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# Report on Ground Water for Athlone House, Hampstead Lane N6

September 2003

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# REPORT
# ON
# GROUND WATER

## Athlone House
## Hampstead Lane
## London N6

Client: **Dwyer plc**

Ref: LBH2921(a)

SEPTEMBER 2003

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*This report has been prepared in accordance with the LBH Wembley Quality Manual.*

*The investigation was performed, where applicable, in accordance with the LBH Wembley Procedure Manual and LBH Wembley Design Guidance Notes.*

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## 1.0 INTRODUCTION

Consideration is being given to the redevelopment of this site through the demolition of a number of existing hospital buildings and the construction of three residential buildings which are to include a linked area of basement car parking.

A site investigation was carried out by LBH Wembley Geotechnical & Environmental in June 2002 (report No. LBH2921).

This report has been prepared as a planning document to specifically address the hydrological aspects of the site in the context of the proposed development.

## 2.0 THE SITE

The site is located in an elevated position near the top of Highgate Hill, on a southwest facing slope that overlooks Hampstead Heath. The approximate National Grid reference of the site is 527700 187400.

The proposed development area lies to the east of Athlone House itself and is occupied by buildings and grounds associated with the hospital. The bulk of the area stands approximately level with the house, but the ground falls locally away towards the southeastern site boundary. The head of a small valley containing a series of ornamental pools lies a short distance beyond the site boundary, in the grounds of the adjacent Beechwood House.

A small unkempt ornamental pond is located within the southern part of the development area, near the southeastern boundary. The site boundaries are bordered by overgrown shrubberies, but there are also a number of very substantial mature trees present scattered around the development area.

### 2.1 Site History

Athlone House was originally called Caenwood Towers and was constructed in 1871, incorporating an earlier house on the site that was known as Fitzroy House. The current development area itself then formed a part of the grounds to Caenwood Towers which were previously the site of the neighbouring property that was known as Duffcrin Lodge, demolished in 1871.

In 1914, at the outbreak of the First World War, Caenwood Towers was requisitioned for the temporary housing of Belgian refugees before being taken over for use as the American Hospital for English Soldiers until the end of the war, when the site was apparently handed back to its owners.

By 1935, the ornamental pond referred to earlier had been constructed.

Following the outbreak of World War Two, the house was once again requisitioned by the Government and used as the official headquarters for a series of RAF units. After the war, the house and grounds were passed to the Ministry of Health for use as a hospital, at which point the house was renamed Athlone House.

Following the adoption of the site as a hospital, a number of new buildings were constructed across the northeastern portion for nurses' accommodation and ancillary buildings.

The sequence of ornamental pools located in the adjoining property, Beechwood, appear to have been constructed soon after the end of the War.

## 3.0 GROUND CONDITIONS

The Geological Survey map of the area shows the geological strata to have a sub-horizontal dip in this area. The site itself is indicated to be underlain by soils of the London Clay Formation, commencing with its uppermost division, the Claygate Member. Stratigraphically younger (hence overlying) soils of the Bagshot Formation are indicated capping the very top of Highgate Hill a relatively short distance to the east of the site.

From the findings of the site investigation carried out in early summer 2002, it is known that the ground conditions comprise a thin layer of made ground / topsoil resting on a variable sequence of silty sandy clays and silts of the Claygate Member. In addition to occasional larger seams of sand some reaching over 1m in thickness, smaller pockets, layers and partings of fine silt and sand were encountered throughout the beds.

Although the site investigation extended as deep as 30m below the ground surface, it is not clear that the base of the Claygate Member was encountered. The indications from the Geological Survey are that the boundary with the underlying clay could lie at around +85m OD. (approximately 30m depth)

## 4.0 GROUND WATER

The former National Rivers Authority ground water vulnerability map indicates the site to be underlain by a minor aquifer with soils of high leaching potential. The site lies outside the designated Environment Agency source protection zones.

The most obvious presence of water at the site is the ornamental pond, with a water level at approximately +107m OD. This is also the approximate level of the nearby head of the sequence of ornamental pools on the neighbouring property.

The pond was noted (September 2003) to be being fed by a small pipe (approx 2" diameter), and the head of the pools to be being fed by a larger pipe (approx 4" diameter).

In the case of this pond it is understood from the ground keeping staff that the pond is fed by a mains water supply to maintain the water level during the summer months. The situation regarding the pools on the neighbouring property is not known.

However, ground water was encountered (April 2002) by the site investigation at +107.4 m OD in Borehole No.3, a short distance to the Northeast of the pond and at +108.4 m OD in Borehole No.2, some distance further to the North. Trial Pits constructed at the same time encountered dampness below approximately +108 m OD in the area of the proposed redevelopment.

Standpipe piezometers were installed in Borehole Nos 1 and 2 of the site investigation and these indicated ground water standing at +109.1 mOD and +109.4 mOD respectively on 2 September 2003.

It is considered likely that although upon inspection, the bottom of the pond was found to be constructed of concrete indicating that the pond is an isolated man-made structure, the original feature may well have been constructed at a position where there was a spring line and hence seepages of ground water emanating from the ground.

Spring lines such as these can be expected at locations wherever saturated sandier layers within the underlying Claygate Beds emerge onto the sloping ground surface. The recharge potential for this perched water table in an elevated situation such as this is considered to be limited. The only catchment area available is the higher ground of Highgate Hill, which rises by a further 15m or so to the East.

Seasonal variations in the ground water conditions in the area of the site are of course likely, and given the exceptionally dry weather that has been prevalent this summer, the current situation is likely to reflect a minimum condition, with appreciable rises in the ground water being probable during the wetter winter months.

The ground water at this site is likely to be regarded as a sensitive catchment source for the surface water streams and ponds that are to be found lower down the slopes of Hampstead Heath.

## 5.0 DISCUSSION

### 5.1 General

The proposed development of this site will comprise the construction of a number of new residential buildings. The architect has provided conceptual details of the proposed development, but details of the structural proposals are not yet available.

The architectural plans indicate three individual blocks A, B and C with a common basement structure for underground parking. The ground surface in the building area slopes down from north to south from approximately +112 m OD to +107 m OD.

### 5.2 Ground Water in Relation to Proposed Basement

It is assumed that the basement may be constructed at depths of up to 5 m below existing ground level, possibly reaching to around +107 m OD. Excavation for the basement is therefore expected to penetrate water-bearing layers of sand and silt within the Claygate Member.

Although the southern end of the basement will almost emerge from the hillside, there will conceivably be a 2 or 3 m head of ground water around the northern end which will be dug further into the ground. Thus, it will be essential to design the basement structure to be waterproof.

A primary consideration for the development will be to prevent any undue impact upon the prevailing ground water regime The interaction of the proposed basement upon the ground water will need to be considered in detail during the structural design of the basement in order to ensure that the structure does not prevent or unduly impede the anticipated general flow of ground water down-slope in the building area.

Given the likely plan scale of the principal water bearing strata in relation to the proposed basement construction, it is perhaps likely that groundwater would simply flow around the perimeter of the basement structure. However, in order to ensure that this is the case it is anticipated that there may be a requirement for specific drainage to be installed to intercept the saturated strata to the north of the basement and to connect this by gravity to a surface discharge in the area of the present ornamental pond at the southern end of Block C.

### 5.3 Basement Considered in Relation to Existing Trees

It is noted that the proposed basement footprint encroaches to within a few metres of numerous Class A and Class B trees. Generally the distance appears to be about 4 m to 6 m but two trees to the north of the basement area lie within about 2 m from the edge of the basement. It is likely that the root systems of all of these trees will be affected to a varying extent by the basement construction works.

Due to the fact that shrinkable clay soils were encountered at this site, the potential long-term effect of the trees on the basement structure itself will also need to be considered. Within their particular zone of influence, the potential effect of the trees will be to induce shrinkage and swelling movements in the near-surface clay soils in response to their demand for soil water uptake and the seasonal changes in ground water conditions.

The existing Class A and Class B trees at the site are already mature and well established. It will be important to maintain moisture availability to their principal root systems. Particular consideration may need to be given to those trees that are located close to and downslope of the proposed development, in areas that could be potentially affected by the drainage provisions discussed above.

## 6.0 FURTHER WORK

Once the structural aspects of the scheme have been developed further it is recommended that early discussions should be held with the Environment Agency (EA) in order to agree any specific measures that they may require in order to protect the quality of ground water leaving the site. It is likely that some form of water quality monitoring will be required as a minimum. Further useful information may also be available from the EA upon the nearby water courses.

# APPENDIX

## WATER MONITORING RESULTS

## SITE PLAN

PROJECT: Athlone House, Hampstead Lane, London N6
CLIENT: Dwyer Plc

# WATER MONITORING RESULTS

| Date | Location | Ground Level (m OD) | Depth to water (m bgl) | Depth to water (m OD) | Depth of standpipe (m bgl) | Remarks |
|---|---|---|---|---|---|---|
| 02.09.2003 | BH 1 | 112.90 | 3.82 | 109.08 | 4.80 | Standpipe blocked with sediment at 4.40m depth |
| 02.09.2003 | BH 2 | 112.20 | 2.78 | 109.42 | 6.10 | Standpipe blocked with sediment at 2.90m depth |

PROJECT: Athlone House, Hampstead Lane, London N6

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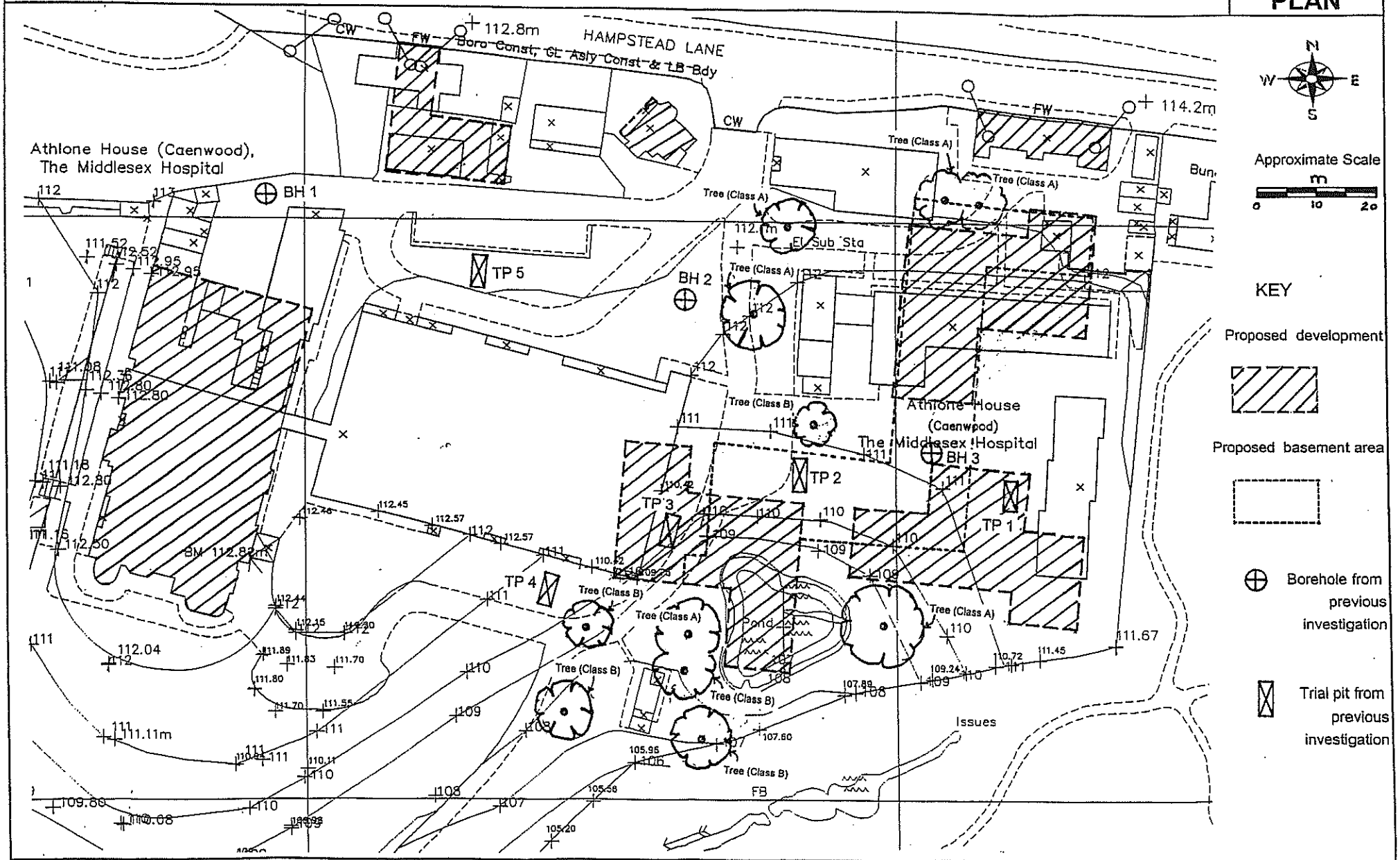
# SITE PLAN




| Project No | |
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