

Basement Impact Assessment

29 Abdardare Gardens

London NW6 3AJ

Formation of New Basement and External Light Wells

Part 1 of 3

Proposed Development

29 Aberdare Gardens is a semi-detached property situated on the east side of Aberdare Gardens. **(Appendix 1 – Drawing IS.729/A1)**

The accommodation is set out on ground and first floors with additional accommodation within the mansard roof structure. At the rear of the property is a single storey extension **(Appendix 2 – Drawing IS.729/A2)**

The site plot at the rear of 29 Aberdare Gardens measures approximately 10.90m wide by 32.50m long. The site boundary at the rear of the property is bounded on all three sides by the gardens of adjoining properties. The proposed basement construction will be carried out within the confines of the site plot **(Appendix 3 – Drawing IS.729/A3)**.

The proposals are to create a basement area to the rear and front half of the property which will extend below the existing ground floor accommodation from the rear by approximately 5m and for a width of 3m to the front half. In conjunction with this, it is proposed to extend the basement area externally into the rear garden to increase the accommodation beneath and beyond the existing single storey rear extension and the patio area to the east side. The area beyond the basement accommodation will comprise a light well and swimming pool with gymnasium, which will also provide an underground link to the home office positioned at the rear of the garden **(Appendix 4 – Drawing IS.729/A4)**.

The new basement accommodation within the footprint of the existing house will comprise a large kitchen dining area, pantry, bathroom, cloakroom, laundry room, utility room, services plant room, and bedroom. The dimensions of the accommodation below the existing ground floor area will be 5m long by 9m wide at the rear and 5m long by 3m wide to the front half. The extended basement area beyond the line of the existing rear elevation to the main house will be 17.80m long by 8.40m wide. The light well and swimming pool / gymnasium complex footprint within the extended basement area will measure 9.60m long by 8.40m wide. There will also be a small light well to the front measuring 1.5m wide by 3m long. **(Appendix 4 – Drawing IS.729/A4)**

The new internal and external basement areas will be constructed using contiguous concrete piles acting as a retaining wall. The piles will be 350mm diameter open auger piles to allow for a maximum depth of excavation of 3m. A concrete capping beam will be cast to the top of the piles and additional reinforced concrete retaining walls will be cast inside the line of the contiguous piles.

The excavation, piling and retaining wall works, together with the new reinforced concrete floor and roof slabs are estimated to take between 25 and 30 weeks to complete, after which time the site restoration works to the soft and hard landscaping will commence.

The removal of the spoil associated with the works will be carried out manually using the new basement area to the front half of the property. Dialogue has already commenced with the owner of the adjoining property (31 Aberdare Gardens), and it is intended to advise on all aspects of the proposed works and to agree the protection methods so as to avoid damage to the adjoining owners property during construction. Similar dialogue will be entered into with the owner of 27 Aberdare Gardens.

Prior to the commencement of the works, the requirements of the Party Wall etc. Act 1996 will be met as well as local authority measures relating to licencing for plant and machinery and traffic and parking restrictions.

The geology of the Aberdare Gardens area comprises London Clay outcrop which is between 90m and 110m thick. This thickness includes the Claygate member at the top of the outcrop. The Upper Cretaceous layer below the London Clay makes up the lower aquifer (**Appendix 5b**).

The London Clay is sufficiently thick in order to isolate the strata of the lower aquifer from any shallow ground water and surface water systems. From Camden Council's aquifer assessment, the strata within the Aberdare Gardens area is defined as being a deposit of low permeability and of negligible significance for water supply or river base flow (**Appendix 6**).

Hard surfacing within the area comprises the carriageway and pavement at the front, hard surfacing to front gardens in varying proportions to each individual property and hard surfacing to the rear gardens, again in varying proportions. From desk top investigations the proportion of hard surfacing to soft landscaping to the rear garden areas has been interpolated as being on average in the region of 25%. Currently the area of hard surfacing to rear garden area of 29 Aberdare gardens is approximately 17%. With the formation of the basement dig out within the rear garden, the proportion of hard surfacing to soft landscaping at ground level will increase to 29% of the rear garden footprint. This increase is associated with the provision of the light well to the basement accommodation and the construction of the home office at the rear of the garden.

During wet climatic conditions a proportion of rainfall hitting the ground will run off, a proportion will evaporate and a proportion will be retained in the soil. The remainder will percolate down to the shallow ground water system. There are no known perennial streams within the vicinity of 29 Aberdare Gardens and the absence of flooding history suggests the ground to be well drained. The topography of Aberdare Gardens is relatively flat but within an area of tiered ground sloping to the South West. Ancient subterranean water course records (**Appendix 7**) also indicate that the ground water flow is to the South West.

Identification of matters of Concern Relating to the basement Impact Assessment

In accordance with Camden Council's requirements the following issues have been taken into consideration with regards to determining the content of the Basement Impact Assessment and the impact on neighbouring properties and the natural environment.

1. Ground water flow.
2. Surface water flow and flooding.
3. Land stability.

Ground water

The following questions have been addressed in accordance with Camden Council's requirements.

Q1 Is the site located directly above an aquifer?

A1 No. The site is not located directly above an aquifer according to the Camden Council aquifer designation map (**Appendix 6**). The substrate within the location of the property is designated as being 'unproductive strata' and is shown on the Camden Council geological map to be situated on top of London Clay outcrop (**Appendix 8**).

Q1b Will the proposed basement extend beneath the water table surface?

A1b No. According to the British Geological Survey Natural Environment Research Council, the nearest borehole information is located within Priory Road – a distance of approximately 200m from 29 Aberdare Gardens. Two bore holes referenced TQ28SE2062 and TQ28SE2063 indicate that the water table is at a depth of 10m (**Appendix 9**).

In accordance with the proposed method of construction, and subject to the final structural design calculations, the contiguous pile length will be 9m, providing a pile depth below basement level of 6m. On the basis of these proposals, the water table would not be penetrated.

Q2 Is the site within 100m of a watercourse, well (used or disused) or potential spring line?

A2 No. According to the British Geological Survey Natural Environment Research Council data base, no wells are situated within the area of Aberdare Gardens. There are also no surface water courses. The nearest subterranean rivers are believed to be the River Fleet and the River Westbourne, which originate at Hampstead Heath and flow south east and south west respectively towards the Regents park Canal and Kilburn. The flow of both rivers is understood to be controlled by culverts with discharge into storm drainage.

Q3 Is the site within the catchment area of the pond chains on Hampstead Heath?

A3 No.

Q4 Will the proposed basement development result in a change in the proportion of hard surfaces / paved areas?

A4 Yes. Currently the area of hard surfaces / paved area is in the region of 49m². In addition to this, the existing single storey rear extension, which will be retained measures 40m². The proposals are to increase the area of hard surfaces / paving by extending the basement dig out to provide a light well. The additional area of hard surfaces / paving will be in the region of 34m² - comprising the area of external paving at basement level and the home office at ground level at the rear of the garden. However, it is intended to create a planting area within the light well with a cumulative footprint of 4m² so as to diminish the effects of the proposals and to assist in the controlled dissipation of rainwater into the substrate. The swimming pool / gymnasium area will be below ground with the existing soft landscaping reinstated over the structure.

Q5 As part of the site drainage, will more surface water than at present be discharged into the ground?

A5 No. The volume of surface water will not increase. The manner of dissipation into the substrate will change but be controlled by the provision of a planting area within the basement light well. The light well area will be designed so as to act as a catchment area and holding sump from which rainwater discharge will be temporarily held before controlled dissipation into the substrate by the planting area provisions.

Q6 Is the lowest point of the proposed excavation close to or lower than the mean water level in any local pond or spring line?

A6 No.

Surface Water Flow and Flooding

Q1 Is the site within the catchment area of the pond chains on Hampstead Heath?

A1 No.

Q2 As part of the proposed site drainage, will surface water flows be materially changed from the existing route?

A2 No. As can be seen from Camden Council's illustration of effect of basements on groundwater flow (**Appendix 10**) the effects of the proposed basement construction will be minimal. The effects of the proposed new construction will be further diminished by there being no other basement structures apparent to adjoining properties or those within the immediate vicinity.

The provision of planting at basement level will help to control the speed of dissipation of rainwater off hard surfaces / paving. Existing rainwater gutter and pipe installations to the rear elevation and the single storey rear extension will also be maintained as existing.

Q3 Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?

A3 Yes. The provision of a light well to the basement dig out area will increase the area of hard surfaced / paved area. Excluding the home office construction at the rear of the garden, the additional hard surfacing at basement level will add 3% to the area of existing hard surfacing.

Q4 Will the proposed basement result in changes to the profile of the inflows of surface water being received by adjacent properties downstream?

A4 No. Any changes to the inflows of surface water will be negligible as illustrated by the illustration of effect of basements on groundwater flow (**Appendix 10**). All rainfall within the site boundaries will continue to dissipate as at present, all be it in a more controlled manner to the area of the proposed development.

Q5 Will the proposed basement result in changes to the quality of surface water being received by adjacent properties and downstream water courses?

A5 No. The current quality of surface water discharge over the hard and soft landscaping within the site boundaries of the property will not be changed. The hard surfaces to the proposed scheme will be of similar constituent parts as those currently installed on the site.

Q6 Is the site in an area known to be at risk from surface water flooding?

A6 No. From available information it is believed Aberdare Gardens sustained flooding on one occasion on 14 August 1975 (**Appendix 11a**). This was however attributable to 170mm of rainfall concentrated within a period of 2½ hours (**Appendix 11b**). The proposed basement level will be 3m below ground level. The water table within the area of Aberdare Gardens is recorded as being in the region of 10m below ground level. In applying the Sequential Test, the area of Aberdare Gardens can be regarded as being low risk to flooding. In this respect the Sequential Test has been passed and the use of the Exception Test is not required. The proposed basement will have two separate and unrestricted means of escape to ground level should an extraordinary risk of flooding within the area arise.

Slope Stability

Q1 Does the existing site include slopes greater than 7 degrees?

A1 No.

Q2 Will the proposed reprofiling of landscaping at site change slopes at the property boundary to more than 7 degrees?

A2 No. the existing landscaping topography will remain unchanged to the areas around the basement excavation.

Q3 Does the development neighbour land with a slope greater than 7 degrees?

A3 No. **Appendix 12** illustrates this.

Q4 Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?

A4 No.

Q5 Is the London Clay the shallowest strata on the site?

A5 No. the London Clay strata is identified by the Camden Geological Study as being between 90 and 110m thick. The underlying Upper Cretaceous chalk layers vary from 13 to 65m thick.

Q6 Will any trees be felled as part of the proposed development, or any works proposed within any tree protection zones?

A6 No. The development only requires the removal of shrubs.

Q7 Is there a history of shrink / swell subsidence in the local area or evidence of such effects on site?

A7 No. From visual inspection of the property and the front elevations of properties within the immediate area and along Aberdare Gardens, no evidence of subsidence issues past or present is apparent.

Q8 Is the site within 100m of a water course or potential soring line?

A8 No. Please refer to the response under Ground water, Question 2.

Q9 Is the site within an area of previously worked ground?

A9 No. According to the Camden Geological map, the area surrounding Aberdare Gardens is identified as not being made up or worked ground (**Appendix 8**).

Q10 Is the site within an aquifer?

A10 No. According to the Camden aquifer designation map, the area within which Aberdare Gardens is situated is designated as being 'Unproductive Strata' (**Appendix 6**) which is defined as being a deposit of low permeability and of negligible significance for water supply or river base flow.

Q11 Is the site within 50m of Hampstead Heath ponds?

A11 No.

Q12 Is the site within 5m of a highway or pedestrian right of way?

A12 No. The proposed basement excavation is approximately 11m from the pavement to Aberdare Gardens and approximately 13m from the carriageway to Aberdare Gardens.

Q13 Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

A13 Yes. The bottom of the existing foundation to adjoining properties has been estimated as being in the region of 600mm below ground level. The proposals require the excavation of the basement to be 2,400mm below the estimated bottom of the existing foundations.

Q14 Is the site over tunnels?

A14 No. Please refer to **Appendix 13**.

Summary

As part of the screening process, the following issues require potential impact investigation.

Ground water

1. Question 4 – Will the proposed basement development result in a change in the proportion of hard surfaces / paved areas?

Surface Water Flow and Flooding

2. Question 3 – Will the proposed basement development result in a change in the proportion of hard surfaces / paved areas?

Slope Stability

3. Question 13 – Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

Further Potential Impact Investigation

Ground water

From historical research and records, a localised ancient river channel is situated within the eastern to central part of Aberdare Gardens. The incised groove of the river channel will allow ground water to accumulate in the depression. Whilst not appearing to be within close proximity to 29 Aberdare Gardens, should the effects of the river channel be encountered during construction works, there may be the possibility that pumping measures may have to be utilised during piling works. However, borehole evidence within the proximity of Aberdare Gardens identifies the water table to be in the region of 10m below ground level. As already stated elsewhere in this Assessment, the designed pile depth will be in the region of 6m below excavated ground level which, allowing for a 3m basement depth excavation will terminate the pile approximately 1m above the level of the water table. The risk of flooding during piling operations is therefore considered to be low.

It is accepted that there will be variations in the water table level at specific times either due to seasonal conditions or man-made events. The works at 29 Aberdare Gardens are planned to commence in July 2012 at which time the water table is anticipated to remain constant and at the previously recorded depth.

The proposed basement construction at 29 Aberdare Gardens will be isolated – that is to say – from Camden Council records relating to basement formation application decisions (**Appendix 14**), there are no known basement formations within the near vicinity of the subject property. The effects of ground water contours and flow, whilst being affected, can be said to be minimal as is demonstrated by the Camden Council geological, hydrogeological and hydrological study illustration (**Appendix 10**). The areas of possible groundwater level increase and decrease being largely confined to the areas north east and south west of the property, as dictated by the ground water level contours and direction of subterranean water courses. It is unlikely that the effect would extend significantly further beyond 29 Aberdare Gardens.

Surface water Flow and Flooding

It is accepted that the external element of the proposed basement excavation will typically remove the shallow permeable ground that previously occupied the excavation footprint. Whilst it could be argued that such action will reduce the capacity of the ground to allow rainfall to be stored in the ground, according to the Camden Council aquifer designation map, the areas within which Aberdare Gardens is situated is designated as being 'Unproductive Strata' (**Appendix 6**) which is defined as being a deposit of low permeability. The proposals transfer the permeability level to the slab level of the new basement. With the incorporation of planting areas at basement level rainfall levels across the shallow ground are to some degree retained allowing the sustainable urban drainage system within the confines of the site boundary to be maintained and the potential of surface water run-off to be managed thereby eliminating the risk of surface water flooding to adjacent properties. The proposed basement excavation is in any event not within an area prone to flooding and therefore does not require the preparation of a Flood Risk Assessment.

Slope Stability

The area within which Aberdare Gardens is situated is not deemed to be an area where maximum stable slope angle should be given consideration. Neither is Aberdare Gardens within areas identified as being worked or made up ground (**Appendix 8**). The proposed works also do not involve the removal of any trees.

Consideration to Structural Damage Beyond the Site Boundary

Before works commence, the adjacent properties on both sides of 29 Aberdare Gardens will require inspection and the preparation of a Party Wall Award in conjunction with a schedule of condition. The load bearing capacity of the existing foundations and the ground bearing capabilities of the subsoil both in terms of the party wall structure (as with 31 Aberdare Gardens) and a flank wall within a distance of 3m (as with 27 Aberdare gardens) will be mitigated by the chosen pile method of basement formation. This method is considered the best way of controlling ground movement during construction whereby the general mass of displaced ground is strictly controlled minimising the risk of overburdening the excavations.

Because the water table depth is below the anticipated pile bearing depth, the risk of flooding and subsidence are also minimised. There should be no need for dewatering during the excavation process. The risk of ground settlement should therefore also be significantly minimised.

As part of the structural design, due care and attention will be given to the design effects on the adjacent property sharing the party wall. The design will ensure that as well as maintaining structural stability the long term effects of re-stabilisation and minimal movement to the adjacent property are ensured.

The depth of the piles within the clay substrate being at 6m will ensure that the new and existing surrounding structures are less prone to seasonal variations in the moisture content of the clay

substrate. At the proposed pile bearing depth the effects of moisture variations causing drying out (subsidence) and ground heave (swelling due to influx of water) should be controlled.

Basement Impact Assessment

The proposed scheme at 29 Aberdare Gardens must satisfy the following criteria.

1. Structural stability of the subject building and neighbouring properties is maintained.
2. The existing subterranean drainage and run off are not adversely affected.
3. The structural stability and the water environment of the local area are not compromised.

The identification of the matters of concern within this Statement (screening) identified two recurring issues.

1. A change in the proportion of hard surfaces / paved areas (Ground Water and Surface Water Flow)
2. The differential depth of foundations will increase relative to neighbouring properties (Slope Stability)

The above concerns have been addressed within the Scoping (Further Potential Impact Investigation) section of this Assessment. Site specific investigations have relied on information previously collated by Camden Council which has been used to demonstrate the low level of risk the proposed scheme poses.

Visual Impact of Basement Excavation from Rear of Property

Following design consultation with the Planning Department, the proposals have been prepared in order to address the visual impact of the scheme in terms of neighbouring properties and the subject property's location within a conservation area. It is understood that the main criteria governing basement formation approval is for them to be as unobtrusive as possible. In this respect it is understood that the size of light wells providing natural light provisions has to be kept to an absolute minimum in order to preserve the unobtrusiveness of the building work when viewed from ground level. This sizing of light wells within the Borough has been advised to be in the region of 1000mm in depth. We have however been informed that wider light wells would be considered provided it can be shown that it is necessary in terms of natural illumination to suit the specific use of the space or providing adequate means of escape from the building. The space within the rear of the basement is to be used as a large kitchen dining area. In assessing the natural light needs of this area reference has been made to the Daylighting and Window Design Guide 1999 as published by the Chartered Institute of Building Services Engineers (CIBSE). The primary criterion to be satisfied has been the provision of enough natural daylight to prevent the use of electric lighting during daylight hours. To determine the depth of the light well required to satisfy this criteria, the No-Sky Line principle has been adopted. This has been illustrated by way of overlay on Section AA as shown on drawing IS.7600.03. From the working plane height (kitchen unit worktop level) at the rear of the accommodation, the extending line passing outwards at window head height determines the point

at which the light well should be positioned externally at ground level. From interpolation, this is shown to be 2500mm from the rear wall of the basement accommodation. By way of supplement and to demonstrate the light levels attainable at the rear of the kitchen dining area utilising the area of proposed glazing, the Daylight Factor has also been determined by manual calculation using the recognised formula

$$\frac{IRC = Taw}{A(1-R)} (CRfw + 5Rcw)$$

The Daylight Factor using this formula based on the space parameters and criteria of the proposals has been calculated as being 0.88. It is accepted in the industry that the outdoor light level is approximately 1,000 lux with an overcast sky. With an average daylight factor for the kitchen dining area of 0.88 the light level would be in the region of 880 lux. Today's domestic light levels are commonly in the range 500 - 1000 lux - depending on activity. With the area of glazing and the proposed depth of the light well opening at ground level, the need for supplementary electric light will be significantly reduced thereby improving the 'Green' credentials of the proposals.

The edge of the support slab to the swimming pool complex beneath the rear garden is positioned on the No-sky line intersection. This cantilevers over the light well footprint at basement level and reduces the visual impact at ground level. The visual size of the unobstructed light well opening at ground level has been further reduced by incorporating a walkway immediately adjacent to the rear extension and rear wall of the conservatory. The visually exposed width of light well as seen from ground level will therefore be reduced to 1200mm. As the works are being carried out in the rear garden area of the property, the impact of the works within the conservation area are also significantly reduced as it will not be seen by the general public or passers-by. The proposals will also be visually very limited from within the rear garden area and when viewed from adjacent properties due to the closure provisions to be incorporated at ground level.

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May2012

