Flood Risk Management Limited

Detailed Flood Risk Assessment

Various Buildings at
Nos. 36,37 and 39 Sandside
Scarborough
YO11 1PG

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[redacted]

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1. Introduction

Flood Risk Management Limited has been commissioned to prepare a detailed flood risk assessment (FRA) for a planning application for a development of commercial on the ground floor and residential at or above first floor level.

A FRA is required because part of the development is identified as being in flood risk Zone 2.

This is a supplementary document to a planning application; the conditions of a planning consent are likely to refer to this document, which means the applicant must comply with specific requirements set out in this report and consider its recommendations.

The Local Planning Authority (LPA) may condition a planning consent using information set out in this report.

2. Approach

2.1 National and Local Planning Policy (Flood Risk)

This report complies with the requirements set out in the Flood and Coastal Risk Change section of the planning practice guidance and the LPA Strategic Flood Risk Assessment (SFRA). It clearly considers:

- The effect of a range of flooding events including extreme events on people and property.
- Residual Risks taking into account the presence of any flood defences.
- How people will be kept safe from flood hazards identified.

This report does not rule out the risk of flooding to the development in all circumstances, it does however consider if the development is at risk in the design event(s) for planning purposes over its expected lifetime, including allowances for climate change based on best available data at the time.

2.2 Scope of Report

This report:

- Will assess the risk of flooding to the development.
- Will assess the risk of flooding that this development might present elsewhere.
- Will signpost Sequential & Exception test Information.

This report:

Will not give any guarantee of that a planning application will be granted, this is a matter for the LPA.

Will not set out any detailed design.

Will not set out any detailed hydraulic calculations.

Is not intended to replace the advice of a town planning expert in respect of a Sequential Test, Exception Test, or identification of sustainability benefits.

2.3 Sources of Data

The following publications and data sources were used in the production of this report:

National Flood Risk Map for Planning – Rivers and Sea

National Map for Risk of Flooding from Surface Water (UFMSW)

SBC & RDC Strategic Flood Risk Assessment: 2021

Scarborough Local Plan: SBC: 2017

National Planning Policy Framework (NPPF): DLUHC

Planning Practice Guidance (Flood Risk & Coastal Change): DLUHC

Flood Risk Assessments Guide for New Development (FD2320)

Flood Risk Assessments: Climate Change Allowances: EA

2.4 Licence and Attribution Information

3. Context

3.1 Location

The proposed development is situated on Sandside near to the Harbour. The National Grid Reference for the development is TA 4951 8881.

Figure 1 : Location Plan

Figure 2 : Aerial View

3.2 Study Area

The study area will be the local North Sea coast.

3.3 Description of Proposed Development

The proposal is for commercial development at ground floor level and residential use at or above first floor level.

3.4 Topography

LIDAR digital surface model data was collected from the Channel Coastal Observatory 2021 dataset has been used to inform topography, the accuracy is +/-0.16m and used for the level data in this report.

This data was converted into a contour map at 500mm intervals for the purposes of this report. The method used was to extrapolate the LIDAR raster files using a Geospatial Data Abstraction Library (GDAL) algorithm.

The extracted contour map has been overlain on the Flood Risk maps to establish a 'best fit' between elevation and modelled flood extents showing a maximum flood elevation of around 3mAOD in the present day 0.5%AEP Event and around 4.5mAOD in the 0.1%AEP Event. See Figure 5.

The buildings on the south elevation have level access to the street at around 5.1mAOD. The buildings on the north elevation are stepped with ground levels at 5.7mAOD and 5.1mAOD respectively.

All dimensions must be checked on site.

4. Flood Risk Information

4.1 Flood Risk & Topographical Maps

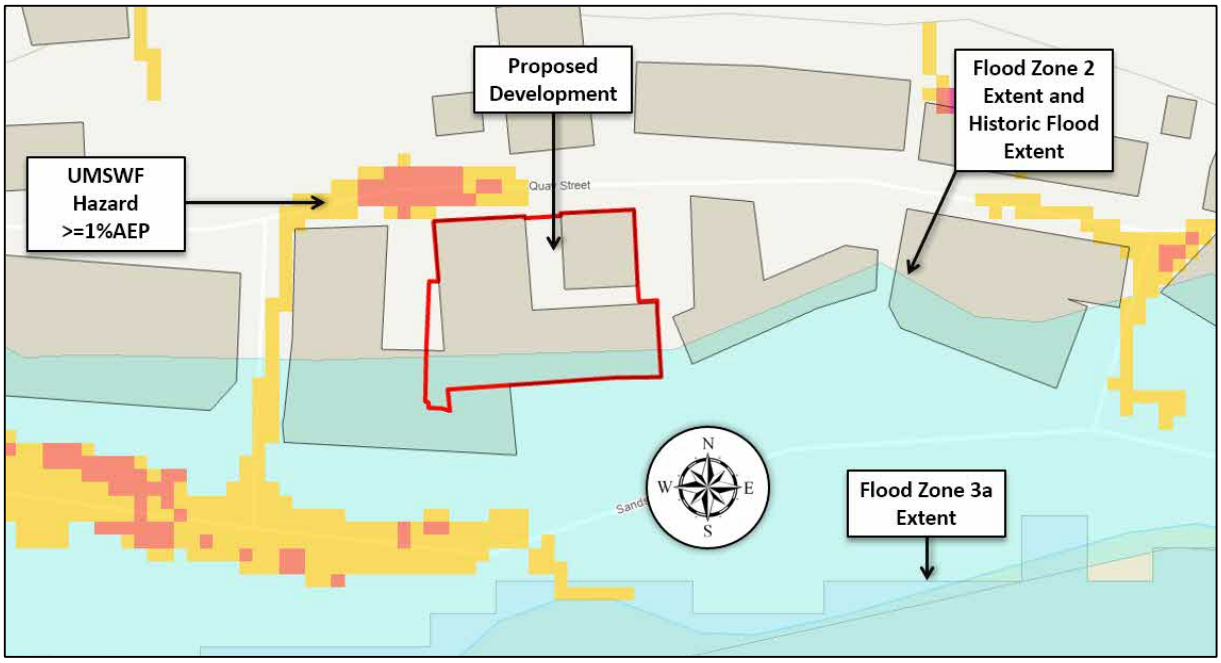

Figure 3 : Modelled and Recorded Flood Extents

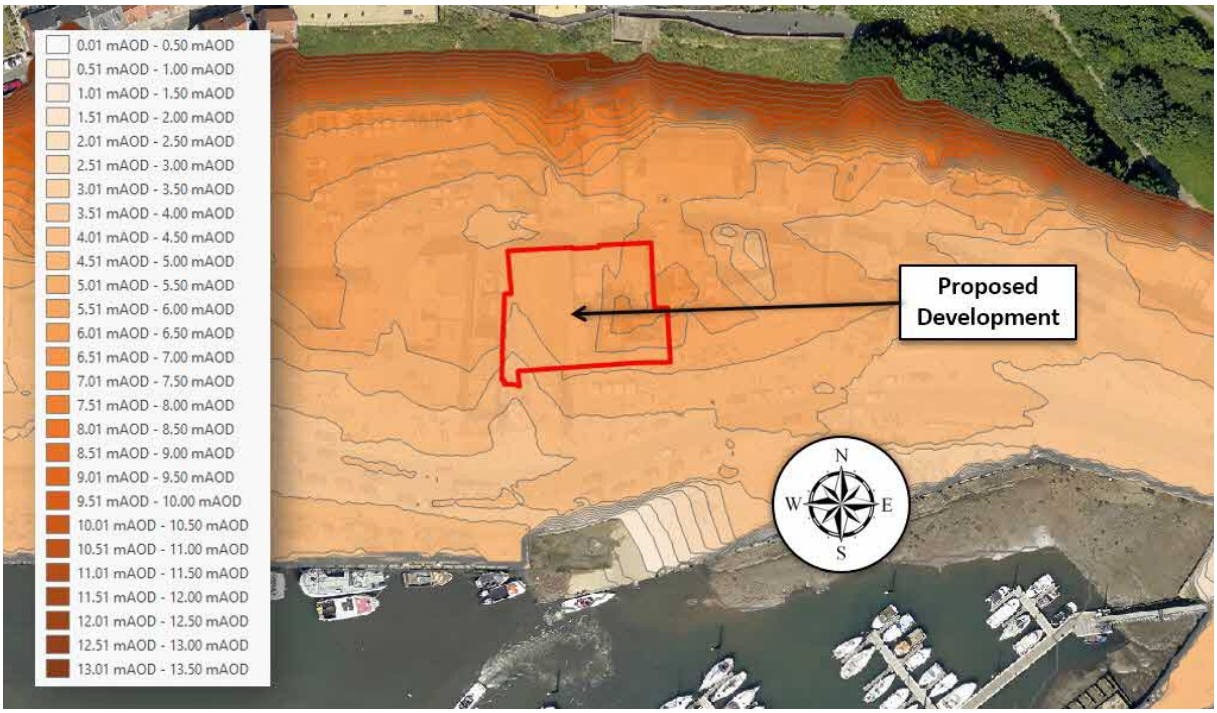

Figure 4 : Topography

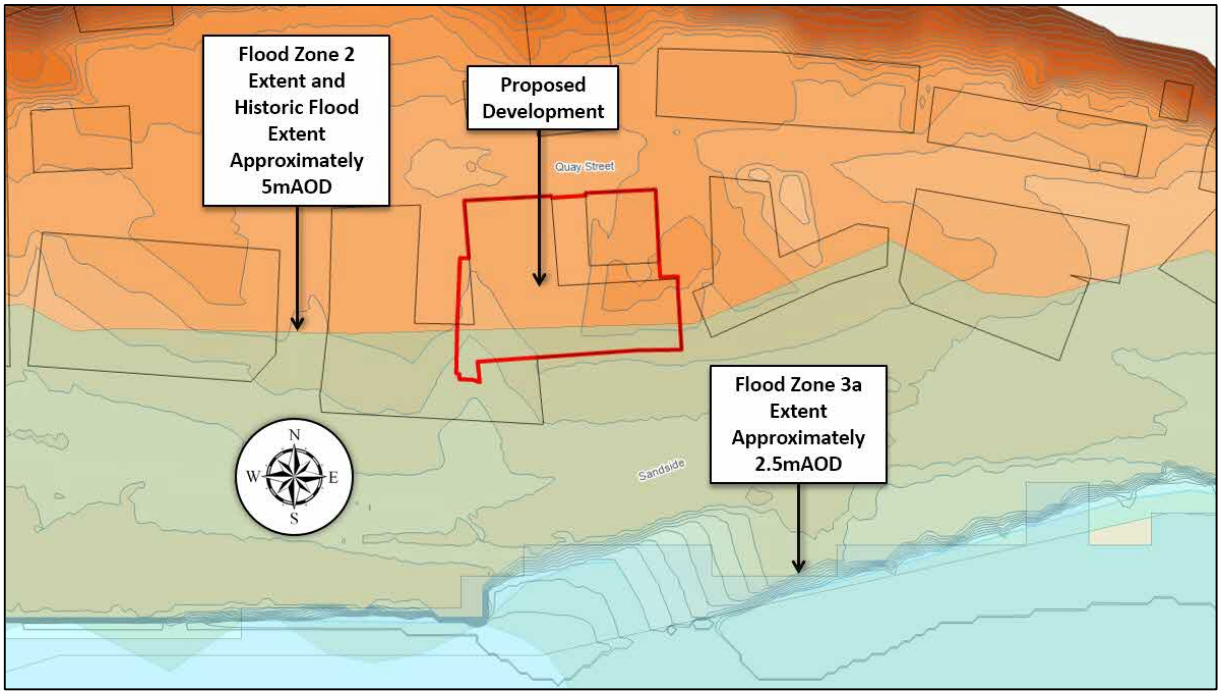

Figure 5 : Topography - Flood Extent Comparison

4.2 Flood Risk Map Commentary

The National flood risk map for planning - rivers and sea shows most of the development is not in Flood Zone 3a but partly in Flood Zone 2.

The national surface water mapping product shows there is no or very low risk of hazard from surface water flooding.

5. Sequential and Exception Test

The ground floor part of the proposed development is less vulnerable as it is a commercial property. The development is location dependant due to the fact it is a seafront tourist development.

A new tourism facility meets several of the strategic planning policy objectives set out in Policy TOU 1 of the Scarborough Local Plan.

This flood risk assessment will consider if the development can be made safe over its lifetime and not increase flood risk elsewhere.

6. Detailed Analysis of Flood Risk

6.1 Historic Flooding

A search of public records indicates the most recent significant coastal flooding event occurred on 5th December 2013 due to a surge tide. Other recent significant events occurred in 1993, and 2017.

During the 2013 event the nearest available tide data shows a 4.328mAOD tide with a residual height of 1.634m, this is based on data from the nearest calibrated station; the local tidal elevation at the development may differ significantly due to local bathymetry and geometry of the coastal defences.

Comparison to topographical information for this event of various public records, including video footage, shows flooding on Sandside to an elevation of around 4.4mAOD, this compares well to the EA historic flood extent map.

6.2 Climate Change

The development is in the Humber Hydraulic region, according to the EA guidance on climate change allowances, over the development's lifetime, sea levels in this region will rise between 681.3mm (Higher Central Estimate (HCE) and 911.3mm (Upper End Estimate (UUE)). The H++ allowances have not been considered because this is not a major infrastructure project, a new settlement, or a major urban extension.

The 2013 tidal event rarity, although less than the 0.5%AEP (high consequence) design event (used for planning purposes) could be considered a good proxy for the 0.5%AEP event with climate change, this would result in a flood depth of around 4.5mAOD at the development.

A reasonable worst-case scenario is a present day, typical high astronomical tide of 3.3mAOD with a residual depth of 1m due to a surge, this gives a present-day tidal elevation of 4.3mAOD. Applying climate change allowances for sea level rise would result in a tidal elevation of 4.98mAOD (HCE) and 5.21mAOD (UUE). This describes the tidal elevation out at sea and does not take into account the impact of local bathymetry and the tidal defences described below.

6.3 Flooding from Surface Water

The national map for surface water flooding indicates the risk from surface water hazard to be very low.

6.4 Flooding from Rivers and Large Watercourses (Fluvial Flooding)

The are no large rivers or watercourses that impact this development.

6.5 Flooding from Groundwater

The proximity and elevation of the development to the coastline makes groundwater flooding most unlikely.

6.6 Flooding from other Local Sources

There are no other local sources of flood risk identified.

6.7 Flooding from the Development Site Itself

As there is no increase in impermeable area there is no increased risk of flooding from the development.

6.8 Flooding due to Residual Risk

The development benefits from a very substantial 340m masonry sea defence wall to the south-east, which is in turn protected by a modern revetment of approximately 30m width, made up of concrete accropodes and rock armour, a treatment designed to absorb wave energy and protect the masonry structure behind. The crest of this structure ranges from 5.5mAOD to 7.5mAOD so would prevent overtopping in the design event plus climate change.

There is a pier/sea wall to the south-west of approximately 250m with crest elevation of approximately 4mAOD, this will not prevent overtopping in the design event with climate change.

These structures do not directly prevent water entering the Harbour via its mouth, albeit at a lower volume than without tidal defences.

6.9 Flooding due to Wave Action

An easterly wind combined with high astronomical tides and a residual depth of water due to surge will likely result in some flooding on Sandside due to both waves breaking on the sea defences and via the harbour. In these circumstances the depth of the water on the development is likely to be short lived but may be of a sufficient volume and velocity to create a hazard as it rapidly drains to a lower ground elevation. This hazard will increase over the lifetime of the development.

7. Conclusion

In the design event, with climate change, the development may be at risk of flooding due to the tide level exceeding the South-Eastern flank of the harbour, a risk that may be exacerbated due to wave action and wind.

In these circumstances flood water will likely drain away from the development quicky due to the local ground elevation but may create a hazard due to the velocity of the water. The impact on the fabric of the building can be mitigated by employing suitable flood resilience measures such as the ones described below.

7.1 Finished Floor Levels

As this is the redevelopment of an existing commercial property at the ground floor level that, by the nature of the business requires near-level access at ground levels to outside space, it is not possible to significantly raise finished floor levels. It is therefore important to consider the flood resilient construction advice below.

7.2 Flood Resilient Construction

The developer should consider incorporating appropriate flood resilience measures. The measures appropriate to this development are:

using flood resistant materials that have low permeability to at least 600mm above the finished floor level.

making sure any doors, windows or other openings are passively flood resistant to 600mm above the finished floor level. The south frontage of these buildings would also lend themselves to the installation of demountable flood barriers such as the aluminium slot type barriers. Flood defence products should not protect the building above 600mm above finished floor level without the advice of a structural engineer.

using flood resilient materials (for example lime plaster) to at least 600mm above the finished floor level

by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the finished floor level.

making sure there is access to all spaces to enable drying and cleaning.

Standards for the installation and retrofit of resistance measures are in British Standard 851188-1:2019+A1:2021.

Standards for speeding the recovery of buildings after a flood are in British Standard 85500:2015.

7.3 Place of Safety (Residential)

Floor levels for the residential accommodation on the first-floor level will be circa =>8mAOD which is 1.79m above the reasonable worst-case scenario in the design event including climate change. Residents should be made aware of the risks from tidal flooding at ground floor level. Because tidal events are short lived, residents should be advised to remain at the first floor and not access or egress the building until the event passes, unless advised otherwise by the authorities.

7.4 Flood Warnings

The commercial part of the development should be closed to members of the public and staff when there is a danger of flooding at ground floor level, this decision should be based on advice from the authorities.

Users of the development should register with the Governments flood information service which can be found here:

https://flood-warning-information.service.gov.uk/warnings.

Report Ends