



Flood Risk Assessment

**Clayton Hotel
Manchester Airport**



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1. Introduction

Frank Fox & Associates has been commissioned by Dalata Hotel Group to undertake a Flood Risk Assessment (FRA) to support an outline planning application for the development of new extension and associated site works at the Clayton Hotel Manchester Airport.

The proposed development comprises a 216 Bedroom extension & associated Restaurant / Bar on the existing Clayton Hotel site, with the loss of two of the existing 365 bedrooms giving a new net total of 214 bedroom.

1.1 Background

The Site comprises approximately 1.8 hectares (ha) of land, located immediately east of Manchester Airport, at National Grid Reference (NGR) SJ821853.

The Environment Agency (EA) Flood Zone Map shows that the Site is located within Flood Zone 1. Areas located in Flood Zone 1 are classified as having a 'low risk' of flooding from fluvial or tidal sources. Flood Zone 1 delineates areas classed as land having a less than 1 in 1,000 (<0.1%) annual exceedance probability (AEP) of river or sea flooding in any given year.

The National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG) specifies that planning applications for development proposals located in Flood Zone 1 where the site area exceeds 1 ha should be accompanied by a FRA that identifies and assesses all forms of flooding to and from the development. It should demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking into account the vulnerability of the proposed development and the potential impact of climate change on risk.

1.2 Scope of Services

The aim of this study is to undertake a FRA that is appropriate to the nature and scale of the Proposed Development, determines flood risk posed to the site and arising from the Proposed Development and recommends suitable mitigation measures, where required.

The objectives of this report are to:

Collect and review existing information relating to the flood risk posed to the Site from all sources (including tidal, fluvial, surface water, groundwater, artificial sources and sewerage and drainage infrastructure);

Assess the flood risk to the Proposed Development under both existing and post-development conditions (taking into account climate change), including assessing the impact that the development may have on flood risk elsewhere; and

Outline any mitigating measures needed to ensure the Proposed Development and its occupants will be safe for the lifetime of the development and will meet the requirements of the NPPF.

1.3 Data Sources

The baseline conditions for the Site have been established through a desk based study on current publicly available information. As the Site is located in Flood Zone 1 consultation has not been undertaken with the EA. This information has been utilised to inform the assessment made within the FRA.

2. Site Information

This section of the report provides a description of the existing site for the proposed extension Clayton Hotel Manchester Airport.

2.1 Site Location

The site is located immediately northeast of Terminal 1 at Manchester Airport and bounded by the railway line to the north, Outwood Lane to the west and the Crown Plaza hotel to the east. The location is highlighted in in Figure 1 below.

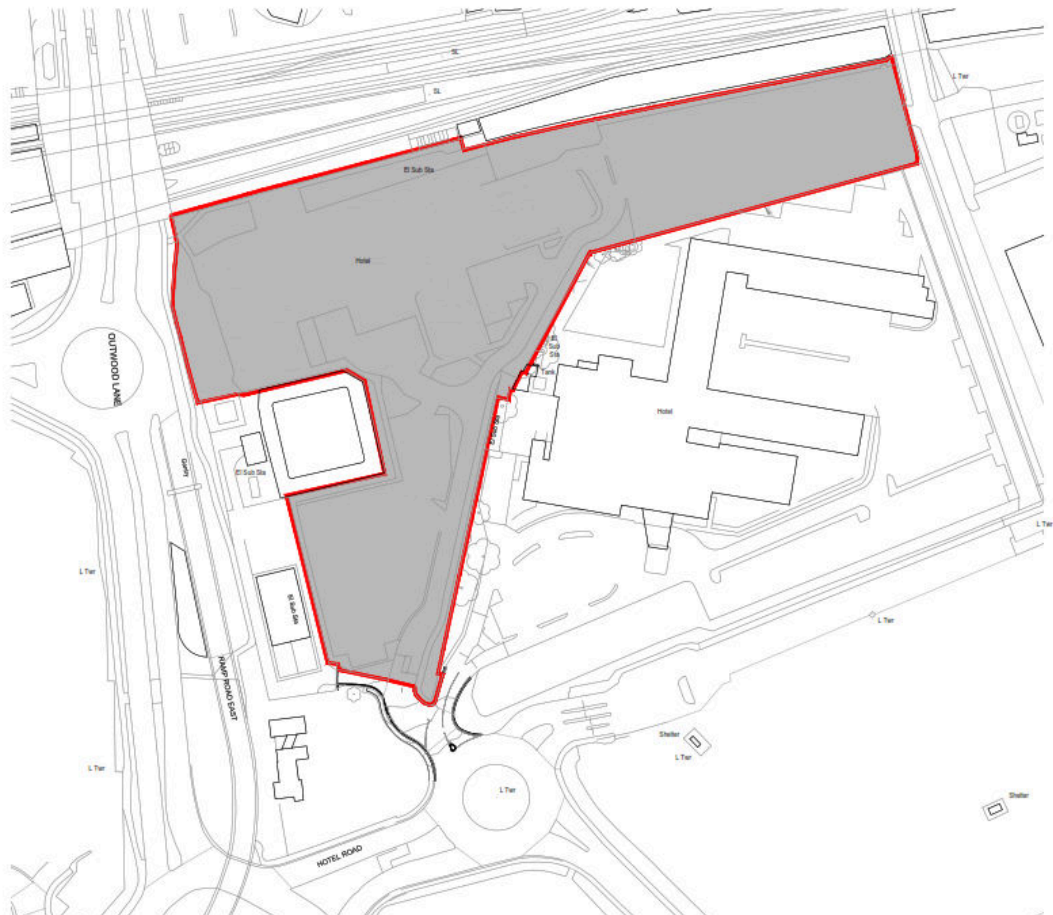


Figure 1. Location Plan

2.2 Existing Site

The Site is currently brownfield and covers an area of approximately 1.8 ha. The existing site is currently used as a hotel and is predominantly hard standing (approximately 95% impermeable area).

2.3 Topography

There is a very slight variation in topography across the Site. Existing ground levels vary between 73.5m Above Ordnance Datum (AOD) and 71.5m AOD with levels generally falling gently away in a general west to east direction.

2.4 Watercourse

There are no watercourses on the Site or within close proximity to the Site.

2.5 Flood Defences

There are no flood defences located in close proximity.

3. Planning Policy and Guidance

The following planning policies and guidance are relevant to the proposed works at Manchester Airport, with regards to flood risk and surface water management.

3.1 National Planning Policy Context

The National Planning Policy Framework (NPPF) is the current guide on national planning policy in respect to flood risk. The NPPF is supported by the Planning Practice Guidance (PPG), an online resource. The PPG supersedes the PPS25 Practice and the Technical Guidance to the National Planning Policy, as detailed in the Ministerial Statement 'Making the planning system work more efficiently and effectively'

The NPPF and associated PPG must be taken into account in the preparation of local and neighbourhood plans, and are a material consideration in planning decisions. It constitutes guidance for Local Planning Authorities (LPAs) and decision-takers, both in drawing up plans and as a material consideration in determining applications.

The NPPF and PPG recommend that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and develop policies to manage flood risk from all sources, taking account of advice from the EA and other relevant flood risk management bodies, such as Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards (IDBs). Local Plans should apply a sequential, risk based approach to the location of development to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

Applying the Sequential Test;

- Applying the Exception Test, if necessary;
- Safeguarding land from development that is required for current and future flood management;
- Using opportunities offered by new development to reduce the causes and impacts of flooding;
- Seeking opportunities to facilitate the relocation of existing development, including housing, to more sustainable locations where climate change is expected to increase flood risk.

3.1.1 The Sequential and Exception Test

The overall aim of the Sequential Test is to steer new development to areas designated as located in Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, LPAs allocating land in Local Plans or determining planning applications for development at any particular location should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zone 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required. For the Exception Test to be passed:

It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared; and

A site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall. Both elements of the test will have to be passed for development to be allocated or permitted.

The PPG provides further guidance on the types of development appropriate in each Flood Zone. Whilst all types of developments are considered appropriate in Flood Zone 1 only certain types of developments are considered appropriate in Flood Zones 2, 3a and 3b and may only be permitted if the Exception Test is passed.

3.1.2 Development and Flood Risk Vulnerability

The NPPF considers the vulnerability of different forms of development and infrastructure to flooding and classifies proposed uses accordingly. Section 7, Paragraph 066 of the NPPG illustrates a matrix which identifies which vulnerability classifications are appropriate within each flood zone.

The development comprises a hotel and associated development, including carpark. Hotel development is classified as 'More Vulnerable' in the NPPF Classification¹⁹ (buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels).

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

The EA Flood Map for Planning shows that the entire Site is located in a Flood Zone 1 (low risk). 'More Vulnerable' development is appropriate in Flood Zone 1; therefore the development passes the Sequential Test and the Exception Test is not required.

3.2 Local Planning Policy and Guidance

3.2.1 Manchester Core Strategy

The Core Strategy forms the basis for how planning decisions are made in Manchester between 2012 and 2027. The strategy includes the following flood risk related policies:

Policy EN 14 – Flood Risk

Development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).

An appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5 ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.

All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SuDS) and the appropriate use of Green Infrastructure.

Where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

Policy EN 8 – Adaptation to Climate Change

All new development will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following:

Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water permeability.

3.2.2 Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA)

The Manchester-Salford-Trafford Level 1 SFRA (published in March 2010) has used existing data to make a spatial assessment of flood risk within key urban areas from all sources now and in the future and builds on the Association of Greater Manchester Authorities (AGMA) Sub-Regional SFRA (published in 2008). It looks at the risk of flooding from rivers, canals, reservoirs, groundwater and surface water and sewers. It provides evidence for LPA officers to apply the Sequential Test and identify the need to pass the Exception Test where required.

3.2.3 Greater Manchester Surface Water Management Plan

The Greater Manchester SWMP (published January 2012) is a study of surface water flood risk, recognising the cause and effect of flood hazard between the districts and communities in Greater Manchester. The report assesses surface water flood risk at a strategic level and makes future recommendations on what the second phase of the SWMP should focus on.

The SWMP identifies the sources and mechanisms of surface water flooding through the development of pluvial and sewer flood models. This assessment signposts, and ranks areas at risk of surface water flooding across Greater Manchester and individual districts. These strategic hotspots will be used to identify potential locations for detailed risk assessment work.

3.2.4 Manchester Local Flood Risk Management Strategy (LFRMS)

Under Section 9 of the Flood and Water Management Act (FWMA) 2010, LLFAs are required to produce a strategy for managing local flood risk. Manchester City Council's Manchester LFRMS outlines the sources of flooding in Manchester focussing on flooding from heavy rainfall, groundwater and from ordinary watercourses (small ditches and streams). The LFRMS gives an overview of how flood risk from local sources will be managed and sets out which organisations are responsible for managing flooding from different sources.

3.2.5 Manchester Preliminary Flood Risk Assessment (PFRA)

The Manchester PFRA has been prepared to assist Manchester City Council meet its duties, as a LLFA, to manage local flood risk and deliver the requirements of the Flood Risk Regulations (2009).

The PFRA focusses on local flood risk from surface water, groundwater, ordinary watercourses and canals. The Flood Risk Areas are areas of significant risk identified on the basis of the findings of the PFRA. The PFRA forms part of the local flood risk management strategies that LLFAs are required to prepare under the FWMA.

3.3 Other Relevant Policy and Guidance

The EA is required to prepare Flood Risk Management Plan's (FRMPs) for all of England covering flooding from Main Rivers, the sea and reservoirs. The Site falls into the North-West River Basin

District FRMP which has been published by the EA and sets out objectives to manage flood risk for the region for the period 2015 to 2021. The Site is located within the Upper Mersey Management Catchment.

3.3.1 Upper Mersey Catchment Flood Management Plan (CFMP)

The EA is required to prepare Catchment Flood Management Plans (CFMPs) to establish flood risk management policies which will deliver sustainable flood risk management for the long term.

According to the Upper Mersey CFMP, the Site is currently located in the Upper Sinderland sub-area, subject to Policy Option 5. This sub-area of south Manchester is heavily urbanised, and a large proportion of watercourses are heavily modified and culverted.

Policy Option 5 outlines areas at moderate to high flood risk where further action can be taken to reduce flood risk. The EA's preferred policy for this sub-area will aim to maintain the current level of flood risk and take account of future climate change, urbanisation and land use management. The EA aims to reduce flood risk through the design and layout of new developments. Taking further action to reduce risk will require additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

4. Flood Risk

4.1 Overview

Flood risk takes account of both the probability and the consequences of flooding.

Flood risk = probability of flooding x consequence of flooding. Probability is usually interpreted in terms of the return period, e.g. 1 in 100 and 1 in 200 year event etc. In terms of probability, there is a 1 in 100 (1%) chance of one or more 1 in 100 year floods occurring in a given year. The consequence of flooding depends on how vulnerable a receptor is to flooding.

The components of flood risk can be considered using the source-pathway-receptor model.

Sources constitute flood hazards, which are anything with the potential to cause harm through flooding (e.g. rainfall, extreme sea levels, river flows and canals). Pathways represent the mechanism by which the flood hazard would cause harm to a receptor (e.g. overtopping and failure of embankments and flood defences, inadequate drainage and inundation of floodplains). Receptors comprise of the people, property, infrastructure and ecosystems that could potentially be affected should a flood occur.

The NPPF requires the effects of all forms of flood risk to and from the Site to be considered within a FRA. There should be demonstration of how these risks should be managed so that the development remains safe throughout its lifetime, taking into account climate change.

4.2 Tidal Flooding

The Proposed Development is not located in close proximity to the sea or any tidal inland watercourses, therefore the Site is not considered to be at risk of flooding from tidal sources.

4.3 Fluvial Flooding

There are no watercourses within the Site boundary or in close proximity to the Site.

The EA Flood Map for Planning shows that the entire Site is located in Flood Zone 1, which means that the Site is at a low risk of flooding from fluvial sources. Land in Flood Zone 1 has a low probability of flooding which is defined as land having a less than 1 in 1,000 (<0.1%) AEP of river or sea flooding in any given year.

The Flood Zones shown on the EA Flood Map for Planning do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding however; given the Site location it is considered that the risk of flooding from fluvial sources is low.

4.4 Surface Water Flooding

The EA Risk of Flooding from Surface Water map shows that the majority of the site has a 'Very Low' risk of flooding from surface water, which has a less than 1 in 1000 (<0.1%) annual probability of flooding in a given year. A very small proportion of the western extent of the site has a 'Low' risk of flooding from surface water which has between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of flooding in a given year.

The Risk of Flooding from Surface Water map from the Flood Warning Information Service does not highlight any potential flood risk.

There are no identified surface water flow paths through the Site and no historical records of surface water flooding have been identified in the SFRA, PFRA or SWMP.

Based on the information above the risk of flooding to the Site from surface water sources is considered to be low.

4.5 Flooding from Artificial Waterbodies

Artificial flood sources include raised channels such as canals, or storage features such as ponds and reservoirs. The Reservoir Act 1975 defines a large reservoir as one that holds over 25,000 cubic metres (m³) of water, although this is expected to be reduced under a review into the safety legislation and regulation of reservoirs to 10,000 m³, and is expected to be phased in once this comes into effect under the EA21.

The EA Long Term Risk of Flooding Map shows that the Site is not located in an area considered to be at risk of flooding should breach or failure of a reservoir occur.

The airport storage lagoon (artificial waterbody) is located in close proximity to the Site, however any overflow from it goes straight to drainage network on site with a high level storage mark 1.0m below the overflow pipe level, which is managed by Manchester Airports Group (MAG) and therefore the risk of flooding from artificial waterbody sources is considered to be low.

4.6 Flooding from Groundwater Sources

Groundwater flooding can occur when groundwater levels exceed ground surface levels as a result of periods of sustained high rainfall. The underlying geology has a major influence on where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers) where the water table is more likely to be at shallow depth.

The geology at the Site comprises glacial till deposits which are underlain by bedrock comprising of Bollin mudstone. The superficial deposits are classified by the EA as a Secondary (undifferentiated) Aquifer. These are predominantly lower permeability layers which may store and yield limited amounts of groundwater. The undifferentiated classification means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. The mudstone bedrock is classified as a Secondary B Aquifer. Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts

of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

The Manchester City, Salford City and Trafford Council SFRA states “there are no known reports of groundwater flooding in the Manchester, Trafford and Salford authorities”.

It is considered that the Site has little capacity to store groundwater, and therefore is considered to be at low risk from groundwater flooding.

4.7 Flooding from Drain and Sewer Infrastructure

Flooding from drains, sewers and surface waters are normally interconnected. Insufficient or reduced drainage capacity within the sewer network can result in drainage capacity being exceeded causing extensive surface water flooding. Likewise increased volumes of surface water can overload sewers and drains, causing the drainage network to backup and surcharge causing surface water flooding.

The Upper Mersey CFMP states that much of south Manchester is heavily urbanised, and that a large proportion of watercourses are heavily modified and culverted. Therefore it is possible that some areas may be at risk of flooding from drain and sewer infrastructure. However, there are no known flooding incidents from drains or sewers on the Site.

There are no known historical records of sewer flooding on the Site. Based on this information it is considered that the risk of flooding from drainage infrastructure is low.

5. Climate Change

5.1 Context

The NPPF requires site specific FRAs accompanying planning applications to assess the risk of all sources of flooding to and from the development and to demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account

The EA published updated climate change guidance. The guidance indicates that climate change is likely to increase river flows, sea levels, rainfall intensity, wave height and wind speed.

5.2 Impact of Climate Change

5.2.1 Fluvial Flooding

The proposed development lies in Flood Zone 1, and is currently classified as being at low risk of flooding from fluvial sources. The Site is located remotely from any watercourses; therefore climate change from this source will not impact the Site.

5.2.2 Peak Rainfall Intensity Allowance

Increased rainfall affects river levels and land and urban drainage systems. Table 3 shows anticipated changes in extreme rainfall intensity in small and urban catchments. For FRAs and strategic flood risk assessments, both the central and upper end allowances need to be assessed to understand the range of impact.

Table 3. Peak rainfall intensity allowance in small and urban catchments

<i>Applies across all of England</i>	<i>Total potential change anticipated for 2010 to 2039</i>	<i>Total potential change anticipated for 2040 to 2069</i>	<i>Total potential change anticipated for 2070 to 2115</i>
Upper end	10%	20%	40%
Central	5%	10%	20%

5.2.3 Surface Water Runoff Generation and Overland Flow

Increase in rainfall intensity and magnitude of storm events are expected to increase. With the construction of predominately hardstanding car parking, access roads, and pedestrian routes, the impermeable area of the Site is expected to increase. As a result of increasing rainfall intensities and an increase in impermeable surface area, surface water runoff rates at the Site will also be expected to increase.

Climate change must be taken into account when considering surface water runoff generated by development sites. This is usually represented by increasing the peak rainfall intensities. An increase in rainfall intensity will result in an increase in runoff rates and volumes from the development, exacerbated by increased amounts of impermeable surface associated within the proposed development. The conceptual drainage strategy outlined in Section 6 indicates that the Proposed Development will restrict surface water runoff to existing greenfield rates through the airport area attenuation system. As such the risk of flooding from surface water is considered to remain low under climate change scenarios.

5.2.4 Groundwater Flooding

The predicted increase in the wetness of winters and the intensity of storm events could impact groundwater level fluctuations across the Site, and possibly increase the level of the water table. As the likelihood of groundwater emergence under the climate change scenario is likely to increase, the potential for groundwater flooding to impact infrastructure will also increase.

The geology of the Site means there is little capacity to store groundwater and impermeable surfacing across the majority of the Site further reduces the likelihood of groundwater emergence, therefore the risk of flooding from groundwater is considered to remain low under climate change scenarios.

6. Surface Water Management

The conceptual drainage strategy of both foul and surface water for the proposed development has been completed by FFA, see drawing 217061-DP-01. Also accompanying this application is a drainage strategy.

6.1 Foul Water

Foul drainage from the new hotel development is proposed to discharge via the existing site connection to the existing MAG system. The foul outflow is proposed to be 119m³/day.

6.2 Surface Water

An existing 1100 dia. mains storm pipe transfers the site. Generally the entire site is hard standing, all site storm water feeds directly to the main storm line and is attenuated as part of the greater airport attenuation system. Due to the fact that the existing site is currently hard standing, there is no proposed change to the outflow value.

6.3 Sustainable Urban Drainage Systems

SuDS have been considered for use on the Site. Storage ponds and swales etc. have been discounted because of the Site's proximity to the airport, open waterbodies are problematic due to aerodrome safeguarding issues and are not considered appropriate for this location. Soakaways and permeable paving have been discounted due to the ground conditions on the Site.

Attenuation is the only suitable option and is catered for in the greater Manchester Airport Development.

7. Flood Risk Management Measures

The following mitigation measures will be considered to reduce the probability of flooding during extreme events and residual risks should also be considered. These measures will help to reduce the impact of a flood event should it occur.

7.1 Mitigating against Surface Water Flooding

In order to contain and mitigate the effects of overland flows, surface water drainage must be implemented to account for the peak runoff increases as a result of the development and must consider the effects of climate change in accordance with the NPPF. The NPPF also states that new developments should not increase the risk of flooding to the development or elsewhere. Surface water runoff should therefore not exceed the peak runoff and volumes already generated by the existing site and betterment should be provided where possible.

7.2 Mitigating against Groundwater Flooding

The geology of the Site means there is little capacity to store groundwater, and the impermeable surfacing across the majority of the Site further reduces the likelihood of groundwater emergence. Therefore the risk of flooding from groundwater is currently considered to be low, and is considered to remain low under climate change scenarios.

Therefore mitigating against groundwater flooding is not necessary on this Site.

7.3 Mitigating against Drainage Infrastructure Flooding

It is proposed that post development surface water runoff will discharge into the existing surface water drainage system.

8. Off-Site Impacts and Residual Risk

8.1 Off-Site Impacts

The Site is considered to be at low risk of flooding from all sources. The conceptual surface water drainage strategy is based on providing storage for up to and including the 1% AEP storm event, with a 40% allowance for climate change. This would ensure that the Proposed Development will not increase flood risk elsewhere and should provide betterment over the existing situation and therefore meet the requirements of the NPPF.

It is considered that in accordance with the conceptual surface water drainage strategy, the Proposed Development is not likely to result in any offsite impacts.

8.2 Residual Risk

Failure, blockage and exceedance of design events for the drainage system are a potential risk to the Site and the surrounding area. Regular maintenance of the drainage system should be undertaken to ensure that the system continues to perform as designed.

9. Conclusion

The following conclusions can be made regarding flood risk to the Site and to off-site areas as a result of the Proposed Development:

The EA Flood Map for Planning shows that the Site is located in Flood Zone 1, the zone of lowest flood risk from fluvial and tidal sources.

The Proposed Development is classified as a 'More Vulnerable' development under the NPPF Flood Risk Vulnerability Classification, and is considered appropriate development in Flood Zone 1.

The EA Risk of Flooding from Surface Water map shows that the site has a 'Very Low' or 'Low' risk of surface water flooding.

The risk of flooding from groundwater is considered low.

The risk of flooding from sewer and drainage infrastructure is considered low.

There are no off-site impacts as a result of the proposed development in terms of flood risk.

There is a potential residual risk of blockage or failure of the surface water drainage system. However, regular maintenance and inspection of the surface water drainage system will be undertaken to prevent blockage.

This FRA for Dalata Hotel Group provides evidence to demonstrate that the proposed works is not at risk from flooding and will not increase flood risk elsewhere. It is therefore considered to be acceptable in flood risk terms.