

Flood Risk Assessment (Rev. E)

Athlone House, London

October 2013



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Abbreviations

- EA Environment Agency
- FFL Finished Floor Levels
- FRA Flood Risk Assessment
- AOD Above Ordnance Datum
- NPPF National Planning Policy Framework
- SFRA Strategic Flood Risk Assessment
- SUDS Sustainable Drainage Systems
- LDD Local Development Documents
- LPA Local Planning Authority

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16756
October 2013
Revision E

1. Introduction

Price & Myers have been commissioned to undertake the Flood Risk Assessment (FRA) for the proposed redevelopment of Athlone House in Highgate, London.

This FRA has been carried out in accordance with the National Planning Policy Framework (NPPF), along with advice and guidance from the Environment Agency (EA), London Borough of Camden Guidance and CIRIA documents.

The NPPF states that an appropriate FRA will be required for all development proposals of 1Ha or greater in Flood Zone 1, or for any development within Flood Zones 2 or 3. Although the development area is less than 1 Ha, the site is larger than 1Ha and is located within Flood Zone 1. Therefore the FRA must be focused on surface water management along with assessing the flood risk from groundwater and overland flows.

2. Site Description and Location

The subject site location is shown in Figure 1. The site occupies an area of approximately 2.66 Ha at OSGR TQ 278874 and is located in Highgate, North London. It is bounded to the south by Hampstead Heath and to the east by a residential development. Published information shows that the site is located on the crest of the hill at an average level of 112.9 AOD. An existing house with the associated hard landscaped areas currently occupies the eastern half of the site. Access is available by Hampstead Lane approximately 30m away from the northern boundary of the site. The existing development is shown in Figure 2.

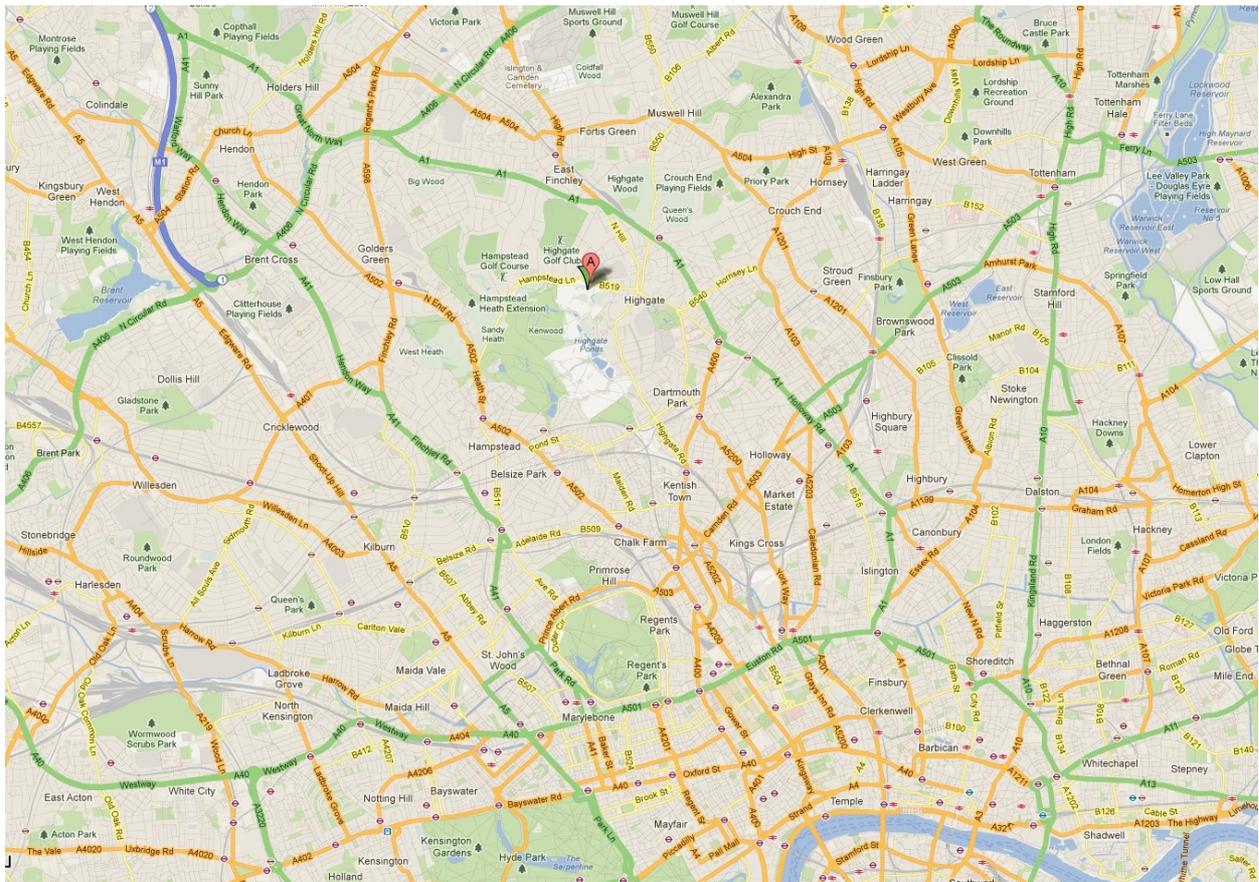


Figure 1. Site Location



 SITE BOUNDARY

Figure 2. Site Boundary & Existing Development

The site co-ordinates are at grid ref OS 527819, 187450

The site postcode is N6 4RU

Latitude North 513417

Longitude West 00925

3. Development Proposal

It is proposed that the site will be redeveloped for residential purposes. The proposals involve the demolition of the existing house and the construction of a new three-storey detached house with a basement. The proposals will have a minor affect on the external areas. Access to the development from the main Driveway will be maintained. See Figure 3 for development proposals.

Figure 3. Development Proposals



4. Flood Risk Assessment

4.1 Flood Risk from Watercourses

There is no risk of flooding from Rivers as identified on the Environment Agency's (EA) indicative flood outline map. The map shows that the site lies within Flood Zone 1 (Figure 4).



SITE LOCATION

Figure 4. Environment Agency Indicative Floodplain Map

4.2 Flood Risk from Groundwater

The ground investigation report for the site issued by GEA (ref.no J12224), on 22nd October 2012, states that the groundwater level is approximately 10m below ground level and 3m below proposed formation level. This report also confirms that water features and spring lines close to the site provide good indication of the depth of the groundwater which is well below the depth of the proposed development. In this regard it is expected that groundwater will remain beneath the basement.

In addition to the above, made ground extends approximately 0.8m-1.5m below ground level and overlays the London Clay. This is also in line with the Geological Survey map of the area (Sheet 256) which shows that the site is underlain by the Claygate Member of the London Clay formation. Therefore, the flood risk from ground water is low as a thick clay (impermeable) layer prevents groundwater from rising near the ground surface.

The ground investigation report also states that *"The site is situated at the crest of the hill and groundwater flow is in a southerly direction"*. This confirms that groundwater flows downstream of the site. Therefore, the proposed development and in particular the new basement will not affect the local hydrogeology and subsequently will not increase the flood risk to the surrounding areas. However, the ground investigation report's recommendations must be fully considered in the

design and construction of the basement as perched water can affect the basement structure. Engineering techniques will be applied to waterproof the below ground structure.

North London's Strategic Flood Risk Assessment (SFRA) also states that there is a very small potential for groundwater flooding due to rising groundwater within the Camden area. This is reinforced by the impermeable geology of the ground strata and the on-going Gardit process which aims in maintaining stable the groundwater level across London. Figure 5 shows the reported flood incidents in this area (it must be noted that this map covers all forms of flooding including groundwater). The map shows that the emergency services have been contacted in the past for a flood incident near the site. However, it is thought that the flooding was related to Emergency Planning Unit flooding.

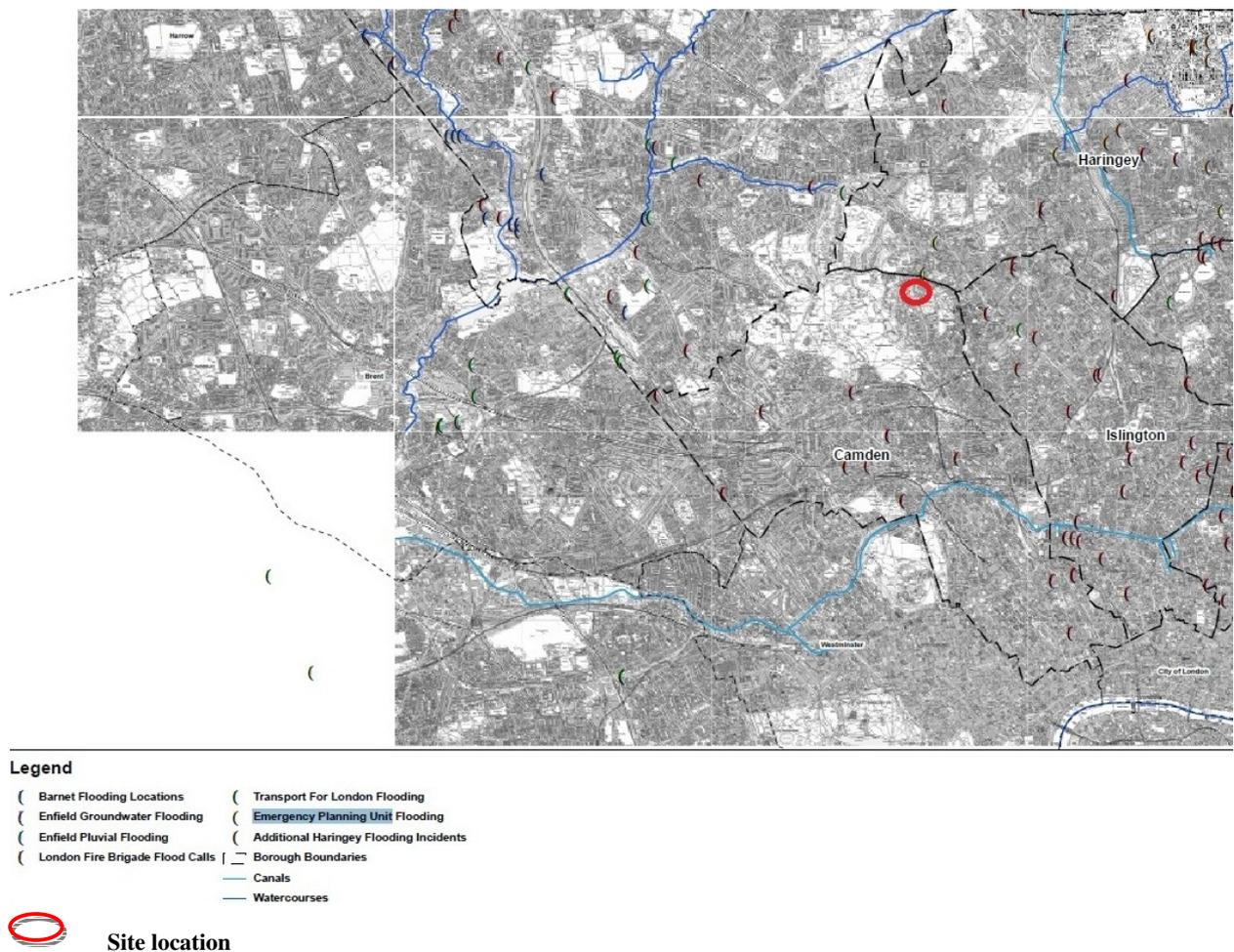
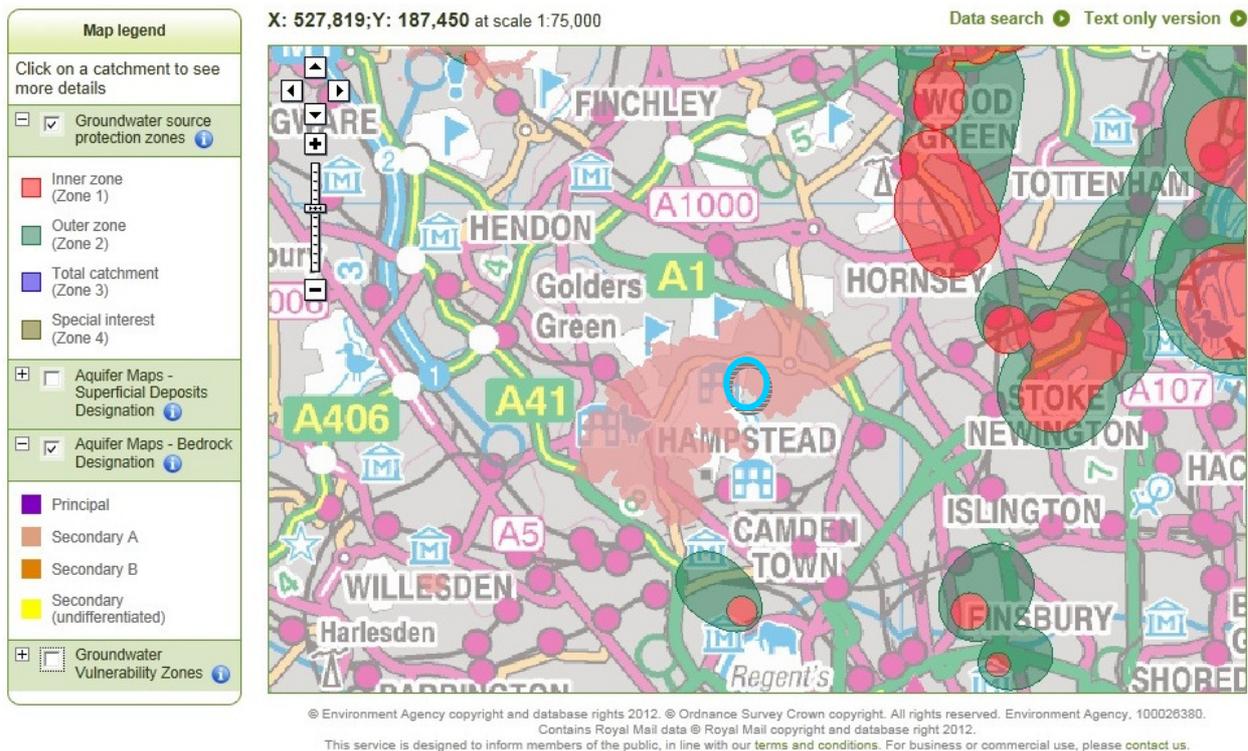


Figure 5. Flood map (Extract from SFRA)

The EA's groundwater source protection zones map also confirms that the site is outside the source protection zones but it is underlain by an Aquifer (Figure 6). This is classified as a secondary "A" Aquifer and is expected to be located well below the basement.



Site Location

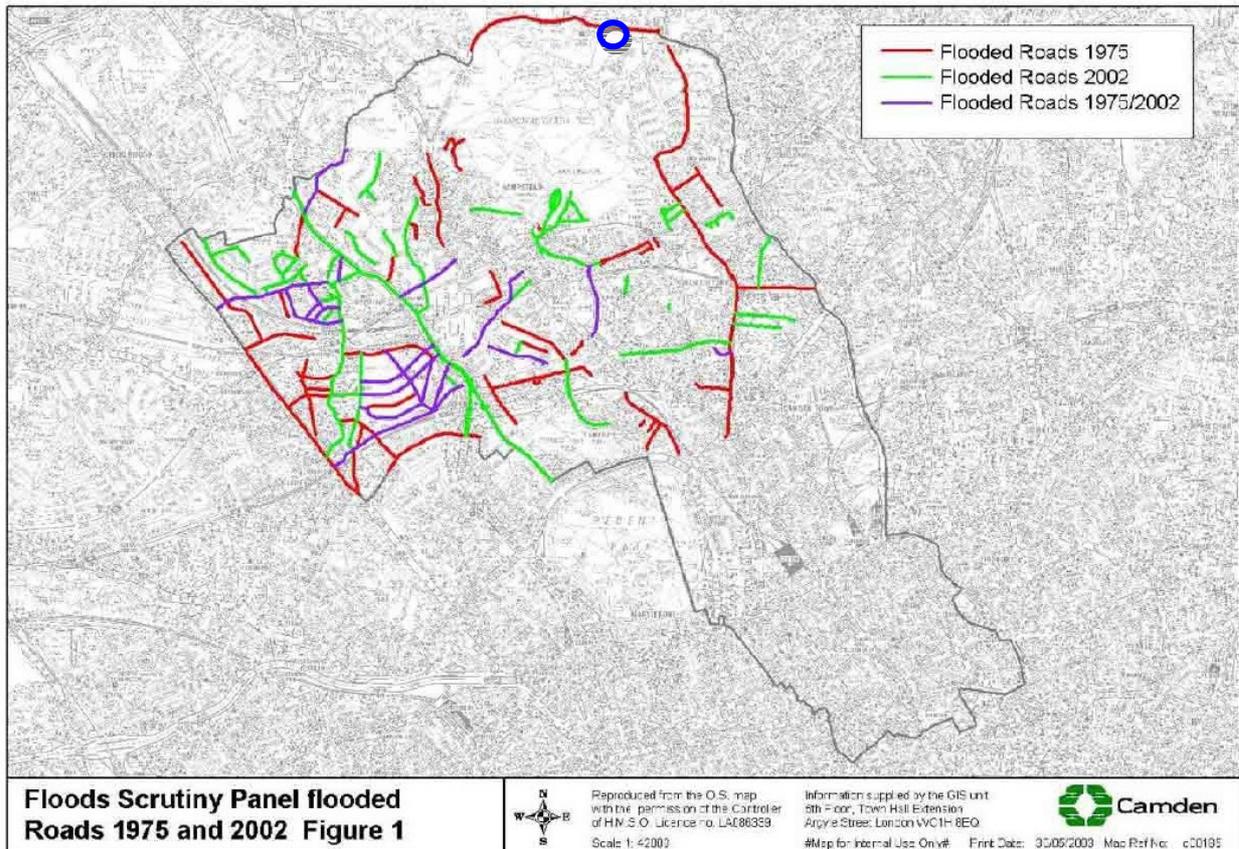
Figure 6 . Environment Agency Groundwater Source Protection Zones Map

4.3 Flood Risk from Sewers and Overland Flows

The SFRA states that *“the flood event on the 7th August 2002 was caused by excessive rainfall causing the main sewer system to become completely inundated. The surcharge pressure forced the water to back onto the streets through manholes and gully gratings and into residents’ homes at basement and ground floor level. It was stated that “Any blocked or otherwise deficient Camden Council highway gullies could not have caused flooding on this scale as the flood water could not drain to the trunk sewer”. “Floods in Camden” report, prepared by London Borough of Camden in June 2003 provides a map that shows which roads and areas were flooded in 1975 and 2002 floods. This report also names the roads that were flooded in these two storms. In accordance with this document, Hampstead Lane was affected in the 1975 flood event (See Figure 7).*

The topography of the area shows that the site is located at the crest of the hill. The proposed development will be constructed on a level platform (around 112.65 AOD). The ground floor level (112.85 AOD) will be slightly lower than the Hampstead Lane road levels, however the topographical survey drawing shows that the ground levels between the house and the Hampstead Lane are above the road levels. Therefore there are no overground flow paths between Hampstead Lane and the house and any flows will flow downstream away from the site.

It is also proposed that gravity drainage is constructed (where achievable) with backflow valves preventing flooding from surcharged sewers. Backflow prevention valves must be also provided for the pumped network that will serve the basement.



 Site Location

Figure 7. Historical Flood Records (Extract from Floods in Camden)

5. Run-off Assessment

Hardstanding and roof areas currently occupy approximately 0.50 Ha of the site area. The proposed development will reduce the impermeable area on site. It is proposed to remove the reported buried slab at the east of the existing house resulting in a reduction of the run-off rate.

In accordance with Environment Agency guidelines, the Building Regulations and Water Authorities advice, the preferred means of surface water drainage for any new development is into a suitable soakaway or infiltration drainage system. Sustainable Drainage Systems (SUDS) can reduce the impact of urbanisation on watercourse flows, ensure the protection and enhancement of water quality and encourage recharge of groundwater in a manner that mimics nature. However, the ground investigation report shows that infiltration is not feasible in this area. Therefore, attenuation to the public sewers is the only available option for this development. Detailed information about where the existing site currently drains was not available at the time that this report was prepared. However it is believed that either surface water runs freely at the adjacent soft landscape areas, or there are existing connections to the public sewers located in Hampstead Lane. Further investigation is required to assess if there are any existing connections to the public sewers and their condition.

The London Plan (dated 2009) requires new developments to attenuate surface water to the public sewers to Greenfield run-off rate. The Greenfield run-off rate from the hardstanding and roof areas is approximately 1.5 l/sec in the 1 in 100 year storm event as calculated with the FEH software. R&D technical Report W5-074/A/TR1 Rev.C re-issued in June 2007 states that “A *practicable*

minimum limit on the discharge rate from a flow attenuation device is often a comprise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. It is suggested that this is 5 l/sec using an appropriate vortex flow control device or other technically acceptable flow control device". Therefore, surface water from the site must be attenuated to 5 l/sec. This flow rate is also in line with Code for Sustainable Homes that requires surface water attenuation to existing rates for developments that increase the flow rates and volumes to the public sewers.

The run-off rate that the existing development generates in the 100-year storm event, was estimated based on the modified rational method:

$Q_{100} = 2.78 \times A \times i$ (where A is the catchment area in Ha and i is the rainfall intensity in mm/hour as estimated from the WinDes software).

$$Q_{100} = 2.78 \times 0.31 \times 107 = 92.2 \text{ l/sec.}$$

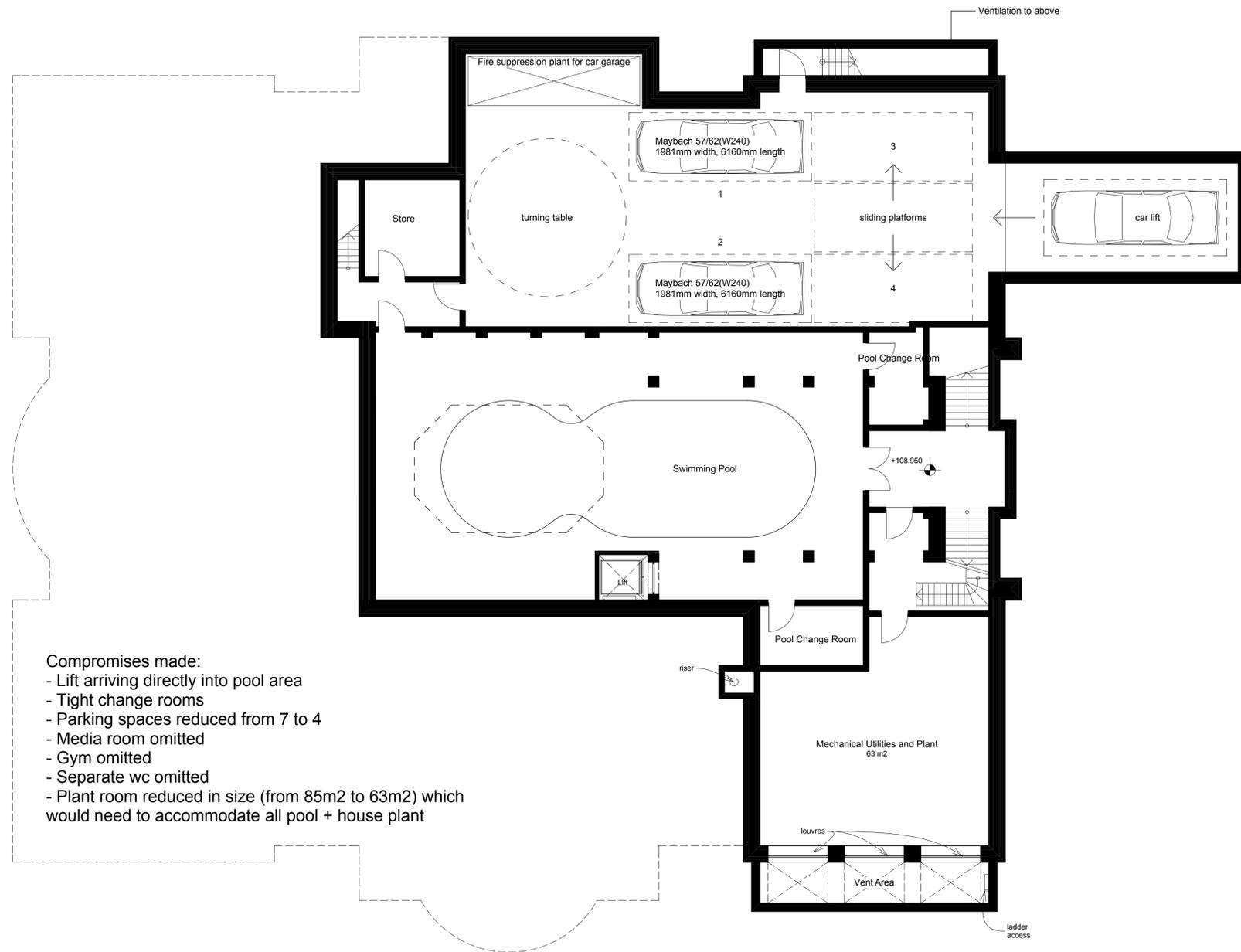
Preliminary calculations showed that the drainage system must be able to temporarily store 150m³ of surface water in the 1 in 100 year + 30% storm event. Attenuation can be achieved through Sustainable Drainage Systems (SUDS) such as ponds and/or attenuation tanks. The preferred means of surface water attenuation is through a pond. These components can be used to store rainwater but also enhance the aesthetics and amenity value of the site. Therefore it is proposed to temporary store surface water through a pond before discharging to the public sewers with a control rate. If site restrictions prove that this is not feasible then alternative means of surface water attenuation will be considered (i.e. attenuation tanks).

6. Conclusions & Recommendations

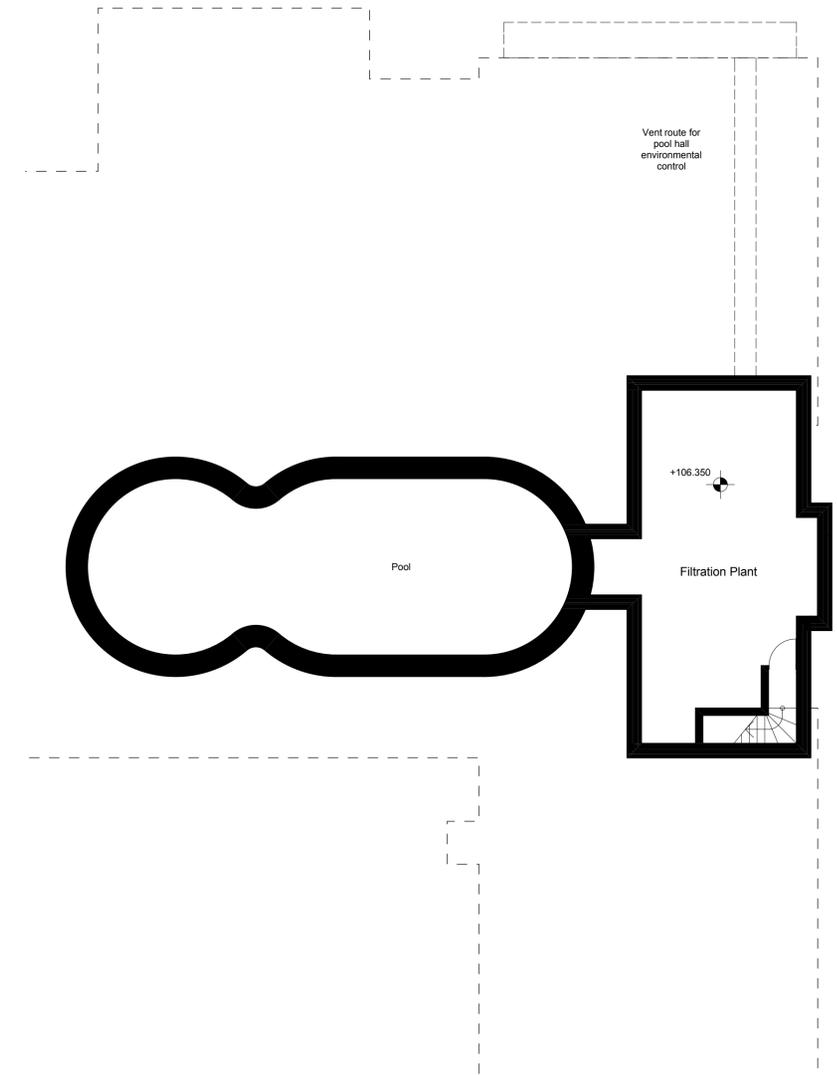
- In accordance with NPPF this site falls within flood zone 1. *Areas with little or no potential risk of flooding (annual probability less than 0.1% for fluvial flooding), which are already developed.* Residential developments in these areas have no restrictions provided that the basements are protected from overland flooding and the surface water drainage proposals will not increase the flood risk on site and the surrounding areas.
- The proposals will not affect the local hydrogeology, as the new basement will be constructed in impermeable ground conditions (London Clay). Therefore the proposed development will not increase the flood risk from groundwater on site or the surrounding areas.
- Attenuated surface water from the site will drain to the public sewers. Further investigation is required to assess if there are any existing connections to the public sewers and their condition. SUDS will be used for temporary surface water storage.
- Surface water will be attenuated to 5 l/sec providing 150 m³ storage into the new SUDS.
- Anti backflow valves will be provided preventing backflow from the public sewers from flooding the property.
- Therefore, the proposed redevelopment has an acceptable flood risk within the terms and requirements of the NPPF.

Appendix A Topographical Survey Information

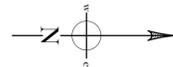
Appendix B Proposed Development Drawings



- Compromises made:
- Lift arriving directly into pool area
 - Tight change rooms
 - Parking spaces reduced from 7 to 4
 - Media room omitted
 - Gym omitted
 - Separate wc omitted
 - Plant room reduced in size (from 85m2 to 63m2) which would need to accommodate all pool + house plant



Sub-basement Plan



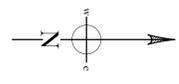
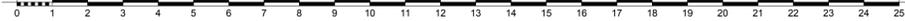
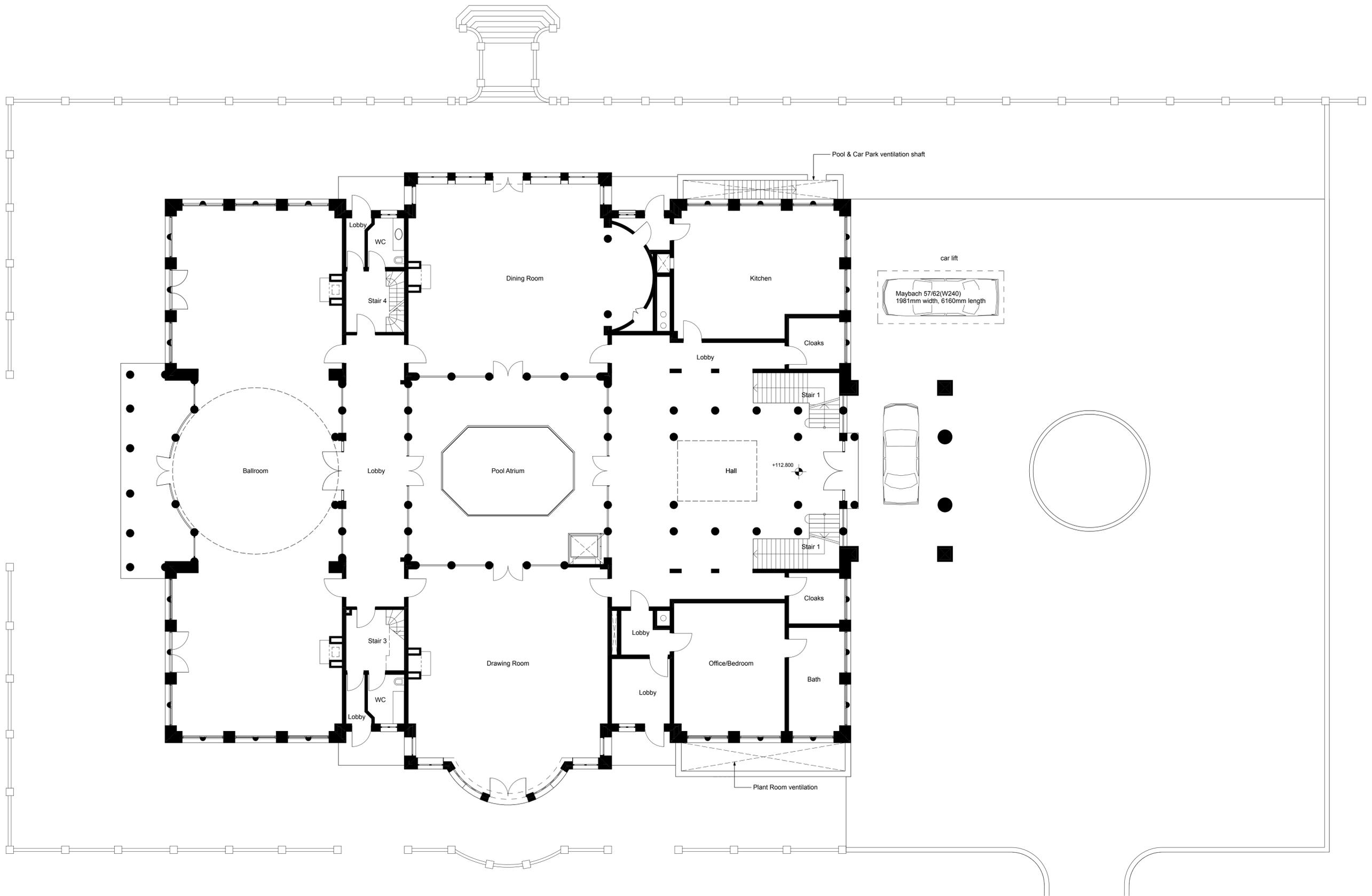
Adjacent Properties and Boundaries are shown for illustrative purposes only and have not been surveyed unless otherwise stated.
 If areas shown are approximate and should be verified before forming the basis of a decision.
 Do not scale, except for planning purposes.
 If dimensions must be checked by the contractor before commencing work on site.
 No deviation from this drawing will be permitted without the prior written consent of the architect.
 The copyright of this drawing remains with the architect and may not be reproduced in any form without prior written consent.
 Ground Floor Slabs, Foundations, Sub-Structures, etc. If work below ground level is shown provisionally. Inspection of ground condition is essential prior to work commencing. Reassessment is essential when the ground conditions are apparent, and redesign may be necessary in the light of soil conditions found. The responsibility for establishing the soil and sub-soil conditions rests with the contractor.

NOTE:
 The internal accommodation arrangement shown is provisional at this stage.

Rev. Date Description Initials

Project Athlone House
 Title Basement Plan
 Date November 2012
 Scale 1:100 @ A1
 Drawing No. 5021A/003
 Drawn by AG

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Project Athlone House
 Title Ground Floor Plan
 Date July 2012
 Scale 1:100 @ A1
 Drawing No. 5021A/004
 Drawn by AG

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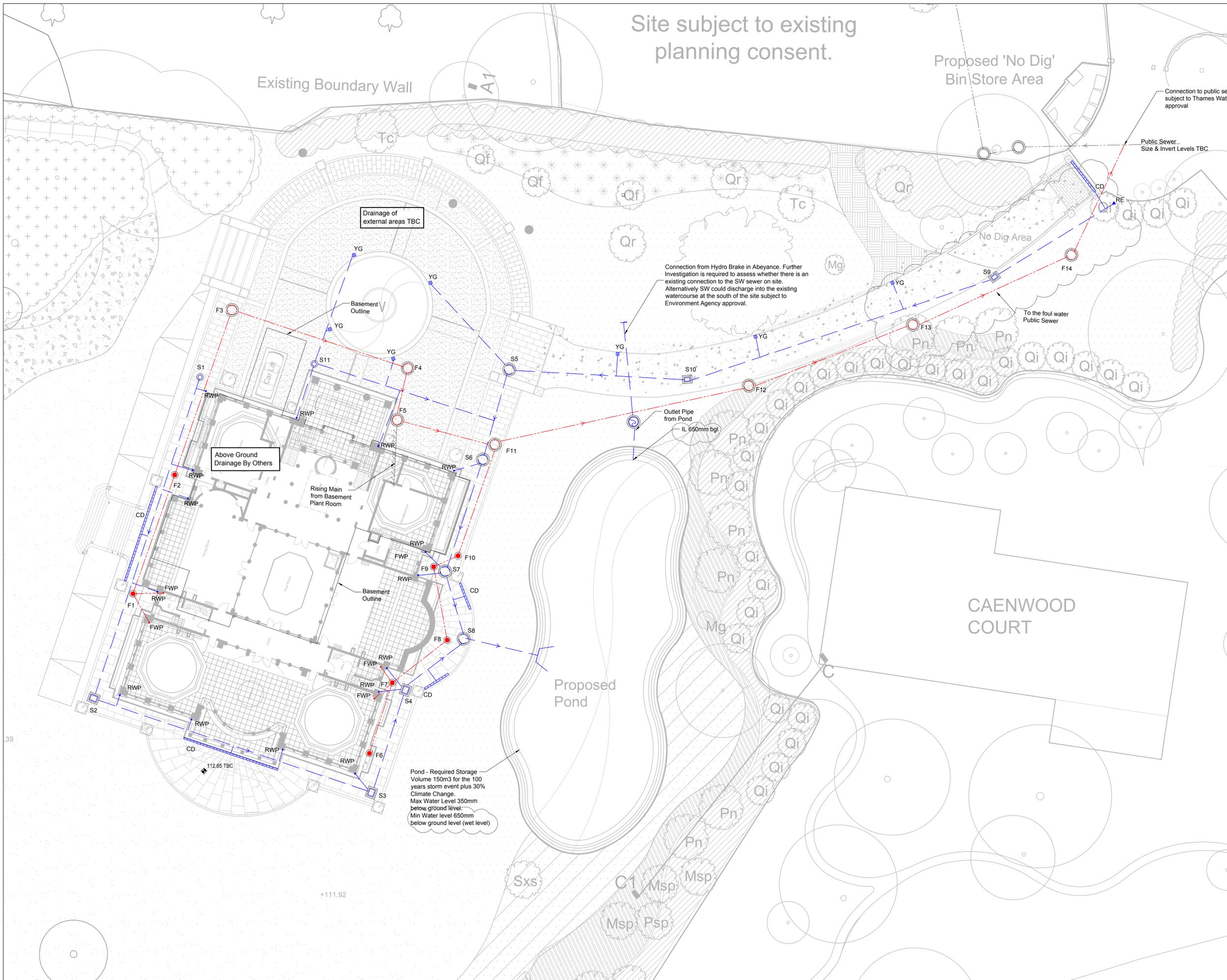
Rev.	Date	Description	Initials

Appendix C Proposed Drainage Layout

Site subject to existing planning consent.

Proposed 'No Dig' Bin Store Area

Existing Boundary Wall



Notes :

1. This Drawing is to be read in conjunction with all relevant Architect's Engineer's and specialists' 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 the intended scale this bar should be 50mm long @ A1 or 25mm long @ A3.
3. Health & Safety : All specific drawing notes are to be read in conjunction with the project "Information Pack" and "Site Rules".
4. This drawing is for information only.
5. All drainage points are indicative and TBC by others.
6. Connection to public sewers subject to Thames Water approval.
7. All pipework to be vitrified clay U.N.O
8. Above Ground Drainage By Others.

DRAINAGE LEGEND

New FW Sewer	
New SW Sewer	
Rising Main	

DRAINAGE KEY

	RWP	Rainwater Down Pipe
	FWP	Foul Waste Pipe
	YG	Yard Gully
	CD	Channel Drain
	RE	Rodding Eye
	S1	Surface Water Manhole Chamber
	F1	Foul Water Manhole Chamber

ABBREVIATIONS

FW	- Foul Water Manhole
SW	- Surface Water Manhole
FWP	- Foul Waste Pipe
RWP	- Rainwater pipe
YG	- Yard gully

INFORMATION ONLY

P4	03.10.13	SG	SG	Issued for Planning-Revised as shown-Revised Landscape plan
P3	01.07.13	SG	SG	Issued for Planning-Revised as shown
P2	17.06.13	SG	SG	Issued for Planning
P1	14.05.13	SG	SG	Issued for Information
Rev	Date	Drawn	Eng	Amendment

ATHLONE HOUSE

BELOW GROUND DRAINAGE PROPOSALS

Drawn TQ Eng SG

Scales 1:200 at A1 at A3

Drawing No Rev

16756_D01 P4

PRICE & MYERS

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Pond - Required Storage
 Volume 150m³ for the 100 years storm event plus 30% Climate Change.
 Max Water Level 350mm below ground level.
 Min Water level 650mm below ground level (wet level)

Connection from Hydro Brake in Abyeance. Further Investigation is required to assess whether there is an existing connection to the SW sewer on site. Alternatively SW could discharge into the existing watercourse at the south of the site subject to Environment Agency approval.

Connection to public sewer subject to Thames Water approval

Public Sewer Size & Invert Levels TBC

To the foul water Public Sewer

Above Ground Drainage By Others

Drainage of external areas TBC

+111.92

39