Intended for
Stadium Capital Holdings

Project no.
30030

Date
21 October 2014

BASEMENT IMPACT ASSESSMENT

MIDLAND CRESENT

Revision History

Revision	Date	Purpose / Status	Document Ref.	Comments
2	12/11/12	Original Final	30030.E.BIA.2	
3	19/09/14	For Planning	30030.E.BIA.3	Revised following receipt of comments from Thames Water and updated regulations
4	21/10/14	For Planning	30030.E.BIA.4	Included the authors details

Prepared By	Reviewed By	Approved By
		
Glynn Irvine	**Shan Ratnam / James Flack**	**Stepan Ruzicka**
Design Engineer	Principal Engineer / Associate	Director

Ramboll
60 Newman Street
London W1T 3DA
United Kingdom

tel +44 (0)20 7631 5291
fax +44 (0)20 7323 4645
london@ramboll.co.uk

CONTENTS

FIGURES

1. EXECUTIVE SUMMARY

Ramboll have been commissioned to carry out a Basement Impact Assessment (BIA) for a proposed development in the London Borough of Camden. The development involves the construction of a new stepped six story building (including two basement levels below Finchley Road carriageway level) in place of an historic train platform. The proposed basements will be above the surrounding rail track levels.

In order to satisfy the requirements of the Camden Planning Guidance a BIA is necessary to prove there is no undue risk or disruption presented in proposed developments. The risk of ground instability and disruption to local amenity can be mitigated through good design and appropriate construction methods. A BIA must consider any change to the flood risk caused by the proposed scheme.

Sections of the rail tracks surrounding the site are shown to be subject to flooding during medium and extreme storm events. Flood risk maps for surface water flooding indicate that the site itself is at very low risk of flooding due to the existing levels being above the water levels of the surrounding rail tracks in the extreme storm events.

This screening (stage 1 BIA) demonstrates the proposed basement at Midland Crescent does not increase the risk of flooding to the surrounding area and that the risks to surrounding properties and the public realm can be minimised through appropriate engineering design. Risk items have been deemed to be closed out through identified appropriate engineering design with a scoping stage for the BIA not deemed necessary.

2. INTRODUCTION

2.1. Brief

Ramboll was commissioned by Stadium Capital Holdings to prepare a Stage 1 Screening study to determine whether a Basement Impact Assessment for the proposed development at Finchley Road NW3 is required.

2.2. Proposed Development

The proposed development is located on a wedge of currently unused land located between rail lines adjacent to Finchley Road, Hampstead, in the Borough of Camden. The railway lines are approximately 9 m lower than the Finchley Road carriageway. The development proposes a stepped six story building (including two basement levels below Finchley Road carriageway level) comprising approximately 60 student accommodation units and studio spaces with 9 residential units. The basements will be above the surrounding rail track levels.

This Report is based on drawings of the development as provided by CZWG Architects on 18th August 2014.

2.3. Qualification of Authors

The qualifications of the authors of this report are as follows:

Glynn Irvine, Engineer, MEng (Hons) Civil and Environmental Engineering.

Shan Ratnam, Hydrologist, BSc, MSc, DIC, CEng, MCIWEM

James Flack, Associate Geotechnics, BEng (Hons), Chartered Geologist and Fellow of the Geological Society of London

Dr Stepan Ruzicka, MSc, PhD, MCIWEM, CEnv

2.4. Camden Planning Guidance (CPG) 4

The London Borough of Camden requires a Basement Impact Assessment (BIA) to be prepared for developments including basements and lightwells within its area of responsibility. CPG 4 – Basements and Lightwells details the requirements for a BIA undertaken in support of proposed developments; in summary the Council will only allow basement construction to proceed if it does not:

- Cause harm to the built environment and local amenity;
- Result in flooding;
- Lead to ground instability.

In order to comply with the above clauses a BIA must undertake 5 stages detailed in CPG 4:

- Stage 1 – Screening. This stage should identify any areas for concern and therefore focus effort for further investigation.
- Stage 2 – Scoping. Identifies the potential impacts of the areas of concern highlighted in the Screening phase.
- Stage 3 – Site investigation and study. Allows greater understanding of the issues previously identified to be developed through focussed site investigation and data collection.

- Stage 4 – Impact assessment. Evaluation of impact, both direct and indirect, of the proposed scheme by comparison with the current situation.
- Stage 5 – Review and decision making. An audit of the information contained in the submitted BIA and a decision taken by the London Borough of Camden.

2.5. Objectives

The purpose of this report is to undertake a basement assessment in accordance with guidance in London Borough of Camden's (LBC) '*Guidance for subterranean development document'* (LBC, 2010). This report follows the screening process set out in Section 6.2 of the Guidance documents. The screening assessment has not highlighted a potential increase in the risk of flooding to the surrounding area. Risk items have been deemed to be closed out through identified appropriate engineering design with a scoping stage for the BIA not deemed necessary.

2.6. Constraints and Limitations

This report has been prepared for the exclusive use of Stadium Capital Holdings for the purpose of assisting them to determine whether further stages of a Basement Impact Assessment are required for the project. This report should not be used in whole or in part by any third parties without the express permission of Ramboll in writing.

Ramboll has endeavoured to assess all information provided to them during this report. The report summarises information from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon. The recommendations summarised in this report relate to details of the proposed development at the time of writing the report. Any substantial changes to the proposed design may require a reassessment of the strategy identified.

3. SITE SETTING

3.1. Site Location

The site is in the London Borough of Camden. The site is approximately 0.16Ha, located adjacent to Finchley Rd, NW3 6LT (approximate National Grid Reference is 526130, 184880). A site location plan (Figure 4) and approximate site boundary plan (Figure 5) are provided.

3.2. Site Boundary and Surroundings

The site is located in a mixed-use area of Hampstead.

- To the east of the site is Finchley Road, which is fronted predominantly by commercial spaces (mainly shops) at ground level with residential apartments above. There is also a Holiday Inn.
- The northern, southern and western boundaries are immediately adjacent to National Rail lines.
- Further to the north is Rosemont Road, which is predominantly residential with a small number of commercial spaces.
- Further to the south is Blackburn Road, the O2 shopping centre and associated outdoor car park. Within the centre are a cinema, gym, restaurants, shops and supermarket.

3.3. Site Description

Site walkovers were undertaken by Ramboll in March-May 2012.

The site is a largely vacant wedge of land located between National Rail lines, overgrown with shrub-like vegetation and grasses. Finchley Road falls from north to south, consequently, vertical level difference between the road level and the railway tracks on either side of the site vary. The road level is approximately 9.5m above the railway lines to the north of the site and approximately 9m above the railway lines to the south of the site.

The existing site itself falls away from the historic access onto Finchley Road to the western extent of the site (as shown in Figure 1). Existing site levels vary from a low point of approximately 49.7m to the western extent of the site and 56.8m adjacent to Finchley Road, as a result of the disused station platform. The surrounding railway line ballast level is at approximately 48m.

There are brick retaining walls along areas of the northern and southern boundaries. Another brick wall with a metal fence runs north/south across the width of the site approximately 10m westward of the eastern boundary at Finchley Road, and a Network Rail cable duct runs along this wall. A ~5m length of fencing is located approximately 15m westward of Finchley Road. The Finchley Road eastern boundary is fenced with wooden hoardings, and there is an advertising billboard in this area.

There are several sets of steps on the site, some providing access down to the rail tracks.

There are two small National Rail huts on the site. Approximately 5m westward from Finchley Road is a brick hut, and approximately 10m westward from the road is a metal communications hut surrounded by a metal fence.

There was some demolition/brick rubble observed on the site.

Figure 1: Photo of the site contained between the railway lines

As shown in Figure 1, the surrounding railway lines provide the natural low points bordering the site. The Ground levels to the north of the site, beyond the railway lines, rise up to a steep embankment to Rosemont Road while the ground levels to the south of the railway lines rise up to Blackburn Road.

3.4. Ground Conditions

The Phase II Ground Contamination Report for Midland Crescent produced by Capita Symonds in February 2012 noted ground conditions as per Table 1 within their report.

Table 1: Ground conditions encountered at the site

Stratum	Depth to Base of Stratum (mbgl)	Description	Aquifer Classification
Made Ground	2.3 to 3.65	Dark grey slightly gravelly clayey material. Gravel is angular to subangular fine to coarse brick, clinker, tile and metal wire fragments. Frequent whole bricks and brick cobbles.	N/A
London Clay	Unproven at 5 m	Firm brow mottled CLAY.	Unproductive Strata

Groundwater monitoring was conducted at the site as part of the investigatory works discussed within the Phase II Ground Contamination Report published by Capita Symonds.

Within the report, it notes that perched groundwater was encountered in two of the four exploratory holes on site. Groundwater levels were encountered between depths of 1.6 and 2.8 mbgl (approximately 53.2 and 52.25m AOD). It was however also noted that the groundwater levels were not consistent and no groundwater was encountered within the deepest exploratory hole of 5m.

A search on the British Geological Website gave archive records of a borehole (ref TQ28SE46 – Electric Light Station Lithos Road, Hampstead) locate approximately 300 metres to the west of the site. Review of the records gives a ground level of 52.43 mOD with London Clay being present to a depth of 88 metres below which a 8 metre thick bed of sand is shown to be present. This in turn overlies Chalk. Groundwater is therefore most likely to be confined to these bottom two strata forming and aquifer with the London Clay Formation confining groundwater to them.

3.5. Site susceptibility to Flooding

3.5.1. Groundwater Flood Risk

The basement level will be higher than the rail track level and furthermore the natural groundwater level is at a much lower level. Therefore, the site is not at risk from groundwater flooding.

As noted, perched groundwater was identified onsite but was not noted at a consistent level across the site. The site is underlain by Unproductive strata, as shown in Figure 11 of the Appendices and within Table 1.

Furthermore, the Environment Agency reveals that the site is not located within a groundwater vulnerability zone or a groundwater protection zone.

Based upon the ground conditions determined from the finding of the data search, flooding of the site due to groundwater is therefore deemed to be of low risk.

3.5.2. Sewer Flood Risk

The route of the surrounding public sewer assets have been obtained from Thames Water. This indicates a combined 1295x813 mm public sewer runs along the western boundary of the site. The relevant information from the Asset Records pertaining to the site are contained within APPENDIX B, and included on the proposed drainage plan in APPENDIX C.

Thames Water has identified that the sewerage network may surcharge to ground level during storm conditions (as per Thames Water consultations dated 22/08/2013).

The Flood Hazard Maps issued by LBC, provided within APPENDIX A, reveal a potential flood route within the area which reflects the route of the public sewer surrounding the site. The accuracy of the maps and flooding history of the sewer within the area would, however, need to be confirmed by Thames Water.

Thames Water manhole 0802 is located within the abandoned land between the railway lines, approximately 34m to the west of the site boundary. The Asset records provided reveal an ancillary device on the downstream side of Thames Water manhole 1901, located within the embankment, north of the railway lines.

Thames Water has requested that proposed surface water drainage designs should incorporate attenuation for extreme storm events on site. Consequently, site drainage would be permitted to connect to the surrounding public sewers on the condition that the discharge rates were regulated to prevent flooding due to the public sewer network. Provided that the discharge rates are restricted from the site to agreed rates with Thames Water, the risk of flooding due to sewers would be anticipated to be low.

3.5.3. Pluvial Flood risk

The image suggests there a water depth of between 10mm and 100mm within the vicinity of the site as a result of a 1:75 year storm event. These maps will form part of the SFRA produced for LBC and reflect the updated information from the existing PFRA. The extent of anticipated pluvial flooding is shown as per the image in APPENDIX A.

The worst case of surface water depth in the area is 100mm deep to the north of the site on the railway tracks. The depth of the flooding is however predominantly restricted to the railway lines, which are lower than the proposed site.

Surface water flood maps have also been obtained from the EA to indicatively show the flood depths for high chance (1:30 year return period) and medium chance (1:100 year return period).

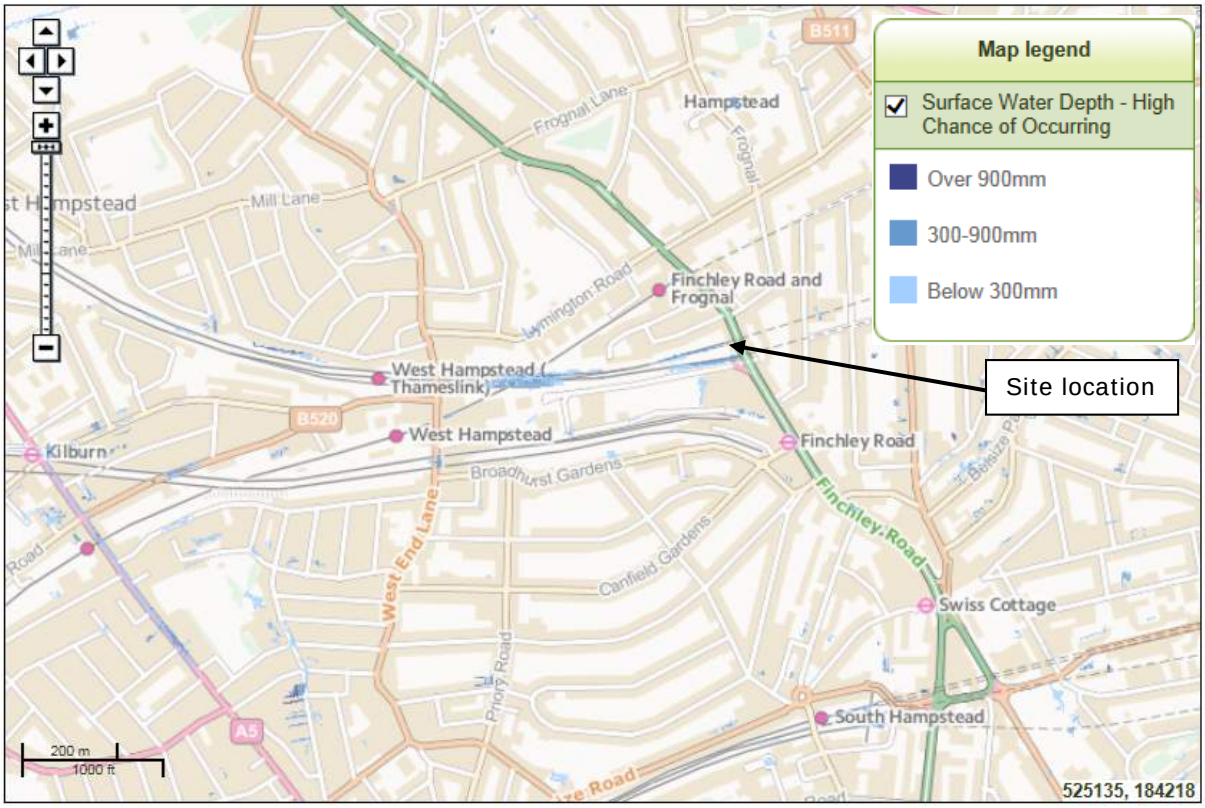


Figure 2: High chance flood maps, sourced from the EA

Figure 2 shows the chance of anticipated flooding of greater than 3.3% surrounding the site. The site is not shown to be at risk of flooding while the surrounding tracks have a high chance of flooding from surface water. High means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%). The figure reveals that the railway tracks may be subject to just over 300mm of flooding during this rainfall event.

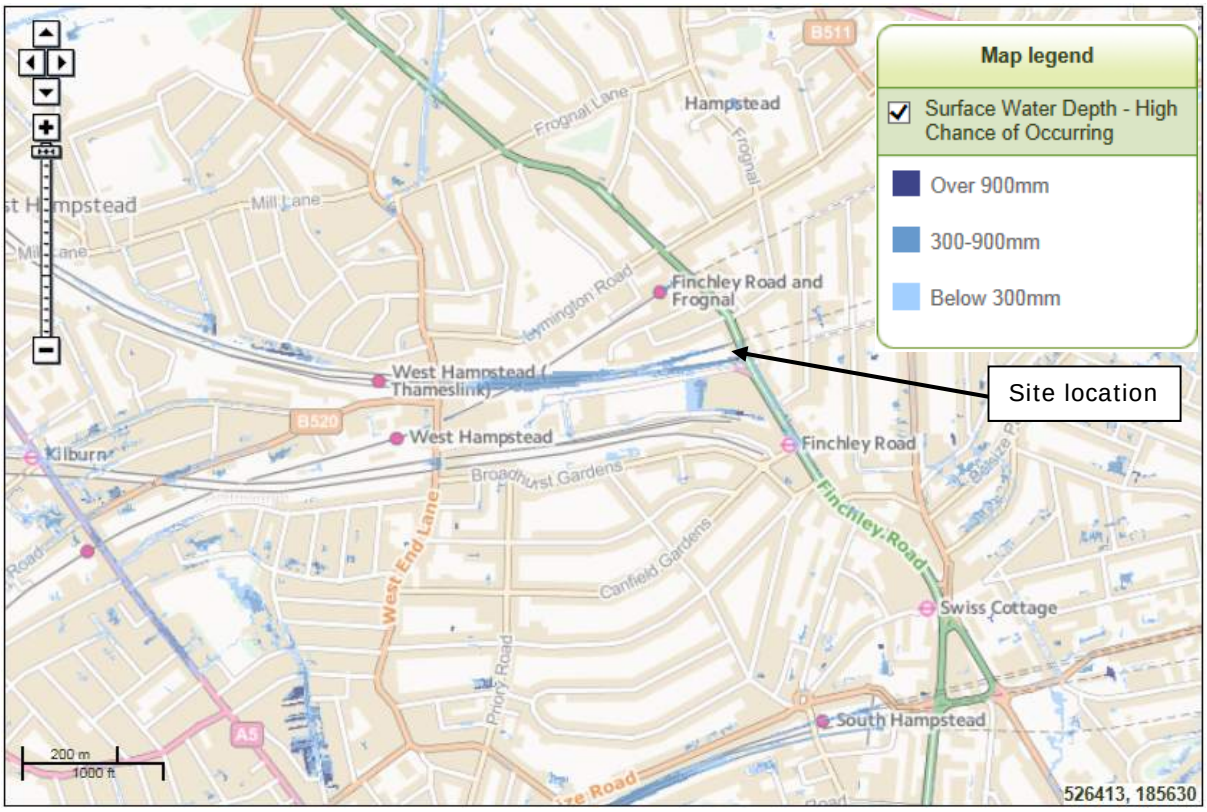


Figure 3: Medium chance flood maps, sourced from the EA

Figure 3 displays the chance of anticipated flooding of greater than 1% surrounding the site. The flood depth within the vicinity of the railway lines has become deeper and extended to the west to West Hampstead station. The flood water depth within this area may be up to 900mm deep in certain locations along the tracks.

The maximum flood depth surrounding the site is shown to be above 900mm in the 1:1000 year event. In order to ensure that the flood risk at the site is not increased for the proposed development, proposed basement floor levels should be kept higher than the flood levels identified on the maps.

3.5.4. Coastal Flood Risk

No flood risk identified.

3.5.5. Fluvial Flood Risk

EA maps have identified the nearest water source of a river or pond as the Hampstead Ponds, which are 1.4km away from the site and outside of their catchment No flood risk has therefore been identified.

4. BASEMENT PROPOSALS

4.1. Proposed levels

The proposed amendments to the site are indicated in Figure 4 below. The existing demolished station platform is proposed to be removed to construct the basement.

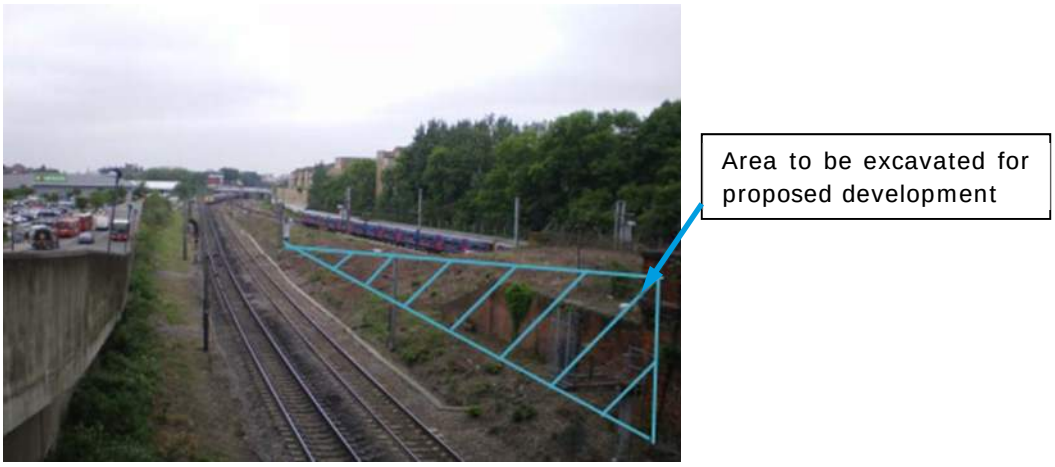


Figure 4: Existing area to be excavated

Figure 5 provides a section through both the existing site and the proposed development taken close to Finchley Road. At this location within the existing site, the ground levels are highest due to the location of the demolished station platform.

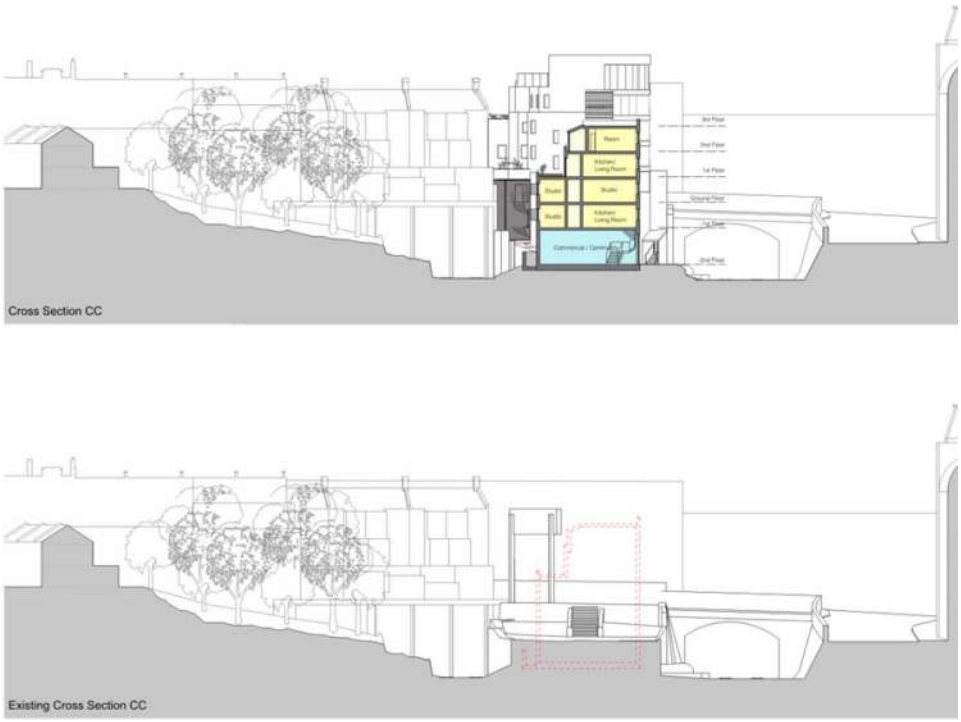


Figure 5: Extract from CZWG drawing 2004-00-DR-0403

The proposed levels at this location will be lowered to be relatively consistent across the site, while the proposed levels remain approximately 1.8m above the railway lines. This would ensure that the proposed basement floor level is above the highest flood levels identified within Section 3.5.3.

4.2. Proposed Site drainage

Separate foul and surface water drainage networks are proposed to serve the site.

4.2.1. Surface water drainage

The proposed development will have blue/green roof attenuation system and run off from the site will eventually drain into the combined sewer. The attenuation system will reduce the peak run of rate by 50% which is compliant with local regulations and the London Plan.

An onsite attenuation strategy is proposed to ensure that rainfall runoff water temporarily retained on site does not increase the flood risk to the site itself or the neighbouring railway lines. A system of drainage channels would be proposed around the boundary of the site to ensure water generated on site is not permitted to drain onto the railway lines.

It is proposed that the attenuation structures would be kept at high level, preventing extensive excavation within the site boundary. Attenuation structures at roof level will be fitted with flow controls to regulate the flow of water from the attenuation features. A final controlled is proposed to be installed at the final surface water manhole within the site boundary prior to the outlet into the Thames Water combined public sewer. This ensures that flood volumes up to the 1:100 year return period storm event with climate change are managed onsite without impacting the adjacent infrastructure.

4.2.2. Foul drainage

It is proposed that the development will be served by two separate foul networks; one serving the upper floors and discharging directly into the public sewer and the other serving the lowest level of the building, fitted with a non-return valve. This would prevent above ground sewer flooding the basement in the unlikely event of surcharged condition in the public sewer, during extreme storm events.

5. BASEMENT IMPACT ASSESSMENT – SCREENING

The following assessment is based on our current understanding of the proposed scheme and the screening methodology set out in the LBC's 'Guidance for Subterranean Development.

5.1. Surface flow and flooding screening assessment

Question	Response	Justification	Mitigation
1: Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	The site is located 1.4km away from the pond chains on Hampstead Heath and outside of their catchment.	None required
2: As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	**Yes**	The site was historically drained when in use as a station, but the site has become derelict and overgrown. It is assumed that there is an existing connection to the public sewer to the west of the site. It is proposed to maintain this connection or provide a new connection to the Thames Water combined public sewer network if the existing connection is unusable. The proposed development will ensure that run off will be discharged into the public sewer.	Surface water drainage strategy to be implemented as established within the Ramboll document RUK-30030-01 Rev04, plan included within APPENDIX C. As part of the proposed surface water drainage designs, surface water has been attenuated at 50% of the peak existing runoff rates. Due to the ground conditions at the site and adjacent infrastructure, it is not possible to infiltrate water within the site boundary. Green roofs have been proposed throughout the scheme which will reduce the overall volume of water discharge from the site through evapotranspiration. Consequently, the overall water volume from the site will also be slightly reduced. Both the volume and flow rate for the proposed development is proposed to be less than the existing case. The drainage strategy has been approved in principle by LBC and incorporates criteria for connection into the public sewer raised by Thames Water.
3: Will the proposed basement development result in a change in the proportion of hard surfaced /paved external areas?	**Yes**	The site was historically drained when in use as a station, but the site has become derelict and overgrown. The proposed development will result in 100% hard standing.	Surface water attenuation system to be implemented as established within the Ramboll document RUK-30030-01 Rev04, plan included within APPENDIX C and this will include blue/green roof. The drainage strategy has been approved in principle by LBC and incorporates criteria for connection into the public sewer raised by Thames Water.
4: Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	**Yes**	The basement itself will not have any impact on adjacent properties or water courses as the structure at an elevation higher than the rail track will not have an impact on surface water flows. But surface water flows within the site will change due to the development and can result in increased flow into the public sewer.	Surface water attenuation system to be implemented as established within the Ramboll document RUK-30030-01 Rev04, plan included within APPENDIX C. Final approvals are required to be obtained from the authorities. A flow control device, in the form of a hyrdobrake is proposed to restrict flow to the public sewer. The proposed drainage scheme reduces the existing flow rates by 50% into the public sewer. A maximum flow of 30 l/s is permitted through the hydrobrake which will discharge surface water from the site over a longer time period. The proposed drainage strategy is in line with guidance as established within the London Plan. The drainage strategy has been approved in principle by LBC and incorporates criteria for connection into the public sewer raised by Thames Water.

Question	Response	Justification	Mitigation
5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No**	There should not be any concern of any changes to the quality of surface water being received by adjacent properties as all foul and surface water will drain to the public sewer.	None required
6: Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	**Yes**	The site is located next to Finchley Road which flooded in 2002 (Figure 6). This was due to a high intensity rainfall event where Camden suffered widespread surface water flooding (North London Strategic Flood Risk Assessment, 2008). All of Camden is assumed to be within the Greater London Indicative Flood Risk Area (London Borough of Camden Preliminary Flood Risk Assessment, 2011). Flood maps obtained from the Environment Agency note that the site has a very low chance of flooding which means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%). Flood Risk Assessment has been screened out through consultations with LBC (refer to Appendix B). For further details of the drainage strategy, refer to Ramboll document RUK-30030-01 Rev04.	The basement level will be set above the predicted flood levels to prevent pluvial flooding estimated by both the EA and LBC. Further details are provided within section 2.5.

5.2. Subterranean (groundwater) flow screening assessment

Question	Response	Justification	Mitigation
1a: Is the site located directly above an aquifer?	**No**	According to ground investigation at the site (Capita Symonds, 2012), the site is understood to be located on Made Ground over London Clay which provides an aquiclude to the underlying Thanet Sands and Upper Chalk. See Section 2.4.	None required.
1b: Will the proposed basement extend beneath the water table surface?	**No**	The ground investigation and BGS records indicated that the natural ground water level is at significant depth below the basement level and the proposed basement level will be close to the level of the existing railway line which it is assumed has its own drainage network. Therefore, the basement itself is unlikely to alter the groundwater flow regime. Furthermore, given the anticipated ground conditions, the foundations are unlikely to affect the groundwater regime.	Undertake ground investigation to better understand the hydrogeology of the site and undertake appropriate groundwater impact assessment as part of the detailed design of the foundations/substructure. Initial investigations have established that there is limited groundwater at the site, refer to section 2.4.
2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	Based on a review of historical maps (accessed via www.old-maps.co.uk, EA website (Groundwater SPZs in 'what's in my backyard', Find Maps, BGS Geoindex map (accessed online), no wells (used/discussed) or springs were identified. The closest identified well was identified approximately 1km south east of the site. Consultation with EA and LBC Environmental Health to confirm no other water features are present within this area.	None required.
3: Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	The site is located 1.4km away from the pond chains on Hampstead Heath and outside of their catchment.	None required

Question	Response	Justification	Mitigation
4: Will the proposed basement development result in a change in the proportion of hard surfaced /paved areas?	**Yes**	The site was historically drained when in use as a station, but the site has become derelict and overgrown. The drainage strategy has been developed on the assumption that the site will be 100% hardstanding. However, the site does underlain by non-aquifer (London Clay).	Ensure that the proposed discharge rates into the public sewer are not greater than the existing discharge rates and conform to the London Plan, as per the proposed drainage strategy. As part of the proposed surface water drainage designs, surface water has been attenuated at 50% of the peak existing runoff rates. The proposed drainage strategy utilised green roofs across the roof to prevent the water from immediately flowing into the public sewer.
5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	**No**	All surface runoff will be discharged into the public sewer network, and therefore the total recharge within the site to subterranean water is likely to be reduced compared to existing brownfield condition. However, as the site is relatively small it should not have a significant impact on the overall groundwater regime of the wider area.	None required
6: Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	**No**	The site is located 600m to the south of the pond chains on Hampstead Heath and outside of their catchment.	None required

5.3. Slope stability screening assessment

Question	Response	Justification	Mitigation
1: Does the existing site include slopes, natural or manmade, greater than 7º? (approximately 1 in 8)	**Yes**	Slopes in excess of 1 in 8 exist at the site and are managed through retaining walls from the historic platform and steps from the platform to the west of the site.	The historic platform is proposed to be removed, reducing the high point at the site and the requirement for the steep slopes to lower levels.
2: Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7º? (approximately 1 in 8)	**No**	The proposed site is set back from the lower level of the rail tracks surrounding the site, enabling a shallow slope profile from the tracks to the proposed ground level.	N/A
3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7º? (approximately 1 in 8)	**No**	The site is within a railway cutting but will not influence the slopes due to its proximity from them	N/A
4: Is the site within a wider hillside setting in which the general slope is greater than 7º? (approximately 1 in 8)	**No**	The existing site slopes are formed by the location of the historic platform.	The historic platform is proposed to be removed, reducing the high point at the site and the requirement for the steep slopes to lower levels.
5: Is the London Clay the shallowest strata at the site?	**Yes**	The Capita Symonds Phase II Ground Contamination Report for Midland Crescent (Feb, 2012) comprised 4no. Window Sample Boreholes. All locations that progressed beyond the Made Ground encountered London Clay.	Long term ground movements from loading or unloading the clay will be designed for.
6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained? (Note that consent is required from LB	**No**	Situated within multiple areas of the Site are stands of scattered broadleaved sapling trees, species include: sycamore (Acer Pseudoplatanus), ash (Franxinus excelsior) and hawthorn (Crataegus monogyna). Due to their young age and a stem diameter at breast height (DBH) of less than 75mm, the trees	None anticipated - Review prior to site clearance.

Question	Response	Justification	Mitigation
Camden to undertake work to any tree/s protected by a Tree Protection Order or to tree/s in a Conservation Area if the tree is over certain dimensions).		are not applicable for a BS5837 tree survey.	
7: Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	**No**	N/A	N/A
8: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	Based on a review of historical maps (accessed via www.old-maps.co.uk, EA website (Groundwater SPZs in 'what's in my backyard', Find Maps, BGS Geoindex map (accessed online), no wells (used/discussed) or springs were identified. The closest identified well was identified approximately 1km south east of the site.	Consultation with EA and LBC Environmental Health to confirm no other water features are present within this area.
9: Is the site within an area of previously worked ground?	**Yes**	Site is brownfield, having previously been used as residential housing and as railway platforms/ticket office.	A site investigation will quantify the risk of encountering obstructions within the Made Ground. These will be removed and the final raft foundation with be constructed on the London Clay
10: Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	**No**	The proposed raft foundation will be founded on the London Clay. There are no River Terrace Deposits across the site that may contain a shallow aquifer.	None required
11: Is the site within 50m of the Hampstead Heath ponds?	**No**	The site is located 600m to the south of the pond chains on Hampstead Heath and outside of their catchment.	None required
12: Is the site within 5m of a highway or pedestrian right of way?	**Yes**	Finchley Road is located to the east of the site.	A strategy for maintaining pedestrian access along Finchley Road in the vicinity of the site, will be prepared following consultation with LBC as is likely that footpath diversions will be required.
13: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	**No**	The proposed foundation level will be approximately at railway level. The adjacent road bridge is founded at or below this level. As is the adjacent property to the north which sits on a raft that spans two retaining walls that are both founded at or below the railway level.	None – undermining will not occur.
14: Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	**No**	The development is specifically designed so that it does not protrude into any exclusion zones. i.e. • within 4.5m of a working rail track • within 3.5m of an overhead gantry • within 3m of an overhead powerline • within 1m of the communication equipment boxes • over the communications cabin • to have opening windows onto the railway land	Review any changes to the proposed scheme.

6. CONCLUSIONS AND RECOMMENDATIONS

This study concludes that the proposed scheme will **not** have a significant impact on surface water flow and flooding, groundwater and slope stability that cannot be readily mitigated as part of the detailed design.

6.1. Mitigation Measures Included Within Drainage Strategy

The previous section has assessed any potential impacts on surface water flow, flooding, groundwater and slope stability in line with the screening guidance. All potential risks identified have been mitigated in the proposed drainage strategy. The drainage strategy has been approved in principle by LBC and incorporates criteria for connection into the public sewer raised by Thames Water.

The specific mitigation measures included are summarised as follows:

- Surface water drainage strategy agreed in principle with LBC.
- SuDS included within the site wide drainage design with a climate change factor of 20% added to the proposed rainfall intensities
- Proposed discharge rates from the site reduced by 50% from the existing flow rates in line with the London Plan to reduce the risks of sewer flooding.

6.2. Further Mitigation Measures to be Included

The following items as a result of current consultations with the local authorities:

- Non – return value to be installed on the foul drainage serving the lowest level of the building to prevent water ingress into the basement in the event of the sewer becoming surcharged.
- Detailed design of drainage and levels across the site to be submitted to the authorities post planning.
- Undertake a detailed intrusive site investigation and prepare both a factual report and interpretive report in or to inform the detailed design of the substructure and services and to mitigate any adverse impacts on neighbouring property;
- Ensure any revisions to the scheme do not intrude into any network rail exclusion zones.

7. REFERENCES

Capita Symonds (2008) Phase I Geoenvironmental Report Midland Crescent – Network Rail Land, London, Version 1.0, November 2008.

Capita Symonds (2007) Phase I Geoenvironmental Report Midland Crescent, London, Version 1.0, November 2007.

Capita Symonds (2012) Phase II Ground Contamination Report Midland Crescent, London, Final v1, February 2012.Arup (2010) London Borough of Camden, Camden geological, hydrogeological and hydrological study: Guidance for subterranean development, London, Issue 01, November 2010.

Environment Agency (2011) Preliminary Flood Risk Assessment: London Borough of Camden, London, Vol. 2, December 2011.

Mouchel (2008) North London Strategic Flood Risk Assessment, London, Final, August 2008.

Halcrow (2011) Preliminary Flood Risk Assessment for London Borough of Camden, London, version 0.2, 13th April 2011.

Halcrow (2011) Surface Water Management Plan for London Borough of Camden, London, version 0.5, 27th July 2011.

FIGURES

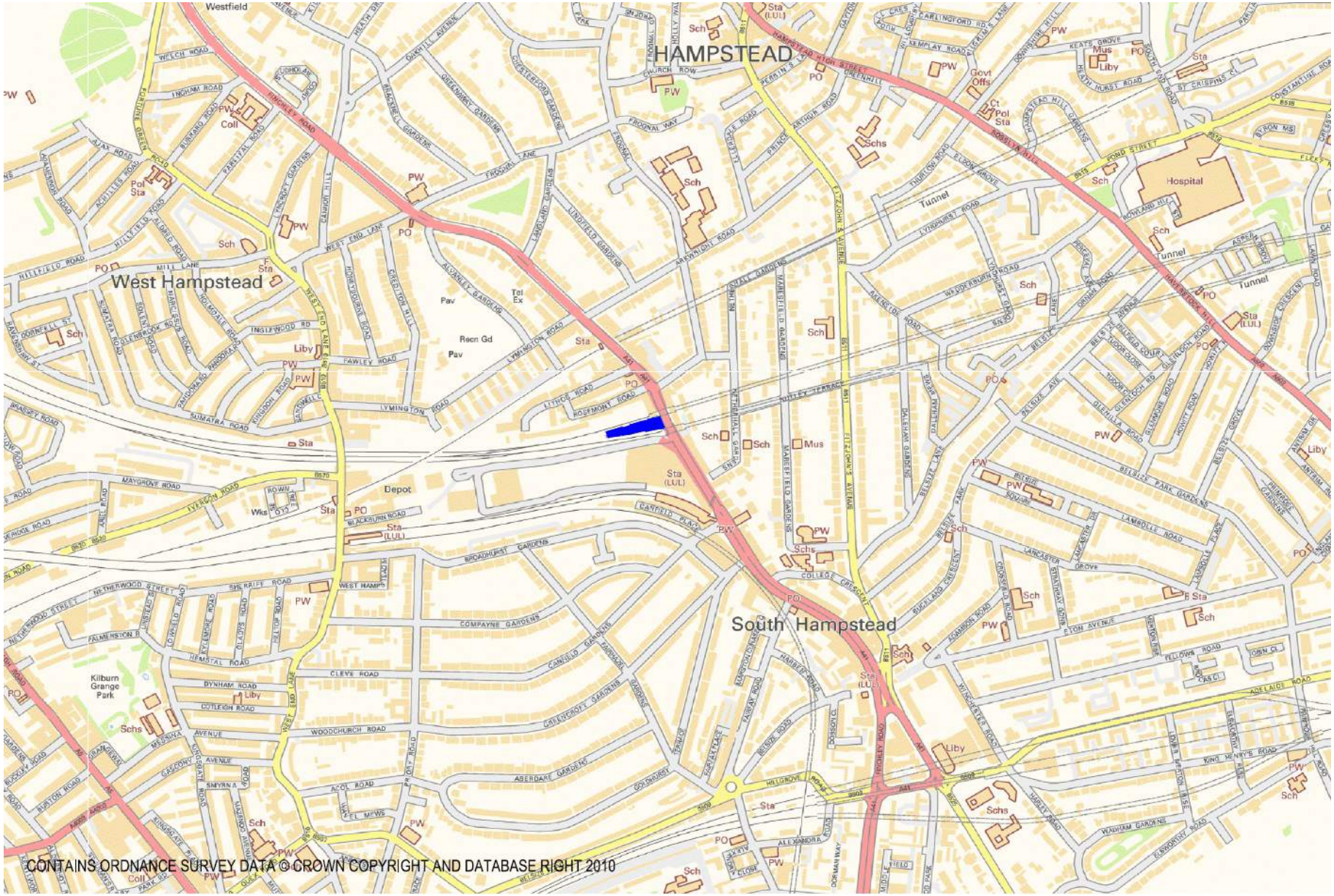
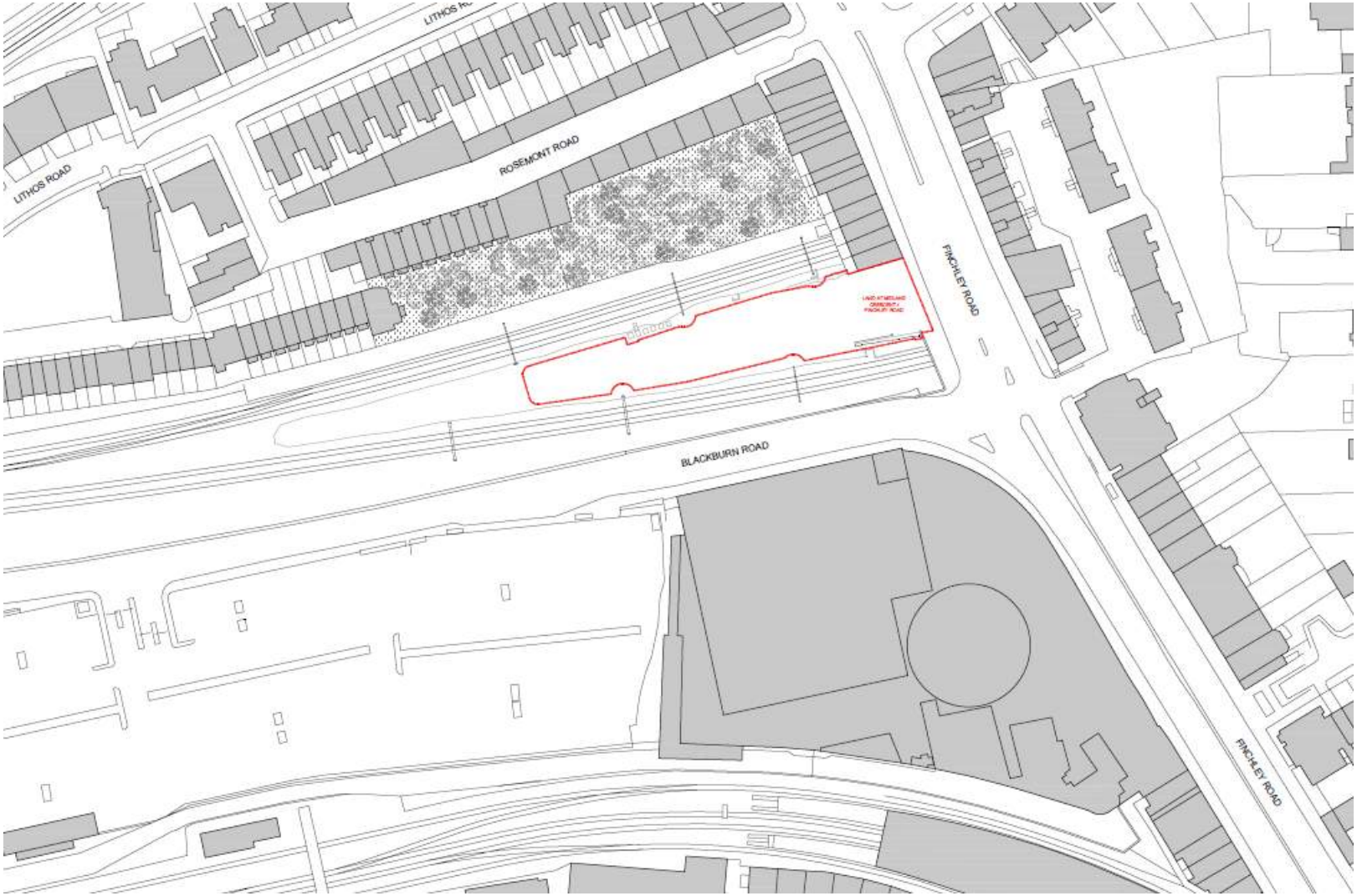
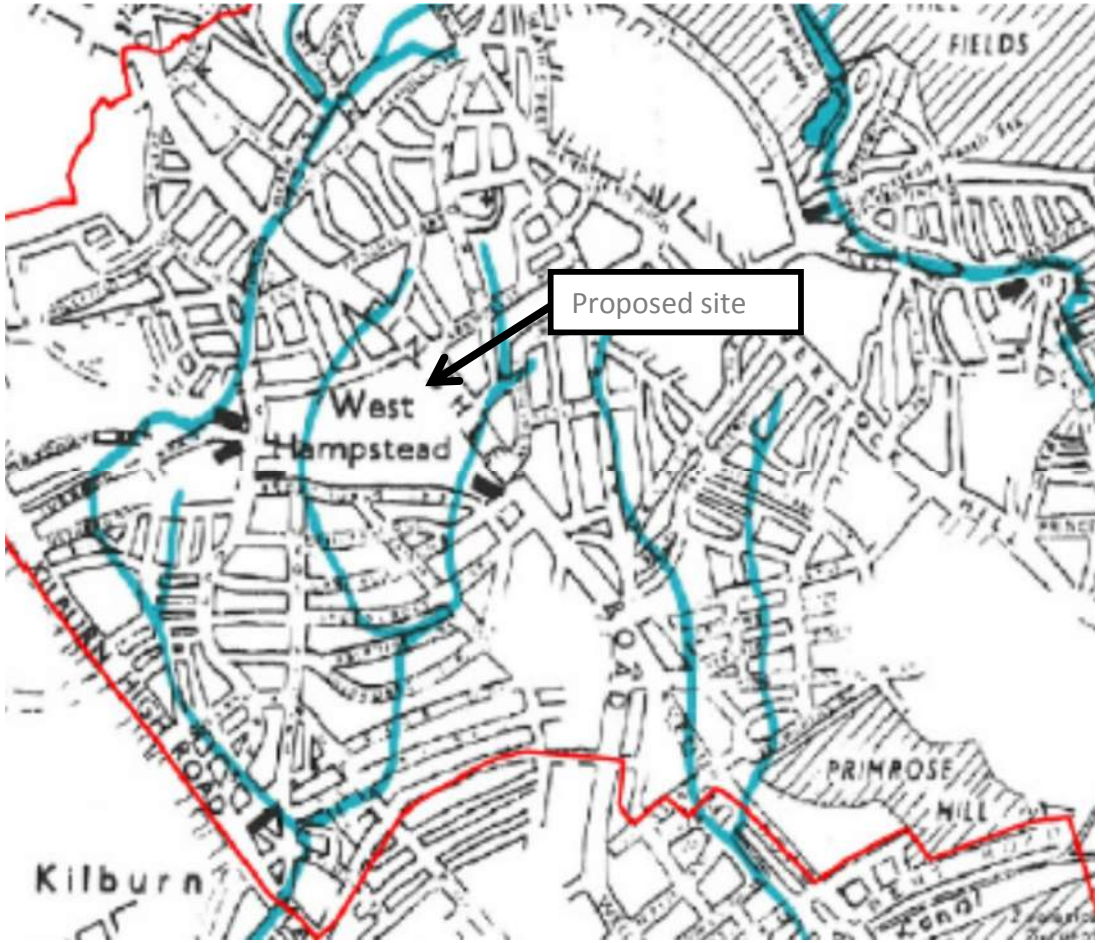


Figure 6: Site Location



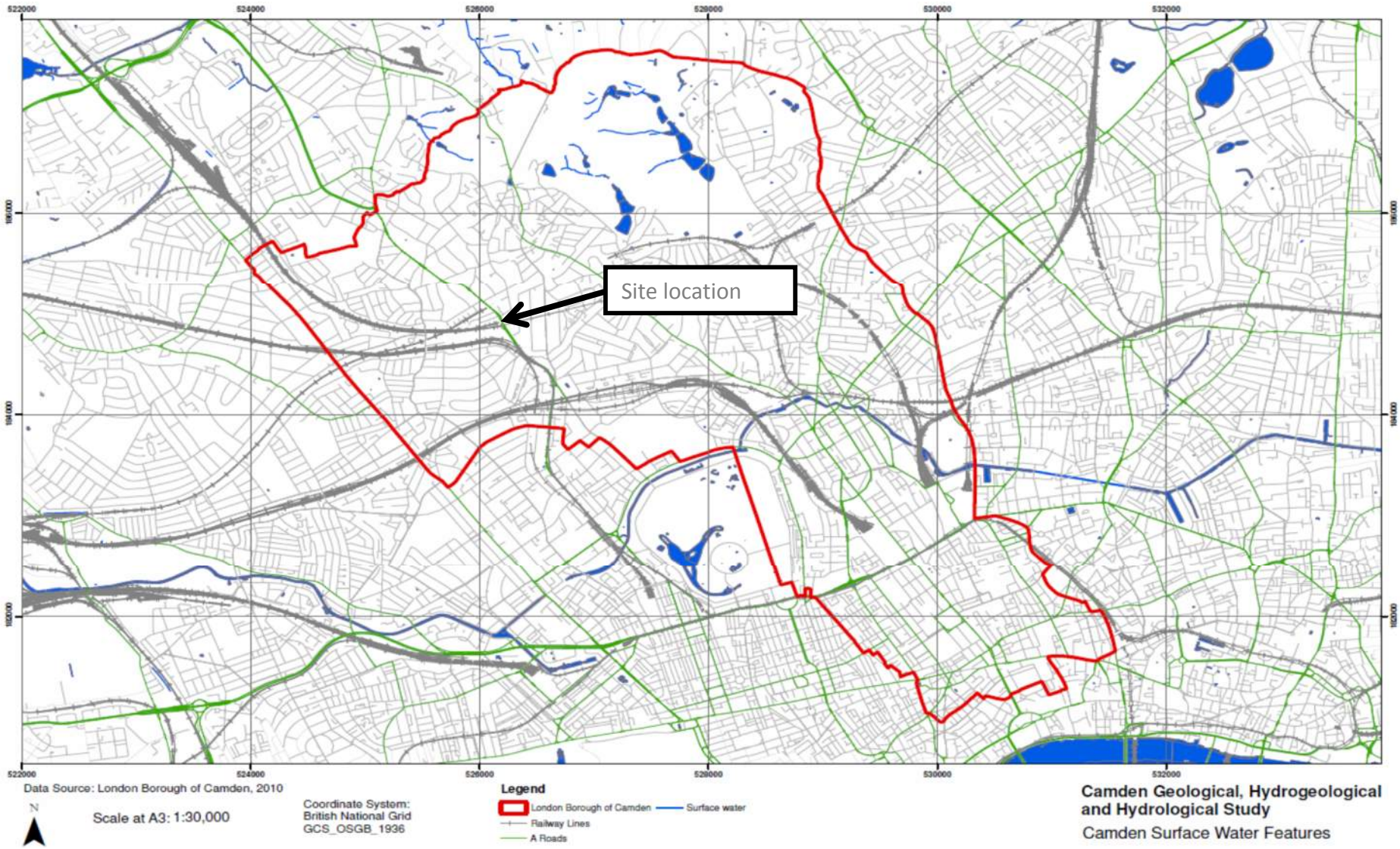
Source: CZWG Drawing "1666-00- DR0101 Site Plan Red Line.pdf" provided 24/10/12

Figure 7: Site Plan



Source: London Borough of Camden; Camden geological, hydrogeological study: Guidance for subterranean development (November 2010)

Figure 8: Watercourses



Source: London Borough of Camden; Camden geological, hydrogeological study: Guidance for subterranean development (November 2010)

Figure 9: Camden Surface Water Features

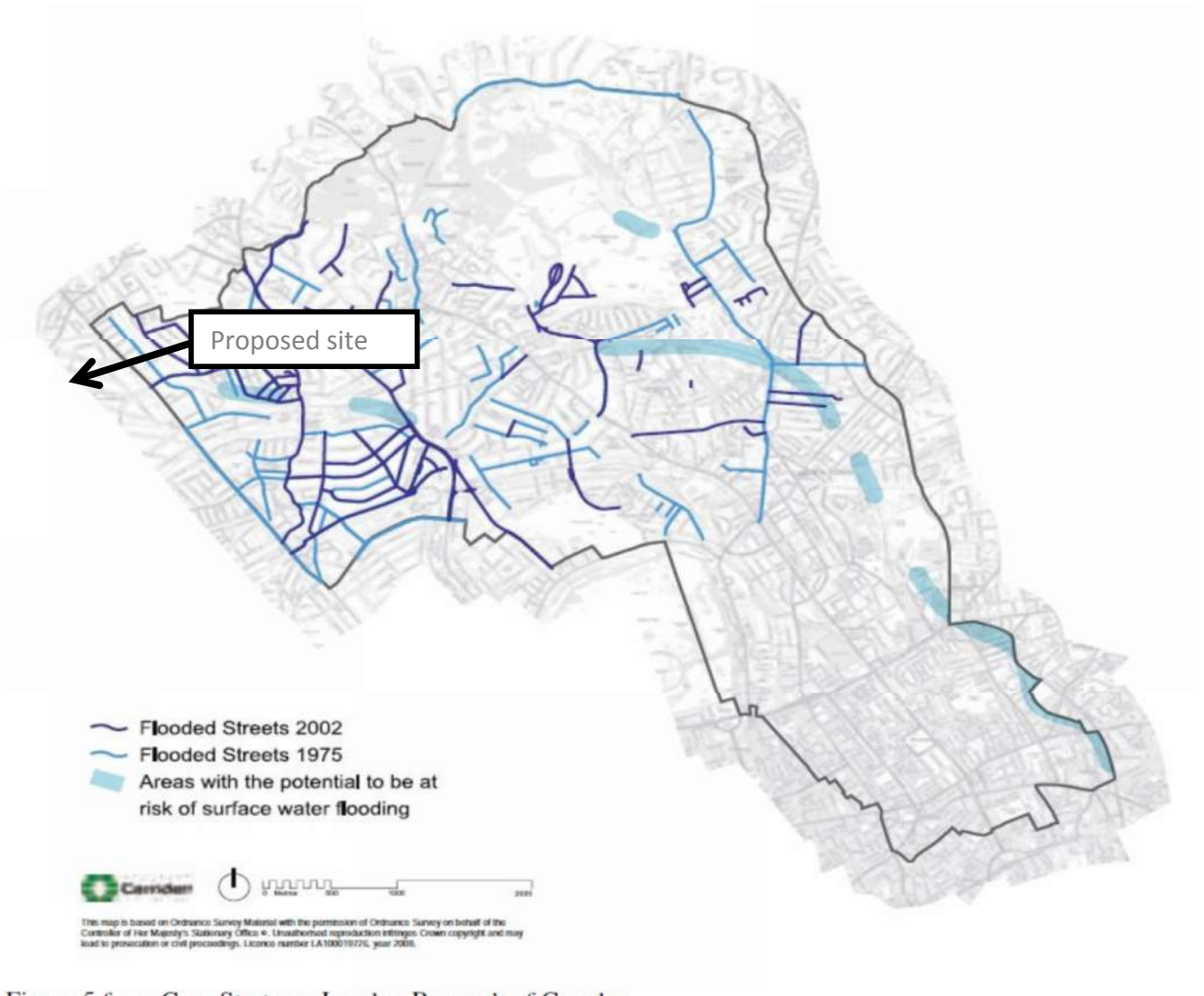
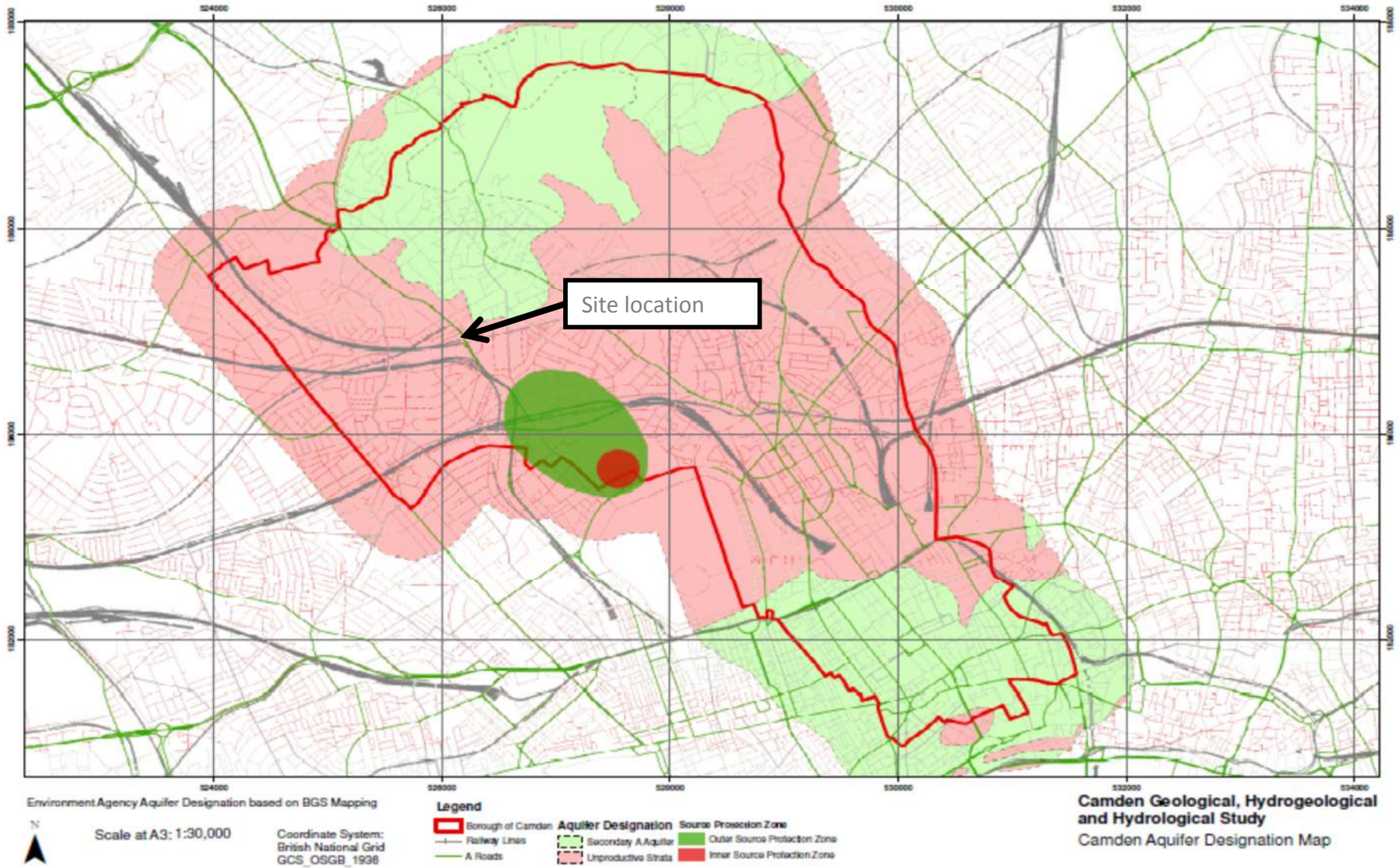


Figure 5 from Core Strategy, London Borough of Camden

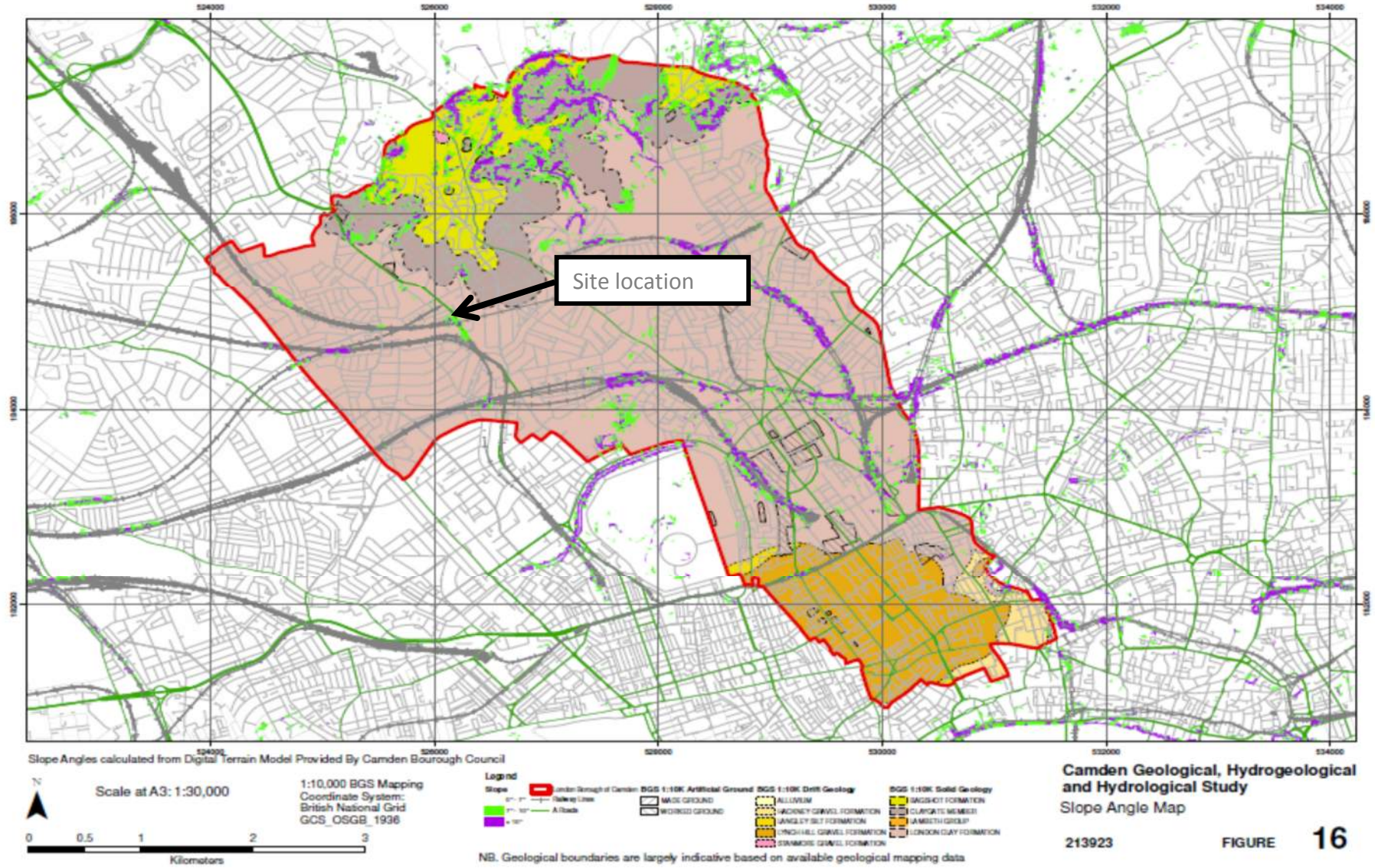
Source: London Borough of Camden; Camden geological, hydrogeological study: Guidance for subterranean development (November 2010)

Figure 10: Flood Map



Source: London Borough of Camden; Camden geological, hydrogeological study: Guidance for subterranean development (November 2010)

Figure 11: Camden Aquifer Designation Map



Source: London Borough of Camden; Camden geological, hydrogeological study: Guidance for subterranean development (November 2010)

Figure 12: Slope Angle Map

APPENDIX A

Flood Hazard depth map for 1:75 year return period

Glynn Irvine

From: Humfrey, Nick <Nick.Humfrey@camden.gov.uk>
Sent: 29 July 2013 13:05
To: Glynn Irvine
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: RE: Midland Crescent FRA
Attachments: West Area Depths.pdf

Hi Glyn,

Thank-you for getting in contact. The reason I would be interested in seeing a Flood Risk Assessment is for reasons of surface water flooding. Naturally the nature of the site precludes sewer flooding and like the rest of Camden there is no concern of coastal or fluvial flooding.

Our concern is based on modelling we have done of flooding in the area which suggests there may be some ponding on the site (see attached map of modelled flooding for a 1 in 75 year event). The modelling this is part of was done with consideration of the areas either side West Hampstead and South Hampstead which are considered areas of flood risk.

The unique situation of Midland Crescent means that I am personally less confident that the modelling is accurate there compared to neighbouring areas but as there is currently flooding predicted, this will need to be assessed. The maps for this were produced after the PFRA which is why you have not come across it and why I said in my comments I would be happy to share information. These maps are being used to inform a new SFRA.

If you think a flood risk assessment is excessive and can demonstrate the surface water risk has been considered and can be managed without doing a full FRA, I am happy with that but I need to see that you've engaged with the specific risk identified in this map.

Thanks

Nick Humfrey
Sustainability Officer

Telephone: 0207 974 4027

From: Glynn Irvine [mailto:Glynn.Irvine@ramboll.co.uk]
Sent: 24 July 2013 10:00
To: Humfrey, Nick
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: Midland Crescent FRA

Hi Nick,

Jonathan passed me on your details as I believe you are looking into the Midland Crescent planning application with Seonaid. I believe you were questioning whether or not an FRA had been undertaken for the scheme. We looked at this when we were writing our Basement Impact Assessment for the site and indeed in compiling our surface water strategy for the site. One of the documents we used for compiling this report was the Environment Agency PFRA London Borough of Camden (Preliminary Flood Risk assessment for Camden) amongst others, as noted below.

The proposed site itself is less than a hectare and is not highlighted as being within an area of potential flood risk within the documents published by Camden. According to the information provided within both the Preliminary

Flood Risk assessment for Camden published by the Environment Agency and the Camden geological, hydrogeological and hydrological study published by ARUP, the site location is within an area of low flood risk from river, sewers and south of the previous historic flooding. The flood maps issued by the Environment Agency shows the site within an area where flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year.

The previous site (the railway station) was 100% hardstanding and the proposed new site is also 100% hardstanding but provisions have been made to reduce the overall site runoff rates into the public sewer to 50% of the existing site in keeping with the Mayor's London Plan, through the use of green and blue roof systems. Within the detailed design of the site, drainage channels and up stands can be incorporated within the site boundary to capture surface water landing within the external hard landscaping and direct it into the below ground network. Overall, the proposals are to reduce the rate of surface water discharge into the public sewer, thus reducing risk of sewer flooding within this area and surface water runoff onto the tracks due to the dedicated surface water network which may not be currently functioning.

For further information on this issue, we would therefore direct you to both the Basement Impact Assessment and the Surface Water Attenuation Strategy, as issued within the planning documents. Can you possibly let me know if this answers your questions raised or if not what further information you would require for the project?

Many thanks,

Glynn Irvine

MEng (Hons)
Design Engineer
Infrastructure

T +44 (0)20 7631 5291
DD + (0)20 7927 8502
glynn.irvine@ramboll.co.uk

Ramboll UK Limited
60 Newman Street
London
W1T 3DA
www.ramboll.co.uk

1 in 75 year storm event - 1hour storm duration

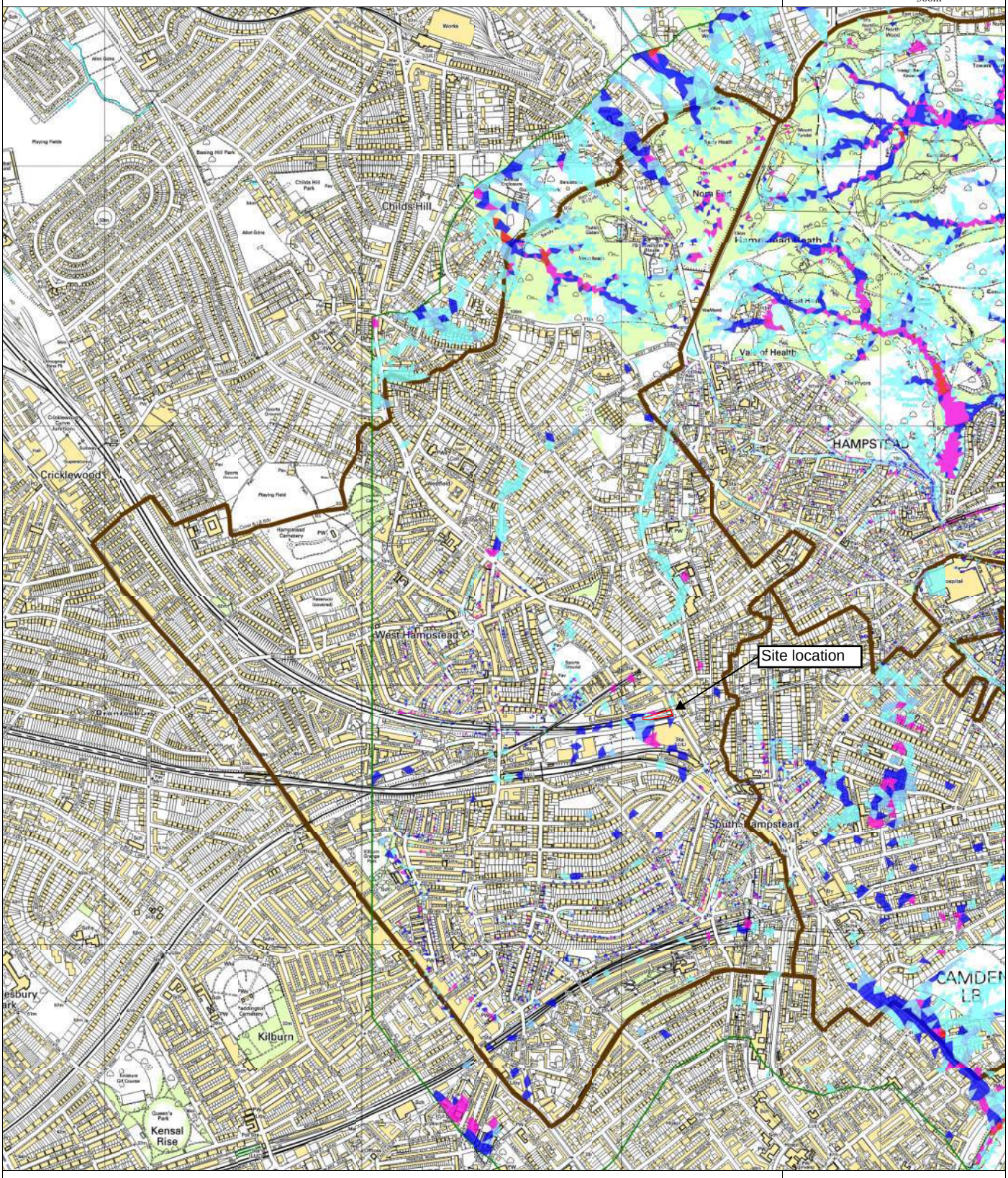
Network - WE&C_FW_May09_Lory_1#9_1#6_1_v72

Run - BV_v72_30_Apr_75yr_1hr!

Simulation - 1-75 at 01/01/2000 01:00:00

Map Centre Coords
x: 525544, y: 185369
Date Printed: 19/07/2012
Scale 1:21000

500m



2D zone [1]

Element Depth : 2DTriangle.sim.depth...

Fill Visibility/Fill Colour (abs)

- < 0
- >= 0
- >= 0.01
- >= 0.02
- >= 0.03
- >= 0.1
- >= 1

General line [3]

Powered by

InfoWorks™

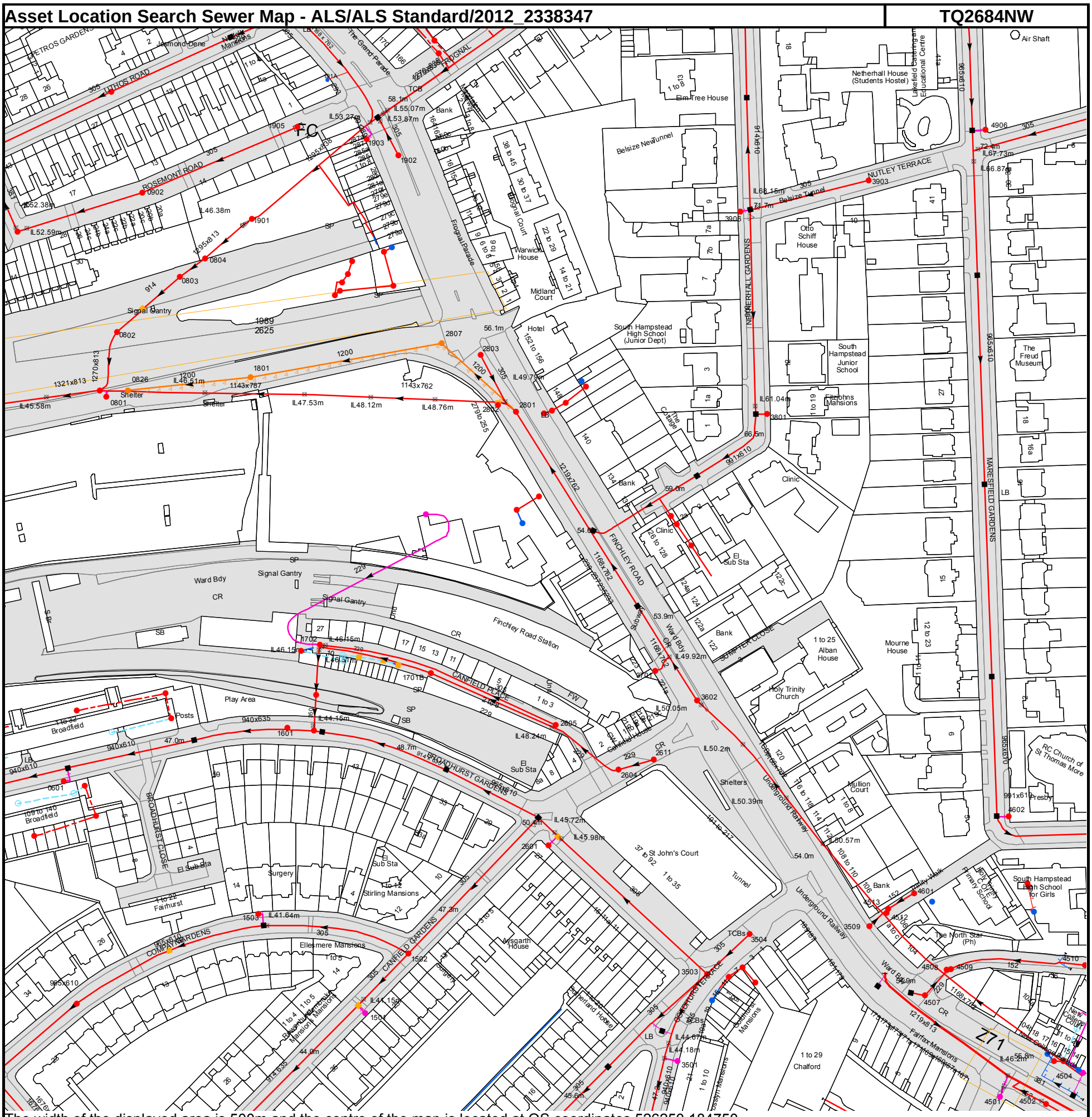
APPENDIX B

Thames Water Asset records

Thames Water Consultation Record

Asset Location Search Sewer Map - ALS/ALS Standard/2012_2338347

TQ2684NW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 526250,184750

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
0802	49.31	45.87
18AH	n/a	n/a
18AG	n/a	n/a
18AD	n/a	n/a
18AJ	n/a	n/a
0803	49.12	46.09
18AI	n/a	n/a
18BB	n/a	n/a
0804	51.78	46.19
18AE	n/a	n/a
18AF	n/a	n/a
091A	n/a	n/a
1901	56	50.41
0902	57.55	53.8
1902	57.86	54.02
1903	n/a	n/a
1905	58.3	55.92
091B	n/a	n/a
191A	n/a	n/a
3501	n/a	n/a
35BJ	n/a	n/a
35CB	n/a	n/a
3503	50.97	47.23
35CC	n/a	n/a
3504	52.33	48.88
3602	53.34	52.43
3706	n/a	n/a
3705	n/a	n/a
3704	n/a	n/a
3906	n/a	n/a
2601	n/a	n/a
2604	52.67	48.54
2611	53.12	49.01
2605	52.05	50.07
3701	n/a	n/a
27CI	n/a	n/a
27CJ	n/a	n/a
27DA	n/a	n/a
28CI	n/a	n/a
2801	55.4	49.44
28CH	n/a	n/a
2802	n/a	n/a
28CG	n/a	n/a
28CF	n/a	n/a
28CE	n/a	n/a
2803	55.99	52.04
2807	55.9	48.57
2901	n/a	n/a
1916	n/a	n/a
1601	47.44	43.74
17BC	n/a	n/a
161B	n/a	n/a
161A	n/a	n/a
1702	48.6	n/a
17BE	n/a	n/a
17BD	n/a	n/a
1501	45.13	n/a
1502	46.46	42.31
1703	n/a	n/a
1701B	50.28	47.36
06BA	n/a	n/a
auto	n/a	n/a
0801	50.19	n/a
06BG	n/a	n/a
0826	49.4	46.13
06BE	n/a	n/a
06BH	n/a	n/a
1801	49.02	46.5
1503	n/a	n/a
auto	n/a	n/a
06AJ	n/a	n/a
06AF	n/a	n/a
06AG	n/a	n/a
06AH	n/a	n/a
0601	n/a	n/a
06BB	n/a	n/a
35CD	n/a	n/a
3801	n/a	n/a
4504	56.29	51.57
4510	61.48	n/a
4602	n/a	n/a
46AI	n/a	n/a
45DG	n/a	n/a
4502	55.61	49.91
45DC	n/a	n/a
45DA	n/a	n/a
45CJ	n/a	n/a
45CI	n/a	n/a
45DB	n/a	n/a
4906	n/a	n/a
4501	54.71	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4601	58.43	57.79
3903	72.04	69.19
3509	54.32	52.46
4508	56.38	53.21
4509	56.52	55.45
4512	55.99	50.83
4513	55.96	52.38
4507	54.72	53.27
45EF	n/a	n/a

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Dawson (development), Barry

From: BCTAdmin@thameswater.co.uk
Sent: 22 August 2013 07:53
To: Planning
Subject: 3rd Party Planning Application - 2013/4575/P

Follow Up Flag: Follow up
Flag Status: Orange

London Borough of Camden
Camden Town Hall
Argyle Street
Euston Road
London
WC1H 8EQ

Our DTS Ref: 35304
Your Ref: 2013/4575/P

22 August 2013

Dear Sir/Madam

Re: LAND AT MIDLAND CRESCENT/, FINCHLEY ROAD, LONDON, NW3 6LT

Waste Comments
Thames Water requests that the Applicant should incorporate within their proposal, protection to the property by installing for example, a non-return valve or other suitable device to avoid the risk of backflow at a later date, on the assumption that the sewerage network may surcharge to ground level during storm conditions.

Surface Water Drainage - With regard to surface water drainage it is the responsibility of a developer to make proper provision for drainage to ground, water courses or a suitable sewer. In respect of surface water it is recommended that the applicant should ensure that storm flows are attenuated or regulated into the receiving public network through on or off site storage. When it is proposed to connect to a combined public sewer, the site drainage should be separate and combined at the final manhole nearest the boundary. Connections are not permitted for the removal of Ground Water. Where the developer proposes to discharge to a public sewer, prior approval from Thames Water Developer Services will be required. They can be contacted on 0845 850 2777. Reason - to ensure that the surface water discharge from the site shall not be detrimental to the existing sewerage system.

Thames Water would recommend that petrol / oil interceptors be fitted in all car parking/washing/repair facilities. Failure to enforce the effective use of petrol / oil interceptors could result in oil-polluted discharges entering local watercourses.

Thames Water recommends the installation of a properly maintained fat trap on all catering establishments. We further recommend, in line with best practice for the disposal of Fats, Oils and Grease, the collection of waste oil by a contractor, particularly to recycle for the production of bio diesel. Failure to implement these recommendations may result in this and other properties suffering blocked drains, sewage flooding and pollution to local watercourses.

Water Comments
The existing water supply infrastructure has insufficient capacity to meet the additional demands for the proposed development. Thames Water therefore recommend the following condition be imposed: Development should not be commenced until: Impact studies of the existing water supply infrastructure have been submitted to, and approved in writing by, the local planning authority (in consultation with Thames Water). The studies should determine the magnitude of any new additional capacity required in the system and a suitable connection point. Reason: To ensure that the water supply infrastructure has sufficient capacity to cope with the/this additional demand.

No impact piling shall take place until a piling method statement (detailing the type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface water infrastructure, and the programme for the works) has been submitted to and approved in writing by the local planning authority in consultation with Thames Water. Any piling must be undertaken in accordance with the terms of the approved piling method statement. Reason: The proposed works will be in close proximity to underground water utility infrastructure. Piling has the potential to impact on local underground water utility infrastructure. The applicant is advised to contact Thames Water Developer Services on 0845 850 2777 to discuss the details of the piling method statement.

Supplementary Comments

Our preferred option would be for all surface water to be disposed of on site using SUDs as per policy 5.13 of the London plan

Yours faithfully
Development Planning Department

Development Planning,
Thames Water,
Maple Lodge STW,
Denham Way,
Rickmansworth,
WD3 9SQ
Tel:020 3577 9998
Email: devcon.team@thameswater.co.uk

Glynn Irvine

From: Humfrey, Nick <Nick.Humfrey@camden.gov.uk>
Sent: 30 July 2013 09:31
To: Glynn Irvine
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: RE: Midland Crescent FRA

Glyn,

Thank-you for getting back to me so quickly. I'm happy with your comments and don't think we need a full FRA given the information you've provided.

Kind regards

Nick Humfrey
Sustainability Officer

Telephone: 0207 974 4027

From: Glynn Irvine [mailto:Glynn.Irvine@ramboll.co.uk]
Sent: 29 July 2013 17:26
To: Humfrey, Nick
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: RE: Midland Crescent FRA

Hi Nick,

Thanks for passing on the flood map for the area surrounding the proposed development site which, as you note, we have not seen these before, having used the PFRA and ARUP's report previously.

As noted from your drawing the worst case of water depth in the area is the 100mm deep area (I assume that your map is showing water depths in meters) to the north of the site which appears to be on the railway tracks itself. This is not altogether surprising, given that there is a steep embankment running from north to south from the residential developments on Rosemont Road. There also appears to be an ancillary device on the downstream side of Thames Water manhole 1901 which is located within the embankment north of the train tracks. This is further upstream from where we are proposing our connection point into the deep Thames Water sewer. The area of flooding generated on the map seems to follow the Thames Water combined public sewer line across the tracks, which is surprising as the sewer is quite large (appropriate page from the TW asset records attached as above) but without confirmation from TW I don't have the confirmation of the capacities within this sewer (we have noted this in section 3, question 6 of the BIA).

The BIA also covers the aspects of the development which have been considered / will be detailed during the next stages of the design for implantation at the site to minimise the risk of sewer flooding further downstream and the effects of sewer flooding felt at the site itself. Within this approach the BIA refers to the surface water attenuation report which lays out the proposals to attenuate the surface water onsite using blue and green roofs, with further controls on the discharge rates from the site through a hydrobrake within the final surface water manhole.

It may also be worth noting that while the proposed development cuts into the existing levels of the historic station platforms, it is still raised above the levels of the surrounding train tracks by significantly more than 100mm in the areas shown on your flood map received. Added to this it is our intention to fall the external surfaces away from the building towards drainage channels or gullies on the perimeter of the site to both prevent surface water from ponding against the building façade and from falling onto the railway tracks.

Consequently, I would say that a FRA would still be excessive to the current requirements, given what is provided within both the BIA and the surface water attenuation document. These documents also form the basis of our future detailed designs for the development which can be incorporated into the scheme with further requirements, should you deem them necessary as is noted within the BIA.

Thanks again for sending on the information and if you require any further information or clarifications, please do not hesitate to contact me.

Many thanks,
Glynn Irvine

MEng (Hons)
Design Engineer
Infrastructure

T +44 (0)20 7631 5291
DD + (0)20 7927 8502
glynn.irvine@ramboll.co.uk

From: Humfrey, Nick [mailto:Nick.Humfrey@camden.gov.uk]
Sent: 29 July 2013 13:05
To: Glynn Irvine
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: RE: Midland Crescent FRA

Hi Glyn,

Thank-you for getting in contact. The reason I would be interested in seeing a Flood Risk Assessment is for reasons of surface water flooding. Naturally the nature of the site precludes sewer flooding and like the rest of Camden there is no concern of coastal or fluvial flooding.

Our concern is based on modelling we have done of flooding in the area which suggests there may be some ponding on the site (see attached map of modelled flooding for a 1 in 75 year event). The modelling this is part of was done with consideration of the areas either side West Hampstead and South Hampstead which are considered areas of flood risk.

The unique situation of Midland Crescent means that I am personally less confident that the modelling is accurate there compared to neighbouring areas but as there is currently flooding predicted, this will need to be assessed. The maps for this were produced after the PFRA which is why you have not come across it and why I said in my comments I would be happy to share information. These maps are being used to inform a new SFRA.

If you think a flood risk assessment is excessive and can demonstrate the surface water risk has been considered and can be managed without doing a full FRA, I am happy with that but I need to see that you've engaged with the specific risk identified in this map.

Thanks

Nick Humfrey
Sustainability Officer

Telephone: 0207 974 4027

From: Glynn Irvine [mailto:Glynn.Irvine@ramboll.co.uk]
Sent: 24 July 2013 10:00
To: Humfrey, Nick
Cc: Carr, Seonaid; JMurch@savills.com; 30030 - Midland Crescent
Subject: Midland Crescent FRA

Hi Nick,

Jonathan passed me on your details as I believe you are looking into the Midland Crescent planning application with Seonaid. I believe you were questioning whether or not an FRA had been undertaken for the scheme. We looked at this when we were writing our Basement Impact Assessment for the site and indeed in compiling our surface water strategy for the site. One of the documents we used for compiling this report was the Environment Agency PFRA London Borough of Camden (Preliminary Flood Risk assessment for Camden) amongst others, as noted below.

The proposed site itself is less than a hectare and is not highlighted as being within an area of potential flood risk within the documents published by Camden. According to the information provided within both the Preliminary Flood Risk assessment for Camden published by the Environment Agency and the Camden geological, hydrogeological and hydrological study published by ARUP, the site location is within an area of low flood risk from river, sewers and south of the previous historic flooding. The flood maps issued by the Environment Agency shows the site within an area where flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year.

The previous site (the railway station) was 100% hardstanding and the proposed new site is also 100% hardstanding but provisions have been made to reduce the overall site runoff rates into the public sewer to 50% of the existing site in keeping with the Mayor's London Plan, through the use of green and blue roof systems. Within the detailed design of the site, drainage channels and up stands can be incorporated within the site boundary to capture surface water landing within the external hard landscaping and direct it into the below ground network. Overall, the proposals are to reduce the rate of surface water discharge into the public sewer, thus reducing risk of sewer flooding within this area and surface water runoff onto the tracks due to the dedicated surface water network which may not be currently functioning.

For further information on this issue, we would therefore direct you to both the Basement Impact Assessment and the Surface Water Attenuation Strategy, as issued within the planning documents. Can you possibly let me know if this answers your questions raised or if not what further information you would require for the project?

Many thanks,

Glynn Irvine

MEng (Hons)
Design Engineer
Infrastructure

T +44 (0)20 7631 5291
DD + (0)20 7927 8502
glynn.irvine@ramboll.co.uk

_____

Ramboll UK Limited
60 Newman Street
London
W1T 3DA
www.ramboll.co.uk

APPENDIX C

Drainage strategy proposed layout

SITE AREA FOR PROPOSED ASSUMED AS 100% HARDSTANDING

POROUS PAVEMENTS NOT INCLUDED IN THE MODEL

AREA INSIDE RED LINE BOUNDARY 1575 m²

ROSEMONT ROAD

FINCHLEY ROAD

BLACKBURN ROAD

APPROXIMATE LOCATION OF EXISTING THAMES WATER PUBLIC SEWER FROM ASSET RECORDS;
SEWER SIZE 1295*813 mm

THAMES WATER MANHOLE 0802
COVER LEVEL: 49.31
INVERT LEVEL: 45.87

PROPOSED DRAINAGE NETWORK

SITE BOUNDARY

GREEN ROOF AREA: 35 m²

GREEN ROOF AREA: 30 m²

GREEN ROOF AREA: 16 m²

GREEN ROOF AREA: 58 m²

GREEN ROOF AREA: 42 m²

GREEN ROOF AREA: 16 m²

GREEN ROOF AREA: 10 m²

GREEN ROOF AREA: 67 m²

BLUE ROOF AREA: 109 m² STORAGE VOLUME: 9.3 m³ 40mm ORIFICE ON OUTLET FROM THE BLUE ROOF

BLUE ROOF AREA: 125 m² STORAGE VOLUME: 10.7 m³ 40mm ORIFICE ON OUTLET FROM THE BLUE ROOF

GREEN ROOF AREA: 14 m²

BLUE ROOF AREA: 83 m² STORAGE VOLUME: 7.1 m³ 40mm ORIFICE ON OUTLET FROM THE BLUE ROOF

BLUE ROOF AREA: 101 m² STORAGE VOLUME: 8.6 m³ 40mm ORIFICE ON OUTLET FROM THE BLUE ROOF

HYDROBRAKE FLOW CONTROL INSTALLED WITHIN CHAMBER TO RESTRICT FLOW RATES TO 50% OF EXISTING BROWNFIELD RATES

ASSUMED EXISTING CONNECTION POINT TO PUBLIC SEWER FROM SITE DUE TO LACK OF PUBLIC SEWER ON FINCHLEY ROAD

TOTAL GREEN ROOF AREA: 295 m²

TOTAL BLUE ROOF AREA: 419 m²
CUMULATIVE VOLUME OF WATER STORED WITHIN THE BLUE ROOF SYSTEM: 35.8 m³

RAMBOLL

Project Title: NIGHAND CRESCENT

Project No: 30050
Sketch No: 30050SK002
Title: PROPOSED DRAINAGE SITE LAYOUT (SURFACE WATER)
Rev 03
By: GI
Checked: MS
Scale: —
Date: 19/08/14