the boundary of the properties.

The sustainable drainage scheme shall be designed in accordance with the Local Authority Planning and Building Control requirements and BS EN 752-4.

The drainage features shall be sized to contain the peak **1:100 year storm event plus 30% extra** (less the restricted surface water discharge from the site based on the peak 1:1 year storm event) for global warming in accordance with PP25's climate change requirements, less the reduced living roofs run-off and the amount of storage required for rainwater harvesting.

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DESIGN CRITERIA

Pre-development restricted surface water run-off – 1 in 1 year design storm frequency

Post-development Design Storm/flooding frequency – 1 in 100 year design flooding frequency

Volumetric run-off coefficient – 1.0

Impermeable run-off – 100%

Permeable run-off – 10%

Living Roofs run-off – 54% Average over the whole year, taken from the German FLL Guide Lines for Green Roofs

DESIGN PROCEDURE

1. Design and analysis of urban storm drainage – WALLINGFORD PROCEDURE – Volume 4, The Modified Rational Method
2. Royal Horticultural Society Guidance on the water requirements for land irrigation

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OUTLINE CALCULATIONS

Pre-development restricted surface water run-off:

Measured impermeable area = 342 m² @ 100% = 342 m²

Measured permeable area = 374 m² @ 10% = 37.40 m²

Total = 379m²

1 in1 Year Storm duration In minutes	Rainfall (mm)	Run-Off Area (m²)	Total Run-Off (m³)
5	5	379	2.00
10	7	379	2.65
15	7.5	379	2.84
20	9	379	3.41
30	10	379	3.79
60	**13**	379	**4.93**
120	17	379	6.44
240	19	379	7.20
360	22	379	8.34
600	25	379	9.48
1440	36	379	13.64

Pre-development restricted surface water run-off = **1.37 l/s per hour**

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Post-development surface water run-off:

Measured impermeable area = 435 m^2 @ 100% = 435 m^2

Measured permeable area = 133 m^2 @ 10% = 13.30 m^2

Measured Green Roof area = 149 m^2 @ 54% = 80.46 m^2

Total = 529m^2

1 in 100 Year Storm duration In minutes	Rainfall (mm)	Run-Off Area (m^2)	Total Run-Off (m^3) Inflow	Total Run-Off (m^3) Outflow	Total Storage (m^3)
5	13	529	6.88	0.41	6.47
10	19	529	10.05	0.82	9.23
15	24	529	12.70	1.23	11.47
20	28	529	14.81	1.64	13.17
30	32	529	16.93	2.47	14.49
60	41	529	21.69	4.93	**16.76**
120	50	529	26.45	9.86	16.59
240	56	529	29.62	19.73	9.89
360	63	529	33.33	29.59	3.74
600	69	529	36.50	49.32	-
1440	91	529	48.14	118.37	-

Plus 30% Global Warming = 16.76 + 5.03 = 21.79 m^3

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Therefore the storage volume required is **22 m³ without any adjustment for rainwater harvesting**

RAINWATER HARVESTING

WATER COLLECTED:	
Roof Area (sq meters)	435
Rain Fall per Year (25 Year Average in mm)	500
Annual Volume (litres)	217500
Less 20% for loses	43500
Totals	**174400**

TOTAL RECYCLING WATER USAGE: per ANNUM						
	No	**Flushes**	**Litres**	**Days**	**Weeks**	**Totals Litres**
W.C.'s Male	10	1.5	6	6	50	27000
W.C.'s Female	10	3	6	6	50	54000
Urinals						0
Laundry	5		5	6	50	7500
Irrigation	133m² x 2.4litre/day/m² x 18 weeks					40219
External taps						
Others						
Totals						**128719**

The above is based on 3 flushes/female/day and 1.5 flushes/male/day if urinals are installed, if not 3 flushes/male/day

Irrigation is based on 2.4litre/day/m² x 18 weeks of evaporation over 18 week Summer period as recommended by the Royal Horticultural Society

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RECOMMENDED TANK SIZE TO GIVE 21 DAYS CONTINUOUS SUPPLY WITHOUT RAIN	
Water required (litres)	**128719**
21 day storage (litres)	**7426**

FINAL SURFACE STORAGE VOLUME REQUIREMENT

Storage without any adjustment for rainwater harvesting = **21.79 m³**

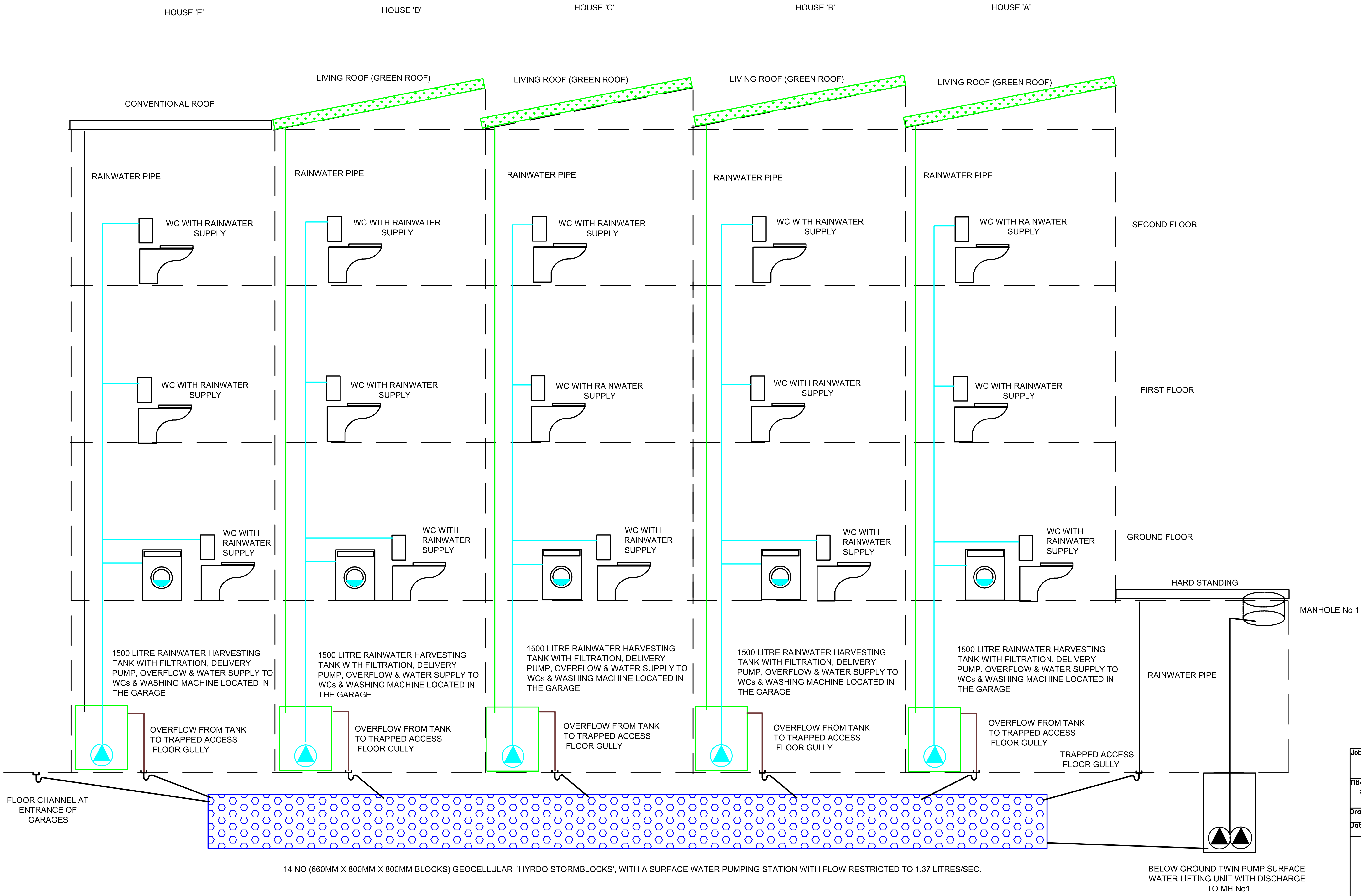
Storage with adjustment for rainwater harvesting = 21.79 m³ - 7.40 m³ = **14.39 m³**

The above is based on 3 flushes/female/day and 1.5 flushes/male/day if urinals are installed, if not 3 flushes/male/day
Irrigation is based on 2.4litre/day/m² x 18 weeks of evaporation over 18 week Summer period as recommended by the Royal Horticultural Society

CONCLUSION

1. **Surface water storage shall be provide by 14 No (660mm x 800mm x 800mm blocks) Geocellular 'Hyrdo Stormblocks', with a surface water pumping station with flow restricted to 1.37 litres/sec.**

2. **Rainwater harvesting shall be provided by a 5 individual 1.5 m³ above ground GRP package rainwater harvesting tank with an emergency overflow to the surface water storage.**



Job: ELSWORTHY RISE/ADILADE ROAD	
Title: SUDs SCHEMATIC LAYOUT	
Drawn: BG	**Scale:** NTS
Date: JULY 2012	**Checked:**

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Drg. No. 718/SK/01

APPENDIX F

PHOTOGRAPHS

View from Elsworthy Rise to Rear of Existing Building

View from Adelaide Road to Front of Existing Building

Rear of Existing Building

APPENDIX G

COMPANY PROFILE

SINCLAIRJOHNSTON

Sinclair Johnston & Partners Limited

Consulting Civil and Structural Engineers.

The Practice was established in 1983 to provide high quality, independent, professional advice on building structures.

Based in London we provide services on projects throughout the British Isles. specialising in complex projects requiring innovation and a high degree of investigation, understanding and design.

The philosophy of the Practice is one of teamwork providing 'Excellence in Design.'

Our portfolio includes a diverse range of projects from new build and alterations to historic buildings. New build projects include retail developments, offices, schools, hospitals, doctor's surgeries and exclusive residential developments. Specialist structural engineering advice is provided on the appraisal, repair and alterations of historic buildings and Scheduled Ancient Monuments.

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William Ellis School, Hampstead

Galvanised Steel Hanger Connection
Wimbledon Bridge, Wimbledon

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- Conservation Engineering
- Foundation Engineering
- Reinforced Concrete Design
- Steelwork Design
- Masonry Design
- Timber Engineering
- Investigation and Reports
- Litigation Support
- Acquisition and Investment Inspections and Reports
- Development Monitoring and Advice

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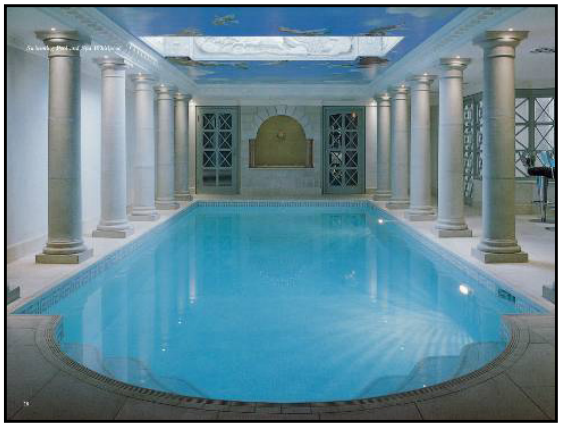
Basements

Smith Street, SW3: Two storey basement under existing house on very tightly constrained site with neighbouring 6 storey buildings.



Tregunter Road, SW10: Project to link house and lodge into single dwelling by adding basement sports complex under garden between the two.

Norland Square, W11: contentious planning application for large basement extending under and beyond this Grade II listed house approved after input from Sinclair Johnston & Partners Ltd mitigated neighbours' concerns regarding adjoining houses and nearby large trees.

Sinclair Johnston & Partners are advising on a large number of residential and commercial scale basement projects. These range from simple underground extensions within the footprint of the existing structure to basements several storeys deep and extending beyond the building itself and under the surrounding grounds, possibly linking several buildings together.

Our work in this field falls into two main areas:

- Structural design and method statements for underpinning, temporary propping and construction.
- Structural reports in support of planning applications.

In any project of this nature, thorough investigation of site conditions is crucial, especially as many projects around London occur in tightly constrained sites with large buildings either side and, in some places, tunnels for the London Underground below. Our long term experience in this work enables us to establish the structural situation early in the design process and advise accordingly.

Sinclair Johnston is a member of the Pyramus & Thisbe Club and is able to act as party wall surveyor in these projects.

Client: **Miscellaneous.**

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project sheet

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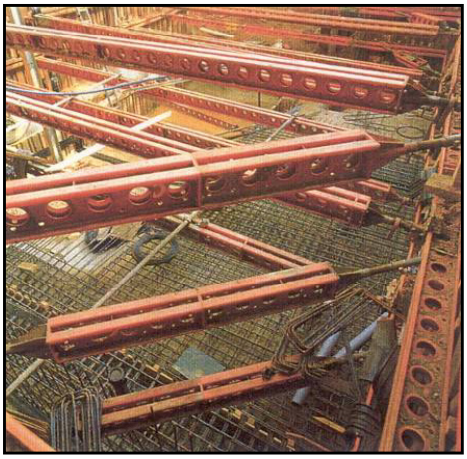
Excavations



Propping to temporary retaining wall.

King post construction and temporary propping

Contiguous bored pile retaining wall and capping beam.

There are several methods of providing secure temporary propping to excavations. Usual practice is for the final details and procedures to be worked up by the selected contractor into a method statement which is agreed by the structural engineer.

Raking struts may be of heavy timber or mild steel sections or, more usually, of purpose-made, heavy duty props by Mabey or RMD. Selection of propping method depends on soil conditions, depth of proposed excavation, surcharge from adjoining buildings and access for piling rigs and other heavy equipment.

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Conservation Engineering

Specialist structural engineering advice is provided on the appraisal, repair and alterations of Historic Buildings and Scheduled Ancient Monuments.

Essentially our philosophy is that of the SPAB (Society for the Protection of Ancient Buildings) – conservative repair, retention of the existing structure where practicable and the insertion of new structure only when essential. This is put into practice by careful research of the history of the building to identify its construction, earlier alterations and detrimental effects of previous usage; followed by thorough investigation of the structural fabric, by visual inspection and selective, well-targeted exploratory works.

We consider that historic buildings benefit from a pragmatic approach based on experience, engineering judgement and attention to detail rather that theory or excessive calculation. We aim to maintain a balance between respect for the historic fabric and the need for commercial viability.

We are able to call on specialists in all materials and techniques and have good working relationships with English Heritage, Conservation Officers and amenity societies

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