

## ⊕ Ducker Site

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### Flood risk feasibility study

#### General

EAS have already provided a study and the following text is from their report.

#### Flood Risk

The Environmental Agency Floodmap for Planning shows the site to be in Flood Zone 1, at 'low risk' of flooding from rivers. The minor watercourse to the west is not an EA 'Main River' but is classed as an 'Ordinary Watercourse'. The EA were consulted on the site and their response is included. They have stated that as the flood source is not a designated 'Main River', it falls under the remit of the Lead Local Flood Authority (LLFA) which is Brent Council. The EA have confirmed that the site is not within a Critical Drainage Area (CDA), but does lie within the Site of Special Scientific Interest (SSSI) designated area Northwick Park and The Ducker Pool.

As the watercourse is not a 'Main River' the EA would not have modelled and mapped this watercourse, so the actual risk is now shown on the EA Floodmap but is better represented on the EA online surface water maps.

The online surface water maps are included. These show the site to be partially in a 'high' risk area. The velocity mapping for the 'low' risk scenario (i.e. the least frequent but worst impacts) shows the flowpath to be from the minor watercourse located to the west of Watford Road. In addition, flow appears to come from the north along Watford Road and across the woodland northwest of the site. The surface water continues to the east across the site and into the minor watercourse to the east of the site where it flows around the adjacent golf course.

Although the online surface water mapping is only an overview of the likely risk, it shows that depths of 300mm to 900mm could occur within the site boundary.

The site identified the open watercourse to the west of Watford Road flows into a 600mm culvert (via a trash screen) beneath the road. This culvert in turn flows into a 750mm diameter culvert which discharges to the open channel within the site. The culverts are identified as Thames Water assets on the sewer records. The Thames Water sewer records also indicate there to be a 375mm surface water sewer in Watford Road falling to the south and a 150mm surface water sewer in Watford Road falling to the north. These sewers join to the west of the site and discharge to the minor watercourse within the site boundary.

Hash Patel of Brent Council noted during the site visit that Watford Road occasionally floods at the point where the watercourse is culverted beneath it, and that the watercourse to the west of Watford Road is quite 'flashy', i.e. it responds quickly to rainfall causing water levels to rise and fall.

The combination of high flows in the minor watercourse and surface water discharge from the catchment to the north of the site via the Thames Water sewer network would result in increased surface water risk across the site. The site is a natural low point and the topography directs water to the south east as part of the local surface water drainage network.

#### Geology

The British Geological Survey (BGS) website shows the site to have the geology of Thames Group – Clay, silt, sand and gravel, which is unlikely to be particularly permeable. The site is now shown to be in a groundwater source protection zone, so the risk of flooding from groundwater is considered to be low.

### Reservoir Flood Risk

The EA online mapping indicates the site to be in a reservoir flood extent area. Although the source is not clear, it appears that the flooding is from Park Lake at the top of Harrow on the Hill. The flood depth is between 0.3m and 2.0m. It is very unlikely that a reservoir would fail but it is recommended that any development on the site has an upper level to which occupants can easily reach in the event of a reservoir breach.

### Drainage

Given there is a minor watercourse crossing the site, it is recommended that the proposed drainage strategy would discharge to the watercourse. It will be necessary to attain greenfield runoff rates if possible, in line with the London Plan. Attenuation features should be in the form of a balancing pond or wetland area and conveyance swales in the first instance. If further attenuation is required, we would recommend lined permeable paving beneath any areas of car parking, to treat runoff prior to discharging to the watercourse.

Given the high surface water risk across the site, it would be necessary to ensure wherever possible that offsite flowpaths are not directed into the onsite drainage system. The onsite drainage system should be sized to attenuate up to and including a 1 in 100 year (+40%CC) rainfall event but should not become flooded by overland flows.

It will be necessary to obtain a Land Drainage Consent from Brent Council to discharge surface water runoff to the minor watercourse.

There is a 225mm foul sewer in Watford Road falling to the south. It is likely that a proposed development on site could discharge foul flows to this sewer, however it may be necessary to carry out a pre-development enquiry with Thames Water to determine whether there is available capacity within the sewer.

### Proposed Development

Although there is medium to high surface water flood risk across the site, there are numerous means to mitigate this and allow development on the site. It is recommended that the development, or at least the ground floor of the development, is a 'less vulnerable' use. The proposed use as a community centre would fall under 'less vulnerable' as it is 'assembly and leisure'. Further 'less vulnerable' uses are contained on the GOV.UK website under Table 2 'Flood Risk Vulnerability Classification' on the following link: <https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones>

### Mitigation Measures

There is clearly a high surface water risk onsite as a result of the minor watercourse and the local sewer network. Several measures can be taken to reduce this risk prior to development.

1. Water Feature – It is recommended that the minor watercourse is improved through the site and used within the proposed development to form a wetland area/water feature. This would allow the flow routes to continue through the site, as well as providing biodiversity benefits within the development. Although a masterplan has yet to be developed, it is recommended that the water features are included in the scheme.
2. Landscaping – It is recommended that the western side of the site nearest Watford Road is landscaped in such a way as to direct surface water towards the minor watercourse/water feature within the site boundary. This will direct surface water away from the building and allow the existing flowpaths to continue through the site following development.

3. Additional Mitigation Measures – A hydrological analysis would establish the peak flow through the 600mm diameter culvert and any additional flows across Watford Road during the periods of heavy rainfall. This can help to quantify the volume and depth of water reaching the site from the minor watercourse. Such an analysis would then allow further mitigation measures to be explored. For example, the location of a linear drain or similar along the site entrance to collect surface water and divert it into the minor watercourse before it reached the new building. Also, this analysis would enable recommendations to be made on raising finished floor levels and designing a surface water drainage system.
4. Minor Watercourse Landscaping – It may be beneficial to increase the capacity within the minor watercourse I the site boundary to enable more flow to pass through the site. However, this could result in an increase in flooding downstream, so the impacts of increasing flows through the site should be investigated further before going ahead with this.
5. Sewer Diversion – Another option would be to diver the Thames Water surface water sewer within Watford Road across the north western corner of the site to discharge to the minor watercourse at a point within the site boundary. This is likely to alleviate some of the surface water risk down Watford Road and at the culvert beneath the road, as the surface water from the north of the catchment would be discharged at a different point. An indication of the diverted sewer has been identified.
6. Management of Minor Watercourse – It would be necessary to put in place an effective maintenance and management system of the minor watercourse. This would include inspections and clearing of debris from the upstream and downstream end of the culvert beneath Watford Road, as well as the channel within the site boundary. So long as the minor watercourse is free-flowing, the risk of surface water weiring over the road and into the site would be reduced.
7. Proposed Drainage System and Offsite Flows – The drainage system serving the new development should be designed in such a way as to minimise offsite flows beign directed into the onsite systems. The onsite drainage system will be designed to attenuate up to and including a 1 in 100 year (+40%CC) rainfall event. However, there is a risk that offsite flows from Watford Road or from the minor watercourse could enter the attenuation feature and reduce the capacity. It will therefore necessary to investigate options to prevent offsite flows entering the onsite drainage system. It may be necessary to include an 'offline' balancing pond, for example, which would not allow flows from the minor watercourse to back up into the pond.

### Conclusion

The flood risk and drainage issues outlined above and the site visit and meeting with Hash Patel have identified the main constraints to the development as a combination of surface water flooding and sewer flooding during periods of heavy rainfall. Several mitigation options could reduce the risk to the site, as detailed above. These options would likely require consideration with reference to the masterplan and may prove to be economically unviable. However, this analysis has concluded that some form of development will be possible at the site and a number of mitigation options are available.

Appendix maps are available if required.

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