



Earth Environmental & Geotechnical

# Flood Risk Assessment

New Bird Street

Liverpool

August 2016

On Behalf Of

Miami Limited

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# **NEW BIRD STREET**

# LIVERPOOL

# FLOOD RISK ASSESSMENT

FOR

MIAMI LIMITED

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Report No. A1252/16

August 2016



Report Title:	New Bird Street, Liverpool Flood Risk Assessment
Report Reference:	A1252/16
Client:	Miami Limited
Issue Date:	12 <sup>th</sup> August 2016
Drafted By:	M Symonds
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# EXECUTIVE SUMMARY

Earth Environmental and Geotechnical Ltd have been commissioned to prepare a Flood Risk Assessment (FRA) for a residential and commercial development at New Bird Street, Liverpool L1 0BP.

The development site is rectangular in shape and is bound by Jordan Street to the north, the A561 St James Street to the east, New Bird Street to the south, and Newhall to the west.

The proposed development is to build a new multi-storey residential with potential for residential apartments, car parking and commercial areas at ground floor, and residential units from the 1st floor above.

This Flood Risk Assessment (FRA) has been prepared to the requirements of the National Planning Policy Framework, 2012 (NPPF), and the NPPG, paragraph 30 which sets out the guidance for preparation of site specific FRA's and reducing flood risk in general by using Sustainable drainage systems (SuDS).

This FRA is considered to be a Level 1 Screening Study as defined by CIRIA 624 Development and Flood Risk.

The Environment Agency (EA) and Envirocheck Flood Maps indicate that all of the site lies within Flood Zone 1, which has a low probability of flooding (less than 1 in 1000 annual probability of flooding in any year)

The development has commercial units at ground floor and car parking at the lower ground and basement levels. Therefore, in accordance with NPPF Table 2, the development is considered to be 'Less Vulnerable'.

In accordance with NPPF Table 3, if the site is in Flood Zone 1, and is classed as 'More Vulnerable' the development is appropriate.

An assessment of potential sources of flood risk including fluvial, pluvial, ground water, drains and sewers, canals and artificial has been carried out, and it is deemed that the probability of flooding from all sources is low.

It is proposed that the surface water run-off from the proposed development will discharge to the existing sewer networks that are believed to be in the roads to the east and west.

The proposed drainage network will be designed so that the post development surface water run-off does not exceed the pre development.

The proposed drainage network will also be design so that no flooding occurs for up to and including the 1 in 30-year storm event, and that any localised flooding will be controlled for up to and including the 1 in 100-year storm event including 40% rainfall intensity increase (climate change).

The surface water management will be designed in accordance with the NPPG guidance in relation to SuDS. The development will not increase the risk of flooding for the site or areas within the vicinity of the site.

In terms of flood risk, the development is deemed to be appropriate.



# 1. Introduction

Earth Environmental and Geotechnical Ltd have been commissioned to prepare a Flood Risk Assessment (FRA) for a new commercial and residential and commercial at a New Bird Street, Liverpool L1 0BP.

The Environment Agency (EA) need to be satisfied that the granting of planning permission will address the risk of flooding to the development site and that the proposals will not in turn increase the risk of flooding to neighbouring land and property.

This Flood Risk Assessment (FRA) has been prepared to the requirements of the National Planning Policy Framework, 2012 (NPPF), and the National Planning Practice Guidance (NPPG), which sets out the guidance for preparation of site specific FRA's and reducing flood risk in general by using Sustainable drainage systems (SuDS). The FRA will also propose preventative measures to mitigate against flooding from any source, if found necessary.

Information provided by the Environment Agency; Strategic Flood Risk Assessment for Liverpool City Council (January 2008); Mersey Estuary Catchment Flood Management Plan (December 2009); and data gathered from the Environment Agency via Landmark Envirocheck is to be used to assess all potential sources of flooding.

The report will also look at a surface water drainage strategy for the proposed development to establish constraints and design requirements and to promote the use of Sustainable Drainage Systems (SuDS) as per the requirements set out in the NPPG.

This Flood Risk Assessment has therefore been prepared in order to identify and evaluate the various possible sources of flood risk to which the proposed redevelopment site might be subjected to, and to identify any mitigation, protection or compensation measures deemed necessary or feasible.



#### 2. Site Location and Description

#### 2.1. Site Location

The site is located at New Bird Street, Liverpool L1 0BP, which is in the Baltic Triangle area of Liverpool City.

The site is bound by Jordan Street to the north, the A561 St James Street to the east, New Bird Street to the south, and Newhall to the west.

The co-ordinates of the centre of the site are approximately: Easting: 334964, Northing: 389245.

#### 2.2. Existing Site

The majority of the site consists of an industrial / warehouse building, with external hard standing concrete areas between the building and edge of the surrounding roads.

#### 2.3. Topography

A topographical survey is yet to take place at the site, and therefore the exact existing ground levels are not known. However, as the majority of the site contains a building, the site is deemed to be flat.

Site observations also found that the hard standing concrete areas between the building and road slope from the building to the channel levels of the road.

#### 2.4. Proposed Development

The proposed site plans are shown in Appendix B, with a full description of the development site being stated by the Architect.

In a brief summary, and in relation to this flood risk assessment, the proposed development is to build a new multi-storey commercial and residential building across the entire site area that will have the potential to have residential units and commercial areas at ground floor, and residential units from the 1st floor above.

#### 2.5. Public Sewers

Sewer records for the area are to be sought, but due to the location of the site it is believed that there is an existing sewer system within the road network that surround each side of the development site.

# 2.6. Watercourses / Rivers / Canals

There are no canals within the direct vicinity of the site.

Queen's Dock is approximately 250m west of the site, which leads onto the River Mersey which is approximately 550m west of the site.



# 3. Environment Agency Flood Maps

The Flood Map (Risk of Flooding from Rivers and Sea) on the EA website (see Figure 1 below) suggests that the all of the site lies within Flood Zone 1, which has a low probability of flooding (less than 1 in 1000 annual probability of river flooding in any year).



Figure 1 – EA Flood Map



#### 4. National Policy and Water Management Guidance

#### 4.1. National Planning Policy Framework (NPPF) and National Planning Practice Guidance (NPPG)

The National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG) set out the Government's national policy on development and flood risk and seeks to provide clarity on what is required at regional and local levels to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk.

The NPPF outlines a risk based approach to the planning process and requires that the Sequential Test is used to guide the decision making process by steering development to areas with the lowest probability of flooding where feasible.

NPPG, Paragraph 030, outlines that the objectives of this FRA is to establish whether a proposed development is likely to be affected by current or future flooding from any source; whether it will increase flood risk elsewhere; whether the measures proposed to deal with these effects and risks are appropriate; whether the evidence for the local planning authority to apply (if necessary) the Sequential Test; and whether the development will be safe and pass the Exception Test, if applicable.

NPPG, Paragraph 051 states that sustainable drainage systems (SuDS) are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible, where they provide opportunities to reduce the causes and impacts of flooding; remove pollutants from urban run-off at source; and to combine water management with green space with benefits for amenity, recreation and wildlife.

Further to this NPPG, Paragraph 080 states that the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable which (in order) are into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain, or another drainage system; to a combined sewer.

# 4.2. Flood and Water Management Act (2009)

The Flood and Water Management Act takes forward some of the proposals from three previous strategy documents published by the UK Government - Future Water (2008), Making Space for Water (2008) and the UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods. In doing so it gives the EA a strategic overview role for flood risk, and gives local authorities responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.



# 5. Flood Risk and Vulnerability

The NPPF sets out the flood risk for a site by assessing the flood zones, flood risk vulnerability classification, and flood risk vulnerability and flood zone 'compatibility'.

Flood risk takes account of both the probability and the consequences of flooding (i.e. vulnerability of the development etc.). Flood frequency is usually interpreted in terms of the return period e.g. 1 in 50 and 1 in 100-year event etc. In betting terms, there is a 50/1 (2%) chance of one or more 1 in 50-year floods occurring in a given year. Similarly, there is a 100/1 (1%) chance of one or more 1 in 100-year floods occurring in a given year.

# 5.1. Flood Zones

There are four classifications for flood zones, as defined in Table 1 of the NPPF and NPPG document.

NPPF – Table 1 – Flood Zones					
Flood Zone	Definition				
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)				
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)				
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)				
Zone 3b The Functional Floodplain	<ul> <li>This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environmen Agency.</li> <li>(Not separately distinguished from Zone 3a on the Flood Map)</li> </ul>				

The EA flood map (Figure 1) and Envirocheck flood map data (Appendix C) has identified that the site lies within Flood Zone 1 which has a low probability of flooding.



# 5.2. Flood Risk Vulnerability Classification

Vulnerability classifications, as defined in Table 2 of the NPPF Technical Guidance document, are Essential Infrastructure, Highly Vulnerable, More Vulnerable, Less Vulnerable and Water Compatible Development.

# NPPF - Table 2 - Flood Risk Vulnerability Classification

#### **Essential Infrastructure**

Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk; Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood; Wind turbines.

#### Highly Vulnerable

Police and ambulance stations; fire stations and command centers; telecommunications installations required to be operational during flooding; Emergency dispersal points; Basement dwellings; Caravans, mobile homes and park homes intended for permanent residential use; Installations requiring hazardous substances consent.

#### More Vulnerable

Hospitals; Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels; **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels; Non–residential uses for health services, nurseries and educational establishments; Landfill\* and sites used for waste management facilities for hazardous waste; Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

# Less Vulnerable

Police, ambulance and fire stations which are not required to be operational during flooding; Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure; Land and buildings used for agriculture and forestry; Waste treatment (except landfill\* and hazardous waste facilities); Minerals working and processing (except for sand and gravel working); Water treatment works which do not need to remain operational during times of flood.

# Water-Compatible Development

Flood control infrastructure; Water transmission infrastructure and pumping stations; Sewage transmission infrastructure and pumping stations; Sand and gravel working; Docks, marinas and wharves; Navigation facilities.

This development is classed as a 'More Vulnerable' as the development will be residential units at ground floor.



# 5.3. Flood Risk Vulnerability and Flood Zone 'Compatibility'

Table 3 of the NPPF identifies if a development is appropriate based on the flood zone to which the site lies, and the flood risk vulnerability classification.

NPPF – Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'							
Flood Zones	Flood Risk Vulnerability Classification						
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible		
Zone 1	$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$		
Zone 2	$\checkmark$	Exception Test required	$\checkmark$	$\checkmark$	$\checkmark$		
Zone 3a †	† Exception Test required	X	Exception Test required	$\checkmark$	$\checkmark$		
Zone 3b*	* Exception Test required	X	X	X	√*		

The development site is in Flood Zone 1 and is classed as 'More Vulnerable', therefore according to Table 3 of the NPPF the site is appropriate for development.



#### 6. The Sequential Test and Exception Test

The Sequential Test is a risk-based test that should be applied at all stages of development and aims to steer new development to areas with the lowest probability of flooding (Zone 1). This is applied by the Local Authority by means of a Strategic Flood Risk Assessment (SFRA).

Furthermore, large sites partially affected by Flood Zones 2 and 3 should be developed sequentially, placing the most vulnerable land uses in the areas with lowest risk of flooding.

The FRA may require the Exception Test to be applied to certain forms of new development. The test considers the vulnerability of the new development to flood risk and, to be passed, must demonstrate:

There are sustainability benefits that outweigh flood risk. It is on previously developed land or there are no other reasonably developable sites.

The new development is safe without increasing flood risk elsewhere.

This site will not require a sequential or exception test as it is classed as an appropriate development.



# 7. Rainfall Intensity Increase (Climate Change)

The NPPF makes it a planning requirement to account for climate change in the proposed design. The recommended allowances are taken from the Environment Agency guidance (Table 2) summarised in Table 4 below.

Applies across all of England	Total change anticipated for the 2020's	Total change anticipated for the 2050's	Total change anticipated for the 2080's
Upper End	10%	20%	40%
Central	5%	10%	20%

The baseline year is 1961 to 1990. It is anticipated the life span of the school will be approximately 80 years, and therefore will fall at least into the 2080's and will have rainfall intensity increase of 40%.



# 8. Envirocheck Data Maps

Refer to Appendix C for Envirocheck flood map data. The data shown on the maps have been sourced by studies from JBA Consulting and the Environment Agency (EA). The summary of each of the maps are as follows:

#### 8.1. Flood Map

The Envirocheck Flood Data Map indicates that the development site lies within Flood Zone 1.

#### 8.2. Pluvial, Fluvial and Coastal Flooding

The Envirocheck (JBA) 75-year return period flood map indicates that there is no pluvial, fluvial or coastal flooding within or in the direct vicinity of the site.

The Envirocheck (JBA) 100-year return period flood map indicates that there is no fluvial or coastal flooding within or in the direct vicinity of the site.

The Envirocheck (JBA) 200-year return period flood map indicates that there is no pluvial, fluvial or coastal flooding within or in the direct vicinity of the site.

The Envirocheck (JBA) 1000-year return period flood map indicates that there is no pluvial, fluvial or coastal flooding within or in the direct vicinity of the site.

#### 8.3. Canal Failure

The Envirocheck (JBA) canal failure map indicates that there are no canals and no flooding within the vicinity of the site.

# 8.4. Surface Water Flood Depths

The Envirocheck (EA/NRW) 30-year return period flood map indicates that there are no pluvial / surface water flood depths within or in the direct vicinity of the site.

The Envirocheck (EA/NRW) 100-year return period flood map indicates that there are no pluvial / surface water flood depths within or in the direct vicinity of the site.

The Envirocheck (EA/NRW) 1000-year return period flood map indicates that there are no pluvial / surface water flood depths within the site, but a pluvial / surface water flood depth of up to 0.15m within New Bird Street (south of site).

# 8.5. Surface Water Flood Velocities and Flow Direction

The Envirocheck (EA/NRW) 30-year return period flood map indicates that there are no surface water flood velocities within or in the direct vicinity of the site.

The Envirocheck (EA/NRW) 100-year return period flood map indicates that there are no surface water flood velocities within or in the direct vicinity of the site.

The Envirocheck (EA/NRW) 1000-year return period flood map indicates that there are no surface water flood velocities within the site, but a surface water flood velocity of up to 2.00m/s wat the far side New Bird Street to the development site.



# 8.6. Hazard Rating

The Envirocheck (EA/NRW) 30-year return period flood map indicates that there is are no flood hazard within or in the vicinity of the site.

The Envirocheck (EA/NRW) 100-year return period flood map indicates that there is are no flood hazard within or in the vicinity of the site.

The Envirocheck (EA/NRW) 1000-year return period flood map indicates that there is are no flood hazard within the site, but a low to moderate flood hazard within New Bird Street (south of site).

#### 8.7. Historic Flood Map

The Envirocheck historic flood map indicates that there has been no flooding within the vicinity of the site from channels, groundwater, drainage infrastructure or mechanical failure.

#### 8.8. Ground Water Flooding

The Envirocheck / BGS flood data map indicates that there is limited potential for groundwater flooding to occur for the central and western areas of the site, but potential for groundwater flooding below the eastern third of the site.

The ESI groundwater flood map indicates that there is negligible risk of ground water flooding for the site.



# 9. Strategic Flood Risk Assessment and Local Risk Management Strategy.

A Strategic Flood Risk Assessment (SFRA) by Liverpool City Council was produced in January 2008 and a Mersey Estuary Catchment Flood Management Plan (MECFMP) by the Environment Agency was produced in December 2009.

The flood data maps within the SFRA are at a scale where the specific flood risk for the site cannot be identified. However, the maps do show an outline view that seems to reflect the data given from the EA and the Landmark Envirocheck data, where Figure 8 identifies that the development site lies within Flood Zone 1; and Figure 9 identifies that there has been no recorded flooding for the area within the vicinity of the development site.



# 10. Sources of Flooding

In accordance with the NPPF, flood risk must be assessed for all sources of flooding and development of the site should be carried out in such a way as to mitigate any potential flood risk to both the site and third parties and their property. This section identifies all possible sources of flooding.

#### 10.1. Fluvial Flooding

Fluvial flooding is resulted from watercourses / rivers surcharging and flooding the surrounding areas.

# 10.2. Pluvial Flooding

'Pluvial' flooding is that which results from rainfall generated overland flow before the run-off enters any watercourse, drain or sewer. It is more often linked to high intensity rainfall events (typically in excess of 30mm per hour). However, it can also result from lower intensity rainfall or melting snow where the ground is saturated, frozen, developed or has low permeability. This results in overland flow and ponding in depressions in the topography. In urban areas 'pluvial' flows are likely to follow the routes of highways and other surface connectivity to low spots where flooding can occur. In some cases, it can deviate from this route into adjacent developments via dropped kerbs (either for access to driveways or disability access).

# 10.3. Groundwater Flooding

Groundwater flooding is caused by the emergence of water from sub-surface permeable strata. Fluctuations in the groundwater table can cause flooding should the table rise above the existing ground level. Groundwater flooding events tend to have long durations, lasting days or weeks.

#### **10.4.** Flooding from Drains and Sewers

Flooding from drains and sewers is caused when the capacity of the drains and sewers is exceeded, and will result in flooding from the manholes.

# 10.5. Canals, Reservoirs and Other Artificial Sources

Flooding from canals, reservoirs and artificial sources is caused when the capacity of the sources are exceeded, or if there is an infrastructure failure.



# 11. Probability of Flooding

Now that the sources of flooding are known, an assessment is to be made of the probability of flooding from each of the sources.

#### 11.1. Fluvial Flooding

Queen's Dock is approximately 250m west of the site, which leads from / to the River Mersey which is approximately 550m west of the site.

The EA, Envirocheck and SFRA flood map all show that the site lies within Flood Zone 1 which has less than 1 in 1000 annual probability of flooding in any given year.

Based on the site being in Flood Zone 1, the probability of fluvial flooding for the development site is deemed to be low.

#### 11.2. Pluvial Flooding

The Envirocheck flood map data indicates there is no pluvial flooding within the site, and the only pluvial flooding within the vicinity of the site being within New Brid Street.

The flood water within New Bird Street only occurs during a 1 in 1000 annual probability storm event, and is approximately 150mm in depth.

There are kerbs which are believed to be 150mm in height, and sloped hard standing concrete areas between the existing building finished floor level and the road channel.

Therefore, as the new residential and commercial is to building is to be at the same floor level as the existing building, the probability of pluvial flooding is deemed to be low.

# 11.3. Ground Water Flooding

The Envirocheck / BGS flood data map indicates that there is limited potential for ground water to occur for the western and central areas of the development site, with potentially for flooding being at the eastern third of the site.

The ESI groundwater flood map however indicates that there is negligible risk of ground water flooding for the entire site area, and the Envirocheck historical flood map indicate that there is no history of ground water flooding.

Taking that the BGS and ESI data suggests that the site has limited potential and negligible risk of ground water flooding, the probability of ground water flooding for the development site is deemed to be low.

# 11.4. Flooding from Drains and Sewers

Due to the nature of the development site location, the nearest drain and sewer are assumed to be within the roads that surround each side of the development site.

The assessed data suggests that there has been no history of flooding from drains and sewers within the vicinity of the site, and therefore the probability of flooding from drains and sewers for the development site is deemed to be low.



# 11.5. Canals, Reservoirs and Other Artificial Sources

There are no canals, reservoirs or other artificial sources within the vicinity of the site. Therefore, the probability of flooding from canals, reservoirs or artificial sources for the site is deemed to be low.



#### 12. Surface Water Management Plan

The surface water management of the development is to adhere to the requirements of the National Planning Policy Framework, 2012 (NPPF), and the National Planning Practice Guidance (NPPG), which sets out the guidance for reducing flood risk00 in general by using Sustainable drainage systems (SuDS).

The management of the surface water will consist of a scheme of SuDS which will be achieved as part of the development in accordance with the Defra – Non-statutory technical standards for sustainable drainage, March 2015 which sets out the government policy to SuDS schemes.

The surface water design will such that the post development surface run-off rates do not to exceed the pre development run-off rates, and are to be reduced as much as practical to reduce the risk of flooding to area within and in the vicinity of the site.

In particular, the surface water design of the development will conform to the guidance set out in Planning Practice Guidance (PPG) where:

Paragraph 051 states, the drainage is to be designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible, will provide opportunities to reduce the causes and impacts of flooding, and will remove pollutants from urban run-off at source;

As assessment will be carried out as stated in Paragraph 079 on whether a sustainable drainage system should be considered depending on the proposed development and its location;

And Paragraph 080 where the aim of the surface water management will be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable: into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain, or another drainage system; to a combined sewer.

Taking the guidance into consideration, the proposed drainage system will also be aim to restrict the surface water to greenfield run-off rate if practical, and to reduce the post development run-off rates to less than the pre development rates as a minimum.

As there are no watercourses within the vicinity of the site, and the building structure occupying all of the site where no infiltration devices are not feasible, the only option will be to discharge the surface water to the existing sewer systems which are believed to be within the surrounding roads.

The proposed drainage network will also be design so that no flooding occurs for up to and including the 1 in 30-year storm event, and that any localised flooding will be controlled for up to and including the 1 in 100-year storm event including 40% rainfall intensity increase (climate change).



# 13. Residual Risk

It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, there are practicable ways to minimise the risk such as by allowing a freeboard (safety margin) and by using suitable construction and management techniques.

This flood risk assessment has been prepared in accordance with the NPPF, Local Planning Policy and the NPPG. Any recommendations regarding floor levels are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

However, it should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development.

Earth Environmental and Geotechnical Ltd do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

The owner/occupier of the property will be required to carry out maintenance on any SuDS devices within the site boundary. It will be the owner's /occupiers responsibility to regular upkeep the drainage network on site throughout the lifetime of the development to ensure that flood risk on and off site is managed effectively.



# 14. Conclusion

The EA and Envirocheck Flood Maps indicate that the majority of the site lies within Flood Zone 1, which has a low probability of flooding (less than 1 in 1000 annual probability of flooding in any year)

The development is to be for commercial use at ground floor level, and therefore in accordance with NPPF Table 2, the development is considered to be 'More Vulnerable'.

In accordance with NPPF Table 3, if the site is in Flood Zone 1, and is classed as 'More Vulnerable' the development is appropriate.

An assessment of potential sources of flood risk including fluvial, pluvial, ground water, drains and sewers, canals and artificial has been carried out, and it is deemed that the probability of flooding from all sources is deemed to be low.

It is proposed that the surface water run-off from the proposed development discharge to the sewers which that are believed to be in the surrounding roads, as infiltration devices are not unlikely to be feasible due to the basement occupying the majority of the site area.

The proposed drainage network will be designed so that the post development surface water run-off does not exceed the pre development as a minimum.

The proposed drainage network will also be design so that no flooding occurs for up to and including the 1 in 30-year storm event, and that any localised flooding will be controlled for up to and including the 1 in 100-year storm event including 40% rainfall intensity increase (climate change).

The surface water management has been designed in accordance with the NPPG guidance in relation to SuDS.

The development will not increase the risk of flooding for the site or areas within the vicinity of the site.

In terms of flood risk, the development is deemed to be appropriate.



Appendix A Site Location Plan



Appendix B Proposed Site Plans



Appendix C Envirocheck Flood Data Maps