Our Ref: KC1062/SS
Your Ref: Planning Ref: 2015/4513/P

13 April 2016

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Dear Sir,

Planning Ref: 2015/4513/P Proposed Works at Flat 3, 269 Goldhurst Terrace, London NW6 3EP Supplementary Flooding Information

A Flood Risk Assessment (FRA) for the proposed extension at 269 Goldhurst Terrace, London, was prepared by AND Designs Limited in June 2015 and submitted within their Basement Structural Method Statement (BIA) as part of the planning application for the development. A site location plan is shown in Figure 1. The planning proposal is described as the *"Erection of single storey side extension and creation of basement below existing dwelling and new extension, with 2 no. front and 2 no. rear light wells".*

Kaya Consulting were commissioned by Ground and Project Consultants to provide additional information related to flood risk, surface water runoff and flood risk management/mitigation measures, if required.

Kaya Consulting accessed the London Borough of Camden's (LBC) online planning portal on April 13 2016 and reviewed the latest documents related to the planning submission, as below:

- AND Designs Limited (2015) Basement Structural Method Statement: Planning Application for 269 Goldhurst Terrace, London, NW6 3EP, June 2015 (the BIA)
- Campbell Reith Consulting Engineers (2015) Flat 3, 269 Goldhurst Terrace, NW6 3EP Basement Impact Assessment Audit, November 2015 (Audit commissioned by LBC)
- OMNIDE (2015) N. 269 Goldhurst Terrace – Planning Presentation 1.3, showing existing and proposed planning drawings

This letter summarises the key findings of the BIA (AND 2015) and subsequent BIA Audit (Campbell Reith, 2015) with respect to flood risk, provides additional detail on the key flood risk issues identified at the site and provides responses to the audit queries raised in the BIA Audit relating to surface water runoff and flood risk.

Key findings of the BIA (AND 2015) and BIA Audit (Campbell Reith, 2015)

The BIA identified that parts of Goldhurst Terrace were flooded by surface water in the 1975 and 2002 floods and the following table summarises the potential sources of flooding identified in the screening assessment:

Potential Source	Potential Flood Risk at Site?	Justification
Fluvial flooding	No	EA Flood Mapping shows Flood Zone 1. Distance from nearest surface watercourse >1km
Tidal flooding	No	Site location is 'inland' and topography > 40m AOD.
Flooding from rising / high groundwater	No	Site is located on low permeability London Clay.
Surface water (pluvial) flooding	Yes	Recorded in unspecified part of Goldhurst Terrace in 1975 and 2002
Flooding from infrastructure failure	Yes	Drainage at or near the site could potentially become blocked or cracked and overflow or leak. Drainage of the basement terrace areas may rely on pumping.
Flooding from reservoirs, canals and other artificial sources	No	There are no reservoirs, canals or other artificial sources in the vicinity of the site that could give rise to a flood risk.

(Source: AND Designs, 2015)

The BIA Audit confirmed that the BIA correctly identified that Goldhurst Terrace was flooded during both the 1975 and 2002 flood events and that the site is at an approximate low point within the street. The Audit also notes that the BIA correctly identified that each of the 4 light wells should be protected by integral upstands to prevent flood water potentially entering the basement.

The BIA Audit also notes that the existing and proposed ground floor layouts show a reduction in garden area associated with an increase in either roof rainfall discharge or hard surfacing to terraces. The Audit recommends that an assessment of areas should be provided together with proposals to attenuate the increased discharge to the surface water drainage system. The Audit also notes that proposals to pump rainwater collected in each light well should be provided.

The key flood risks at the site are:

1. Surface water (pluvial) flooding. Surface water flooding was recorded in an unspecified part of Goldhurst Terrace in 1975 and 2002 (Appendix 4, Floods in Camden (2003) report). It is also understood that the surface water flooding in this area was due to the Thames Water relief sewer being overloaded. It is also understood that Thames Water have since increased the capacity of this relief system.

2. Flooding from infrastructure failure. The Thames NW relief sewer is located close to the site and a trunk sewer is believed to run along the road adjacent to the site.

Supplementary Information on Flood Risk

There are two potential sources of flooding risk identified; and these are from surface water and from infrastructure failure.

It is possible that excess surface water could enter the basement through the light wells at both the front and back of the building. LiDAR ground elevation data was obtained and was analysed for overland flow paths within the area. The results are shown in Figure 2, which indicate the land falls to the south and east.

Goldhurst Terrace level drops from about 41.7 m AOD in front of the site to 37.8 m AOD along the section of the road shown in Figure 2, over some 370m. Ground levels in the approximate location of the Thames relief sewer are around 39.1 m AOD, over 2 m below the site level.

The overland flow paths shown in Figure 2 indicates that the catchment area from which surface water runoff could drain towards the site is very small and therefore the risk of flooding of the site from surface water runoff is low. Most of the surface water runoff upslope of the site flows southwards along Priory Road away from the site.

Based on the LiDAR data, the site sits at approximately the same level as the road, but there is a raised kerb and pavement between the property and the road and given the very small area of surface water runoff draining towards the site (Figure 2), it is unlikely that water would reach depths high enough to overtop the pavement. Nevertheless, the BIA and BIA Audit recommends each of the 4 light wells should be protected by integral upstands to reduce any risk of flood water potentially entering the basement and this is recommended as a precautionary measure.

It is understood that an unspecified part of Goldhurst Terrace was subject to flooding in 1975 and 2002 due to surcharging from Thames Water relief sewer. It is understood that the capacity of this sewer has been increased since then. Figure 2 indicates that any flood waters surcharging from the sewer would tend to flow east. This indicates that the risk of flooding from flood waters surcharging from the Thames sewer appears low.

As the area is developed, it is served by a local sewer system. Any flood waters surcharging from the local sewer system would tend to flow east, following the indicative overland flow paths shown in Figure 2. Therefore, the risk of flooding of the site from surcharging local sewer system appears low.

In summary, giving the fall of the land to the east as shown in Figure 2 and the small upstream catchment area from which surface water runoff could drain towards the site, the risk of flooding from surface water runoff is considered low.

Attenuation of increased surface water runoff from site (due to increased areas of hardstanding)

Planning drawings of the proposed and existing ground floors, indicate that the proposals extend out into the existing terrace area west of the existing building. Hence an area of existing terrace will become a building with associated roof runoff. In addition, part of the garden area to the rear of the property will become a terrace area in the proposed plans. It is assumed that the terrace area is impermeable and is considered hardstanding. The additional area of hardstanding was measured to be

approximately 20 m^2 (i.e. 0.002ha), which will result in slightly increased runoff during high rainfall events compared to existing case.

The volume of runoff that is required to be attenuated to account for the increase in hardstanding compared to existing case was calculated using the Equation 8.6 in CIRIA (C635):

Volume of runoff to be attenuated (m^3) = 10 x RD x A x (0.8)

Where: RD = the rainfall depth for 100 year, 6 hour event (mm). This was calculated using the Flood Estimation Handbook (2009) CD as 84.1 mm and;
A = the additional area of site (ha) is hardstanding (i.e. 0.002 ha).

Thus, the volume that is required to be attenuated is 1.3 m^3. Therefore, it is recommended that the client incorporate a small storage tank to collect and attenuate additional surface water runoff prior to discharging to existing drainage system.

Flood Mitigation Measures

As recommended in the BIA and BIA Audit, each of the 4 light wells should be protected by integral upstands to reduce any risk of flood water potentially entering the basement and this is recommended as a precautionary measure. In this regard, upstands of the order of 0.2-0.3m high above existing ground level should be sufficient.

In addition, it is recommended that an appropriate pumped device is installed, for example a FLIP (Flooding Local Improvement Process) device. The device is a small self-contained pumping unit which is designed to transfer sewage and rainwater from the private drains in individual homes to the main sewer in the road, even during heavy rain. The device also contains a non-return valve, to prevent backflow from the sewer entering the property. A FLIP will significantly reduce the risk of sewer flooding and should be installed as part of the construction/basement extension works. This should also be able to pump any rainwater that may accumulate in the lightwells. The BIA method statement recommends the use of the Delta Dual V3 Sump.

In addition, to reduce the effects of increased surface water runoff from the loss of a small part of the garden to hardstanding, the client should consider installation a small attenuation storage tank, within the drainage system. The volume required to be attenuated is calculated above.

Yours faithfully,

Dr Yusuf Kaya CEng and MICE
Managing Director

<u>References</u>

AND Designs Limited (2015) Basement Structural Method Statement: Planning Application for 269 Goldhurst Terrace, London, NW6 3EP, June 2015 (the BIA)

ARUP (2010) London Borough of Camden: Camden geological, hydrogeological and hydrological study: Guidance for subterranean development, November 2010

Campbell Reith Consulting Engineers (2015) Flat 3, 269 Goldhurst Terrace, NW6 3EP Basement Impact Assessment Audit, November 2015 (Audit commissioned by LBC)

CIRIA (2006) C635 Designing for exceedance in urban drainage – good practice

Flood Estimation Handbook (FEH) (2009) CD-Rom Version 3;

London Borough of Camden (June 2003) Floods in Camden: Report of the Floods Scrutiny Panel

OMNIDE (2015) N. 269 Goldhurst Terrace – Planning Presentation 1.3, showing existing and proposed planning drawings

Figure 1: Site location plan also showing indicative line of Thames NW Sewer

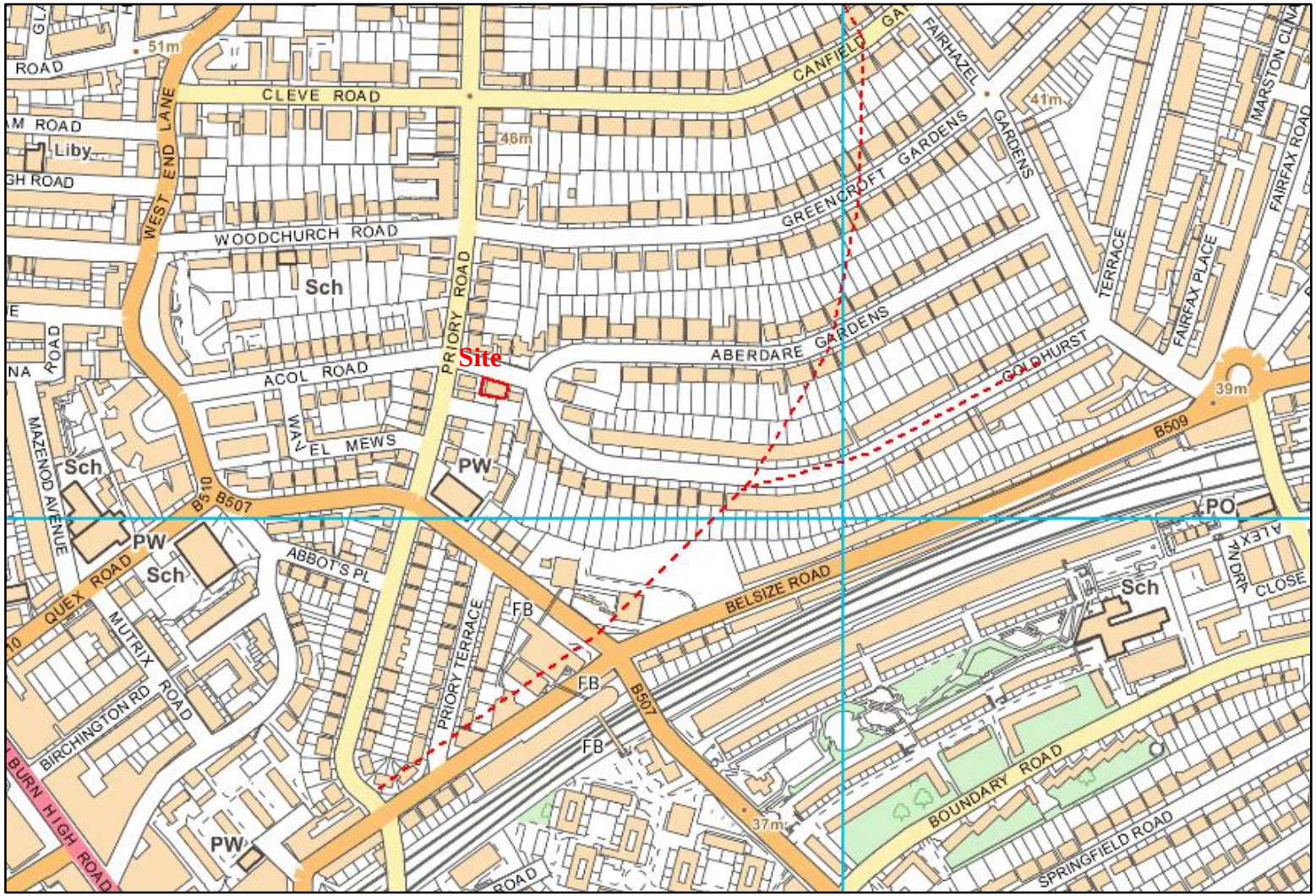

Figure 2: Indicative overland flow paths