HR Wallingford

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Your ref
Our ref MAM6429

29 January 2015

Dear Grace,

Project H – Sub-Basement Link and Service Void: Groundwater Impacts

HR Wallingford has been asked to review the design of the sub-basement link, between the new basement and the main building, as well as the service void close to the property boundary, with reference to any potential impacts on the groundwater flow regime at and near Witanhurst. O ur findings are presented in this letter.

Please note that in carrying out this review we initially considered the "As Built" details of the main basement. This is because some of the details of the actual piling are different to those considered at the time of the original planning application for the basement. Pile depths were reduced, resulting in a lower potential impact than previously considered. We then consider the details of the linking structure.

Improvements on the Initial Proposals
In March 2010 HR Wallingford prepared an impact assessment report related to the basement to be constructed as part of the Witanhurst re-development. This considered hydrology and water quality issues (EX6238, March 2010).

In the report we considered the possible impacts of the construction of the basement on groundwater flows in the area. At the time it was anticipated that the piled walls would be constructed around the edge of the basement and that these would all extend downwards into the low impermeability clay.

This starts at about 15m below the ground surface (top level approximately 110.0m). Whilst it was considered that this piled wall could present an obstruction to groundwater flows this would only be local in nature, with any intercepted groundwater being re-directed around the sides of the basement. The 2010 assessment referred to groundwater modelling carried out by GCG. It was also noted that there in practice was likely to be little groundwater flow at the site due to the local geology and topography. It was concluded that there would be only minor changes in the groundwater flow regime and that these would be at / close to the building.

All hydrological concerns raised were addressed and the information on the hydrology and the planning application were approved by the Planning Inspector at appeal in May 2010.

After the initial plans were prepared the proposed piling regime was changed. Whilst the base level of the piles was set in the relatively impermeable material (at 108.0m), alternate (female) pipes were stopped off at a shallower level. This would avoid the construction of a potential local barrier to groundwater flows, extending all of the way down to the clay layer. We have been advised that the base level of the female pipes around the car park area is 115m (10m below ground) and that the base level of the female piles around the deeper pool area set at 114m (11m below ground).

Recorded groundwater levels at three boreholes close to the site of the basement indicated a groundwater level of about 114m – roughly the same as the base level of the lower set of female piles.

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The strategy of stopping piles short has the effect of avoiding the creation of a "barrier" to groundwater flow. Instead, any groundwater present can flow through the gaps between the longer piles. Thus, in practice any impacts of the basement were less than envisaged at the planning stage, and so even less significant than previously estimated.

Sub-Basement Link, Between New Basement and Existing Building
In addition to the main basement and its associated piles an underground link between the main house and the new basement has been constructed. This was not considered at the time of the original basement planning application. The potential for impacts on groundwater flow regime is outlined here.

Based on sketch SK_819, prepared by Owen Architects, the underside of the slab for the sub-basement link is at 117.2m. This is 1.4m higher than the underside of the base slab of the adjacent pool area (115.8m). In addition, the area of the sub-basement link is small relative to that of the main basement – being less than 5% of the area of the pool section of the basement and about 3% of the total basement area. Its maximum width is about 13% of that of the main basement.

It is concluded that the sub-basement link will have no impact on the local groundwater regime for the following reasons:

- It is higher and in effect in the shadow of the main basement;
- Its plan area and width are minor compared to those of the deeper adjacent basement;
- It is 3.2m above the base of the (local) female piles;
- It is about 3.2m above the observed groundwater level.

Service Void
A small service void has been constructed on the eastern side of the new basement, between it and the wall adjacent to Highgate West Hill. This projects about 2.5m beyond the line of the basement piles, over approximately 15% of the side of the basement. The underside of the base slab is at approximately 118.8m, which is about 3m above the underside of the base slab of the adjacent basement (pool section). It is nearly 5m above the recorded groundwater level in this area.

Based on this information, and the earlier discussion on the improvements relative to the initial proposals, it is clear that this small underground structure is very small relative to the main new basement. With its significantly higher elevation it will not impact on groundwater conditions at the site or in the wider area.

Conclusions
Whilst no additional groundwater modelling has been carried out we conclude that the construction of the sub-basement link and the service void have no impacts on groundwater flows. We also conclude that the provision of the gaps between the piles and the raised underside of the alternate female piles mean that any local groundwater impacts that may have arisen from the construction of the main basement and the associated works are substantially lower than previously estimated. Thus, they remain insignificant.

We trust that the details presented here are clear and useful to you. However, please do not hesitate to contact us if you require any further information.

Yours sincerely

[redacted]

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