FLOOD RISK ASSESSMENT

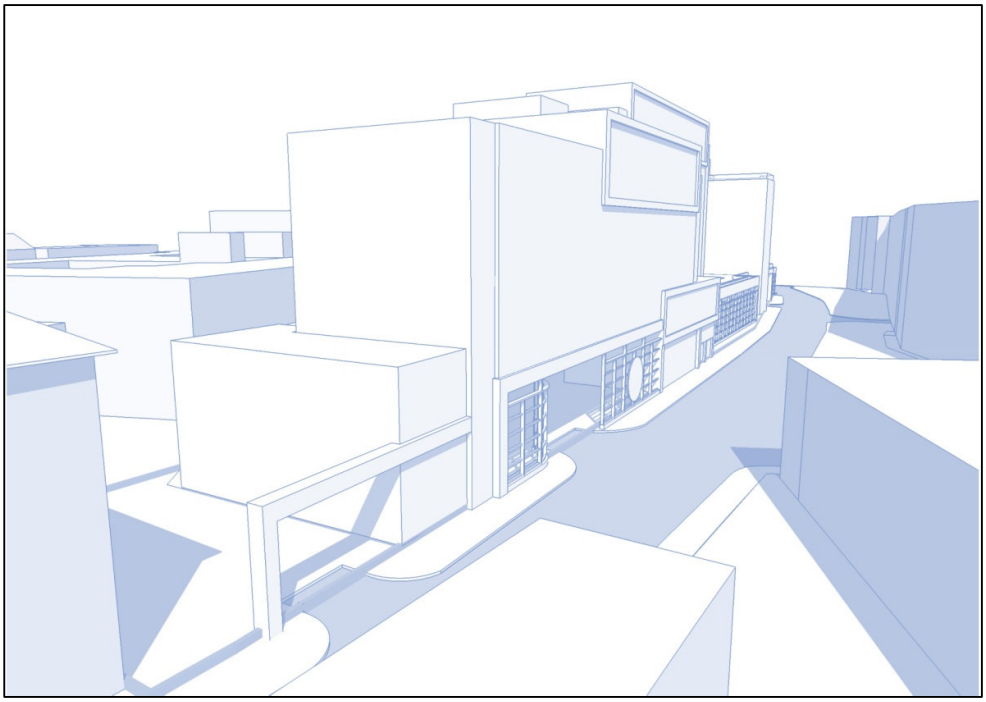
FOR

11 – 13 ST. PANCRAS WAY

LONDON, NW1 0PT

PROJECT NO. U035(L)

24th March 2011



OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

LONDON OFFICE
40 Bowling Green Lane
London
EC1R 0NE
UK

T | +44 (0) 2074157120
F | +44 (0) 2074157012
E | ocsc@ocsc.co.uk
W | www.ocsc.co.uk

NOTICE

DOCUMENT CONTROL & HISTORY

Job No.: U035(L)			Document Ref.: P:\Gary Lindsay\FRA ST PANCRAS			
Rev.	**Status**	**Authors**	**Checked**	**Reviewed**	**Authorised**	**Issue Date**
8						
7						
6						
5						
4						
3						
2	Issued for Planning	**G. Lindsay**	**J. Millar**	**G. Lindsay**	**J. Millar**	**24.03.2011**
1	**Draft**	**G. Lindsay**	**J. Millar**	**G. Lindsay**	**J. Millar**	**03.03.2011**
0	**Draft**	**G. Lindsay**	**J. Millar**	**G. Lindsay**	**J. Millar**	**09.02.2011**

24th March 2011

T-GL/EG

PROJECT NO. U035(L)

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary Consulting Engineers

FLOOD RISK ASSESSMENT

FOR

11 – 13 ST. PANCRAS WAY
LONDON NW1 0PT

INDEX **PAGE**

24th March 2011

T-GL/EG

PROJECT NO. U035(L)

FLOOD RISK ASSESSMENT

FOR

11 – 13 ST. PANCRAS WAY
LONDON, NW1 0PT

EXECUTIVE SUMMARY

Acting on behave of our Clients, the Unite Group Plc and Travis Perkins Plc, O'Connor Sutton Cronin Consulting Engineers have carried out a Flood Risk Assessment with respect to 11 – 13 St. Pancras Way, London, NW1 0PT. The assessment was commissioned to ascertain the potential likelihood of the site flooding during various extreme storm events, and the impacts of developing the site would have on other land owners within the catchment.

From information obtained from the Environment Agency, the site has been found to lie outside Zones 2 and 3 and is in a zone that has little or no risk of fluvial flooding of < 0.1% (Zone 1). Records from the Thames Water Ltd. And the London Borough of Camden (the Strategic Flood Risk Assessment SFRA) indicate that they have no record of the site or the adjacent area flooding. There is an existing canal (Regent's Canal) to the north of the development site, but this watercourse is not affected by rivers and coastal flooding as it is a controlled watercourse (use of canal locks) and no surface water drainage network outfalls to it either and therefore shall not have any affect on the proposed development site.

It is recommended that the future redevelopment of the site be carried out with the ground floor level set above the existing road levels of St. Pancras Way and that all new drainage systems be constructed to the recommendations and specifications of Thames Water Ltd., the Environment Agency and the London Borough of Camden together with the proposed development site drainage strategy outlined in this document. With these measures in place the potential for any flooding on the redeveloped site or the adjacent areas will be considered to be minimal.

24th March 2011

T-GL/EG

PROJECT NO. U035(L)

FLOOD RISK ASSESSMENT
FOR
11 – 13 ST. PANCRAS WAY

1.0 INTRODUCTION

1.1 Purpose of Assessment

Acting on behave of the Unite Group Plc and Travis Perkins Plc, O'Connor Sutton Cronin Consulting Engineers have carried out a Flood Risk Assessment with respect to 11 – 13 St. Pancras Way, London, NW1 0PT.

The proposed mixed use development consists of commercial buildings located at ground floor level with 548 student apartments located above in three blocks. The apartment buildings will vary in height from five to nine storeys. A site location plan is attached in Figure 1 and Architectural Floor Plans and Schedule of Accommodation are attached in Appendix A to the rear of this report.

The proposed site has been analysed against information provided by Thames Water, London Borough of Camden, The Environment Agency and topographical and local knowledge.

1.2 Project Brief and Objectives

The flooding assessment was commissioned to ascertain the potential likelihood of the site flooding during various extreme storm events, and the impacts of developing the site would have on other land owners within the catchment.

The Flood Risk Assessment has been undertaken in accordance with the recommendations of PPS 25 'Development and Flood Risk Practice Guide'

and takes account of the Environment Agency's Guidelines relating to PPS25.

The project has reviewed information supplied by the various government bodies indicating flood levels ranging from 1 in 10 to 1 in 1000 year events.

1.3 Limitations

This study is concerned with the risk to people and property from fluvial, tidal and pluvial flooding associated with the proposed development site. At present there is no level of minimum acceptable risk in relation to residential developments.

The most common way of assessing the likelihood of extreme flood events is to look at the probability of the event happening on an annual basis. For example a 1% annual flood probability can be viewed as having a return period of 100 years or a 1-in-100 year event.

It is important to acknowledge that a 1% annual probability has a 26% chance of being equalled or exceeded at least once in 30 years, and a 49% probability of being equalled or exceeded at least once in 70 years. The 1% annual probability flood also has a 15% chance of occurring twice in 70 years.

2.0 SITE DETAILS

2.1 Site Location and Description

The site is located on St. Pancras Way approximately 900m to the northwest of the main entrance to St. Pancras International Train Station. The site is situated within the London Borough of Camden.

The site has a curtilage of 0.466 Ha and currently comprises the builders' merchants Travis Perkins which has two buildings situated to the north and south of the site. Customer car parking is located in the central area of the site and employee car parking to the south of the southern building. A storage yard for materials is located at the northern boundary. All external

areas are hardstanding and no green areas are situated within the site boundary.

Existing ground levels of the site are 19.15m approximately at the southern boundary and this rises to 20.85m at the northern boundary approximately.

The surrounding area to the site is mixed use in character with the Royal Veterinary College and Beaumount Animal Hospital situated to the west, St. Pancras Way runs adjacent to the eastern boundary with St. Pancras Hospital and a former sorting office to its far side. An eight storey student accommodation building and a three storey building are located to the north and the south of the development site respectively.

The characteristics of the site observed during the site reconnaissance visit and obtained from current Ordnance Survey maps are summarized in Table 2.1 below. A plan showing the general layout and boundaries of the site is given in Appendix A to the rear of this report.

Table 2.1 – Site Description

FEATURE	DESCRIPTION
PHYSICAL CHARACTERISTICS	
Area of site	Approximately 0.466 Hectares
Ground levels	The site rises from 19.15m in the south up to 20.85m to the north of the site.
Current use/ buildings	Currently the site is 100% hardstanding with 2 no. existing structures, 2 no. car parking areas (staff and customer) and a storage area.
Basement	No evidence of an existing basement was observed.
External surfacing / vegetation	100% hardstanding site, there are no areas of open space/landscaping.
Surface Water & Flooding	There are no streams or ditches on the site.
Waterlogged or marshy ground.	None observed.
Wastewater & Site Drainage	Main drainage sewers run along St. Pancras Way

2.2 Development Proposals

The proposed mixed use development consists of a 3877m^2 commercial building located at ground floor level with 548 student apartments located above in three blocks. The apartment buildings will vary in height from five to nine storeys. A site location plan is attached in Figure 1 and Architectural Floor Plans are attached in Appendix A.

The proposed scheme shall discharge the stormwater run-off rate from the site into the drainage network in accordance with Thames Water Ltd, the Environment Agency and the Local Authority regulations and agreements.

The storm flows will be attenuated to an agreed discharge rate in accordance with Thames Water Ltd, Environmental Agency and the Local Authorities requirements, thereby reducing the impact the proposed site will have on the drainage network.

3.0 CATCHMENT CHARACTERISTICS AND HISTORY OF FLOODING

3.1 Catchment Characteristics and Potential Sources of Flooding

Following a review of the Environment Agency flood risk map, it is indicated that the site lies in the EA's Flood Zone 1 which identifies the site as a little or no risk of river (fluvial) or coastal flooding. This was also confirmed by telephone conversation with Ms Marie Edwards of the Environment Agency.

There is also an existing canal situated to the north of the development site. The Regent's Canal navigates its way in an east-west direction. It provides a link from the Limehouse Basin and the Thames River in East London to the Paddington arm of the Grand Union Canal in the west. The Regent's Canal is not connected to any surface water run-off drainage system and is a stand alone controlled water course with the use of canal locks.

A review of available information relating to the site has identified a number of different mechanisms and possible sources of flooding which may have an impact on the proposed development. Please refer to Table 3.1 for possible flood mechanisms.

Table 3.1 – Possible flood mechanisms

FLOOD SOURCE	MECHANISM	AFFECTING	
		Typical Impact	On site
Surface run-off from storm water	Excessive run-off from site and from surroundings. Overland flow resulting from surcharging of local sewers	Up to neighbourhood scale impacts, including transport	Probably entering site via surrounding land from the east. Could flood ground floor units, services etc
Drainage services	Blockages and/or insufficient capacity of drainage & foul sewers	Up to neighbourhood scale impacts, including transport	Surcharging of public sewer systems, increasing possibility of flooding entering buildings
Water supply services	Leaks in the public watermain system	Generally site specific only	In isolation typically leaks have limited impact.
Rising groundwater in shallow aquifer	Groundwater levels in a shallow aquifer during recharge from high river levels	Generally site specific only	Should the groundwater exceed the level of services or basement, flooding could occur.

4.0 ASSESSMENT OF AVAILABLE INFORMATION

4.1 Information Supplied by Environment Agency

The Environment Agency supplied the following information:

- Flood Zone maps showing the extent of the Flood Zones 2 and 3 in the area.

Copies of relevant correspondence with the Environment Agency can be found in Appendix C to the rear of this report.

Ms Marie Edwards of the Environment Agency was contacted to discuss the site setting in relation to the flood risk zones and to agree the methodology/objectives of this assessment.

4.1.1 Methodology and Objectives of Flood Risk Assessment

It is the aim of this assessment is to adopt a methodology in accordance with the supplementary guidance document and as directed during consultation with the relevant technical staff within the Environment Agency.

The supplementary guidance document uses a three-tier approach to analysing flood risk, in line with PPS25, dependant on a site's location relative to the updated Flood Risk Zones 1, 2 and 3, as shown on flood plain maps. The general risk rating for these zones is as follows:

- Zone 1 – little or No risk (probability of fluvial flooding of <0.1%);
- Zone 2 - Low to Medium (probability of fluvial flooding 0.1 – 1%);
- Zone 3 – High (probability of fluvial flooding >1%).

For Zone 1 sites, wholly outside of Zone 2 and 3, the primary concern is from surface water run-off. Developments on sites within Zone 2 and 3 are subject to a sequential test, using a precautionary approach. It should also be noted that dependent upon the site, flood risk concerns within PPS25 may be outweighed by considerations within PPG3, promoting brownfield site redevelopment.

The proposed site at St. Pancras Way lies outside of Zone 2 / 3 on the flood maps supplied by the Environment Agency which is included in Appendix C to the rear of this report.

In discussions with Ms Marie Edwards of the Environment Agency it was confirmed that they have no record of the site or adjacent area flooding.

Therefore the potential for the site to flood due to extreme high intensity rainfall events can be classed as low risk.

4.2 Information Supplied by Thames Water

O'Connor Sutton Cronin contacted Thames Water regarding the proposed development enquiring about any localised flooding. *(OCSC are still awaiting correspondence from Thames Water, once information is received the report shall be reissued).*

4.3 Information Supplied by the London Borough of Camden

O'Connor Sutton Cronin obtained the Strategic Flood Risk Assessment for the Borough of Camden with regard to the development site. It states that the borough has a high risk of flooding from sewer and surface water flooding but not fluvial due to the lack of watercourses. From a review of the Camden Flooding Map which is included in the Strategic Flood Risk Assessment (Map 22), included in Appendix D to the rear of this report, it indicates past street flooding. It confirms that no street flooding has occurred in the immediate area of the development site, but recommends contacting Thames Water to acquire the relevant information about the local drainage infrastructure in the adjacent areas for the site. Information obtained from the London Borough of Camden is in Appendix D.

Discussions were also had with Mr. Jesper Graham of the Highways Section of the London Borough of Camden, and he confirmed that the there has been no incidents of flooding from the local drainage and road network in the immediate area of the development site.

5.0 GEOLOGY AND GROUNDWATER CONSIDERATIONS

5.1 Geology

O'Connor Sutton Cronin received a Phase 1 and Phase 2 Geo-Environmental Assessment from Messrs WSP Environmental for the development site. It states the following geological make up of the site as follows:

Made ground deposits with a London Clay Formation over a layer of a Lambeth Group above a Thanet Sand layer and a White Chalk formation respectively.

5.2 Hydrogeology

O'Connor Sutton Cronin received a Phase 1 and Phase 2 Geo-Environmental Assessment from Messrs WSP Environmental. It states that the nearest water feature to the development site is 150m northwest of the site and is not in an area affected by flooding. This document makes reference to the underground River Fleet which 'historically' flowed in a southerly direction along the route of St. Pancras Way immediately adjacent to the eastern boundary of the site and that this may lead to possible river channel deposits and shallow groundwater beneath the site.

6.0 POTENTIAL IMPACT OF PROPOSED DEVELOPMENT

6.1 Risk of Flooding and Effects on Proposed Development

6.1.1 Risk of Fluvial Flooding

Flood Maps obtained from the Environmental Agency for this site can be found in Appendix B. It shows that the development site is not in Zones 2 - 3, and is in a zone that has little or no risk of fluvial flooding of <0.1%. This was confirmed via telephone conversation with Ms Marie Edwards of the Environment Agency.

As previously stated the adjacent Regent's Canal (to the north of the development site) is a stand alone controlled water course. Fluvial flooding in areas 'downstream/upstream' of the canal shall not affect the water levels in the canal due to the use of canal locks and therefore shall not increase the risk of potential flooding to the development site.

6.1.2 Risk of Flooding from Surface Run-off

Flooding from overland flow may occur when intense rainfall exceeds the infiltration capacity of the ground or any surface water drainage systems, both on site and in the surrounding urban area.

The existing Regent's Canal (to the north of the development site) is not connected to any surface water network. Therefore during a large storm event the existing canal shall not be affected and risk of flooding to the development site from the canal is considered to be low.

Based on the findings of this report, the site is at low risk of flooding from surface water run-off. Hence, flooding associated with run-off does not appear to be a major problem. Drainage will be designed such that surface water run-off from proposed development will be no greater than pre-development surface water run-off rate.

6.1.3 Risk of Flooding from Highways

Information obtained from the London Borough of Camden indicates that no flooding has occurred on any adjacent road network to the development site. Therefore the risk of flooding from the roads/ highway drains is considered to be low. This was also confirmed via a telephone conversation with Mr. Jesper Graham of the Highways Department of the London Borough of Camden.

6.1.4 Risk of Flooding from Thames Waters Infrastructure

(OCSC are still awaiting correspondence from Thames Water, once information is received the report shall be reissued). However from correspondence from the Environment Agency and the Hiighways Department of the London Borough of Camden, we are of the opinion that there shall be no issue from Thames Water.

6.1.5 Risk of Flooding from Artificial Drainage Systems

Flooding from artificial drainage systems may occur at the site from blocking or overloading of pipes or sewers or failure of pumping systems. On the basis that any new foul water sewerage and surface water system for the proposed redevelopment will be designed to meet the requirements of Thames Water Ltd, the Environment Agency and the Local Authority. This should ensure that the drainage systems have sufficient capacity to prevent overloading under the normal range of operating conditions. The annual flood risk form new artificial drainage systems are considered to be low.

6.1.6 Risk of Flooding from Groundwater

As previously mentioned, there is historical evidence that the Fleet River runs underground adjacent to the development site along the route of St. Pancras Way. The current scheme design does not allow for any basement construction. The preliminary site investigations carried out on the site indicates groundwater to be at 1.8m bgl. Therefore the potential for groundwater to enter the proposed ground floor level is minimal (as foundations shall be designed to Eurocode Standards to eliminate the potential for any affect to or from groundwater). However we would recommend that further site investigations be carried out on the site to confirm exactly the groundwater/water table level.

6.2 Impact of Climate Change

The effects of future climate change will clearly have an impact on flood risk. Predictions by the United Kingdom Climate Impacts Programme (UKCIP) include an increase in the severity and frequency of storms. It is predicted that the UK will experience warmer, wetter winters, with up to 20% more winter precipitation (although there will be a reduction in autumn rainfall).

Impacts of climate chance are also likely to have an impact on flood risk from flash flood conditions due to greater surface area run-off from intense rainfall, increased flooding due to overland flow and from artificial drainage

system overload. Wetter winters may result in higher groundwater levels and saturated ground conditions, resulting in increased risk of groundwater flooding.

In discussions with Ms Marie Edwards of the Environment Agency and Thames Water Ltd, it was confirmed that climate change factors described above are unlikely to have any affect on the proposed development site.

6.3 Finished Floor Levels for the Development

In discussions with Bellis Cooley Architects the proposed finished floor levels of the future development shall be above the existing levels of the site, which in turn is above the existing road level of St. Pancras Way. The proposed vehicular entrances and threshold entrance for pedestrians shall also be super-elevated to rise up into the development. With this strategy in place and based upon the historic information obtained from the London Borough of Camden that indicated no street flooding in the immediate area the risk of flooding from an external source is reduced and is not of concern.

7.0 STORM WATER DRAINAGE STRATEGY

The proposed storm water strategy for the proposed development is as follows; (*To be confirmed by others).*

In our experience we believe the following shall probably be the strategy:

The existing site is 100% hardstanding which generates surface water run-off of approximately 70 l/s for a 5 year return period to the local surface water drainage network. In our opinion we shall be required to retain this surface water flow figure for the proposed future development. With the existing site being 100% hardstanding, the proposed development may have to provide an attenuation system to store any access surface water run-off generated in accordance with Planning Policy Statement 25 (PPS25), e.g. allowances for climate change. The exact details of the drainage strategy shall be agreed with the relevant bodies (i.e. Environment Agency, Thames Water Ltd and the local Authority) post planning.

8.0 SUMMARY AND RECOMMENDATIONS

A Flood Risk Assessment has been carried out for the above site with respect to its future redevelopment.

The site has been found to lie outside Zones 2 and 3 and is in a zone that has little or no risk of fluvial flooding of <0.1% (Zone 1). Records from the Environment Agency, Thames Water Ltd. and the Strategic Flood Risk Assessment from Camden Borough Council indicate that they have no record of the site flooding.

It is therefore recommended that the future redevelopment of the site should be carried out with a minimum finished floor level set above the existing road levels of St. Pancras Way, with entrance thresholds being super-elevated up to the main structures. This ensures that any flooding that might occur from an external source shall not enter the development site but continue along the route of St. Pancras Way. All new drainage systems that shall be constructed within the development site should be adequately sized to reduce the risk of possible blockage and to the recommendations of Thames Water Ltd, Environment Agency and the Local Authority.

GARY LINDSAY
For O'Connor Sutton Cronin

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

FIGURES

APPENDIX A

Architectural Plans

&

Schedule of Accommodation

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

APPENDIX B

Existing Site Photos

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

APPENDIX C

Information Supplied by the Environment Agency

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

APPENDIX D

Information Supplied by the London Borough of Camden

OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary
Consulting Engineers

APPENDIX E

Topographical Survey of Site

APPENDIX F

Flood Risk Assessment Appendix 'C'

Form for New Developments

1.0 Development Description and Location
1a. *What type of development is proposed and where will it be located? Whether it is new development, an extension to existing development or change of use etc.* The proposed mixed use development consists of a 3877m^2 commercial building located at ground floor level with 548 student apartments located above in three blocks. The apartment buildings will vary in height from five to nine storeys. Currently the site is developed and the existing buildings are to be demolished for the proposed development. The site is located on St. Pancras Way approximately 300m to the northwest of St. Pancras International Train Station. The site is situated within the London Borough of Camden
1b. *What is its vulnerability classification?* The proposed development site is in Zone 1 – little or No risk (probability of fluvial flooding of <0.1%)
1c. *Is the proposed development consistent with the Local Development Documents?* Yes
1d. *Please provide evidence that the Sequential Test and where necessary the Exception Test has been applied in the selection of this site for this development type?* From the Sequential review and evidence gathered from the EA, the development site falls within an area classified as Zone 1 (little or no risk).
2.0 Definition of the Flood Hazard
2a. *What sources of flooding could affect the site? (see annex C PPS25)* See table 3.1 in main body of report.

2b. *For each identified source, describe how flooding would occur, with reference to any historic records wherever these are available.* See table 3.1 in main body of report.
2c. *What are the existing surface water drainage arrangements for the site?* The site currently connects into the Thames Water storm sewer network.
3.0 Probability
3a. *Which flood zone is the site within?* According to the Environment Agency, the development site lies within the indicative flood Zone 1.
3b. *If there is a Strategic Flood Risk Assessment covering this site, what does it show?* The development site in included in the Strategic Flood Risk Assessment of the London Borough of Camden. According to this document the site does not appear to be at risk of flooding.
3c. *What is the probability of the site flooding taking account of the contents of the SFRA and of any further site-specific assessment?* The proposed development would have a 1 in 200 year probability of flooding.
3d. *What are the existing rates and volumes of run-off generated by the site?* 1 in 2 year peak flow would be in the order of 63 l/s.

4.0 Climate Change
4a. *How is flood risk at the site likely to be affected by climate change?* See Section 6.2 in main body of report.
5.0 Detailed Development Proposals
5a. *Please provide details of the development layout, referring to the relevant drawings.* Please see Architect drawings supplied as part of this submission in Appendix A of this report.
5b. *Where appropriate, demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding.* There shall be no basement development. All finished floor levels shall be above that of St. Pancras Way with pedestrian and vehicular access to the development ramped up to the FFL .
6.0 Flood Risk Management Measures
6a. *How will the site be protected from flooding, including the potential impacts of climate change, over the developments lifetime?* The proposed develop shall have finished floor levels above that of St. Pancras Way with entrances ramping up to these levels. The development shall be constructed in accordance with the drainage strategy outlined in Section 7.0 of this report and in accordance with the requirements and specifications of the EA, Thames Water and the Local Authority.

7.0 Off Site Impacts
7a. How will you ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere? The site is currently developed, and does not form part of a flood plain; there is no indication that the site has been affected by flooding in the past. By redeveloping the site the risk posed to adjacent properties is not increased.
7b. How will you prevent run-off from the completed development causing an impact elsewhere? The proposed development shall comply with best practice and the requirements of Thames Water before discharging into the drainage network. In-line with this policy, storm water attenuation for the scheme shall be provided. This will reduce the amount of storm water leaving the site during high rainfall events reliving pressure on the drainage system. These measures will reduce the risk of storm water from the proposed scheme from having a detrimental effect on adjacent properties.
8.0 Residual Risks
8a. What flood-related risks will remain after you have implemented the measures to protect the site from flooding? Apart from extreme flood events, the site may be at remote risk of flooding from groundwater infiltration, blocked outfall pipes or damage to watermains. These risks are discussed in section 6.0 in the main body of the report.
8b. How, and by whom, will these risks be managed over the lifetime of the development? It is envisioned that the proposed building will have a detailed Health and Safety plan which shall include procedures to follow during a flood event.