

Flood Risk Assessment In support of planning application for single level extension to the Marsh Mill Tavern

project: The Marsh Mill Tavern

address: Marsh Mill Village, Fleetwood Rd North FY5 4JZ

job ref: 2214

subject: Flood Risk Assessment

date: March 2022



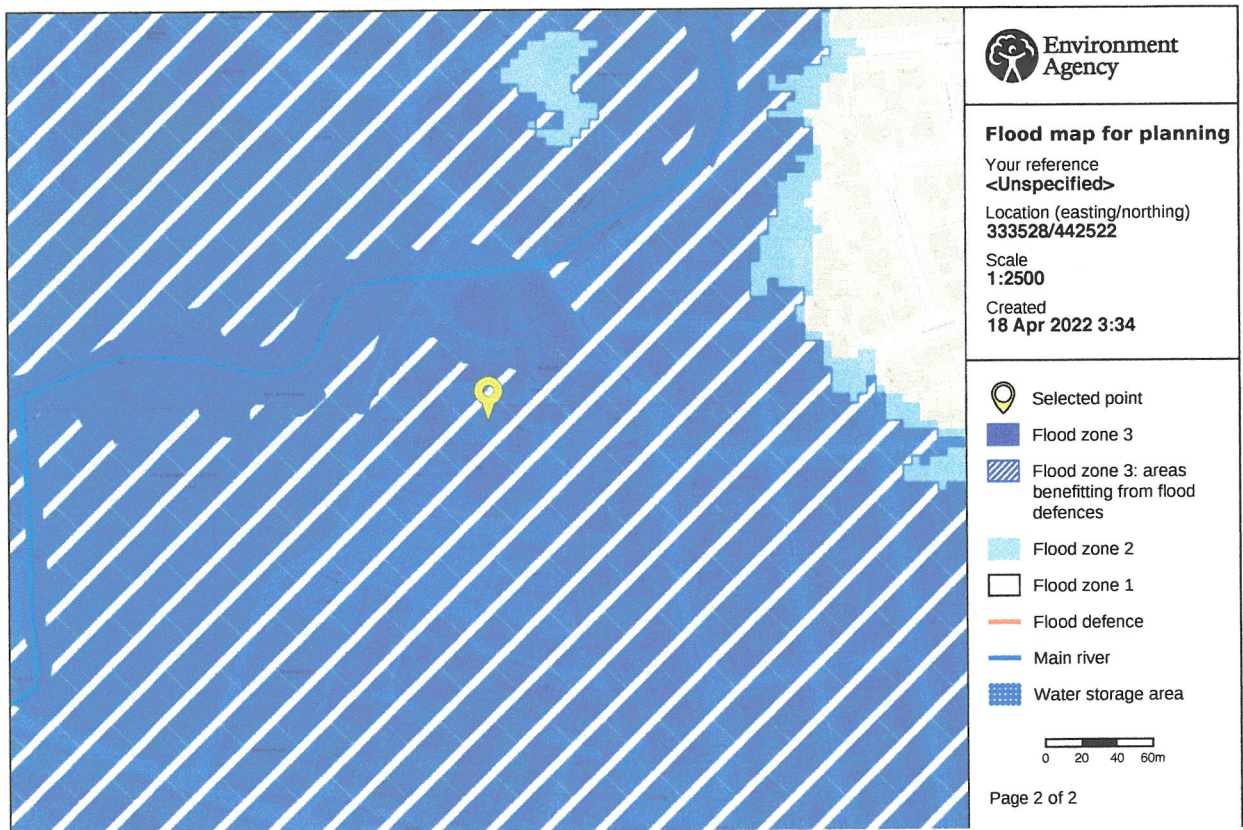
## 1.0 Introduction

The report is produced in support of the application for and extension to the side of The Marsh Mill Tavern, Marsh Mill Village. The two storey building is presently used as a public house operated by Joseph Holt. The aim is to create additional floor area to accommodate additional dining area due to the success of the existing operation

The surrounding area is a combination of retail, office and residential use with open playing fields to the west. The site is accessed off Fleetwood Rd North via a communal access road into the retail area.

A flood Risk assessment is required to be prepared in relation to the development potential of the site and is a requirement of the Environment Agency for the following reasons

The site lies within the indicative flood risk area as detailed on the Environment Agency Flood Zone 3. The main risk is associated with the tidal flooding. The site is however covered by an extensive network of sea defences, hence the 'Low risk' definition



## 2.0 Site Details

Across the proposed site the average datum is 5.68 AOD. The existing and proposed ground floor, floor finish of the property is 0.3m above this at 5.98 AOD, this level is within the Flood Zone 3 primarily due to risk of tidal flooding. The level of risk associated with the site is based on the integrity and height of the surrounding coastal defence network.

The site is accessed directly off Fleetwood Road North. The site presently consists of ground floor licensed premises with accommodation to the first floor. Through the development there will be an increase of floor area of 52m<sup>2</sup>



### 3.0 Flood Risk

The site is located within the Environment Agency designated Flood Risk Zone 3. The principle flood hazards are detailed below

**River Wyre:** Low Risk (EA Risk Assessment Level): : the 1:100 year flood levels of 6.44m AOD at the low point of the Stannah defences at Thornton. This is around 2km east of the site. This is not considered to be a risk too the site. The main threat to the site would be from a combination of tidal and river flooding. This is dealt with, below.

**Tidal/Storm Surge:** Low Risk (EA Risk Assessment Level): The main threat will be overtopping of the sea wall. The Wyre SFRA indicates that the site is protected from flood risk by a number of sea defence structures. The main defences that will impact on the proposed site are located as follows

Stannah defences – 2km East.

Fleetwood Western defences – 3km West

It is the Wyre defences that potentially create the greatest risk as the main coastal defence structures have been significantly upgraded. Of these it is the Stannah defences that have most impact.

As a result of the Stannah defences the EA Flood Risk is categorized as 'low' (grid X:332827, Y:446979). The chance of flooding each year is therefore 1.3% (1 in 75) or less but greater than 0.5% (1 in 200). Since this analysis was undertaken further improvements to the sea defences have been made including the Stannah defences as part of the wider Thornton area Action plan.

Although the site will be protected by the Wyre flood defences the site could be impacted by a breach to the existing sea wall or tidal surge in the future. A full review of the existing flood defences, tidal flooding and breach analysis is provided below.

**Land/Surface Water:** Low risk (EA Risk Assessment Level). The site is located on flat ground. There is a surface water streams and culvert to the west of the site that leads to Hillyard Pool. Following improvements to the surface water outflow they have been designated as 'Low Risk'. There is an extensive underground drainage network with no obvious overland flow paths within the site. The Geology of the area is generally highly permeable with a combination of sand and gravel deposits. The water table is known to be low in the area due to the nature of the Substrate. As a result surface water tends to dissipate rapidly.

**Groundwater:** No risk: The bedrock is defined as 'Secondary B' which indicates predominantly lower permeability layers which may store and yield limited amounts of ground water due to localized features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers. The Ground water vulnerability is classed as "Minor Aquifer High'. No standing water has been evident on site due to the underlying geology.

**Sewers:** Enquiries to United Utilities suggest there to be no issues with the local surface water drainage through the sewer system. The site presently discharges into the sewer system. As the total area of new hard surface is minimal, the increase in volume of water discharge will increase with minimal effect.

**Reservoirs:** No risk. There are no reservoirs in the area that form a risk

#### **4.0 Flood Defence Assessment**

The site is protected from coastal flooding by defences located on the eastern seaboard of the Wyre Estuary and to the north and west along the Fleetwood promenade. Of the two it's the Wyre defences that pose the most risk. The coastal defences on the Agency and a number of private landowners. The main area of private defences is the responsibility of NPL at the Thornton industrial estate.

The majority of the flood defences are located at a level of 7m AOD, however discrete sections of these defences are located below the design tidal flood level at 6.5m AOD. These defences are therefore below the recommended protection required from the 1 in 200 year event. The flood defences comprise of earthen embankments and in some areas concrete and steel reinforcement.

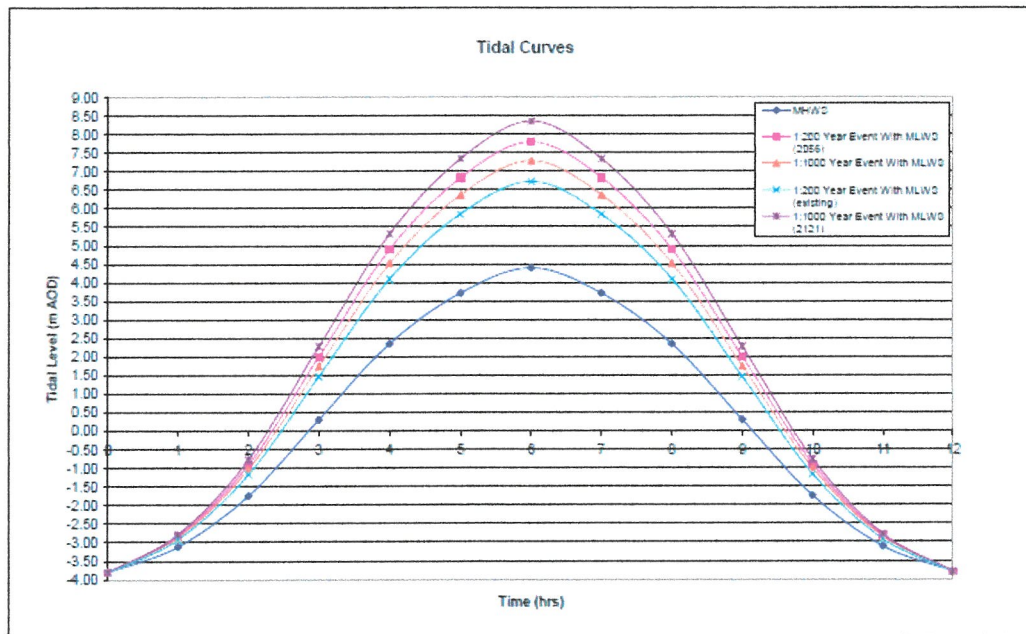
The existing tidal flood defences protecting the site are generally located above 7.0m AOD. Since the improvements to the Stanah defences the defences now provides protection levels as high as 7.5 AOD.

The 200-year tidal flood level is typical guideline standard set out in NPPF Guidance. The tidal flood level for the river Wyre in a 200-year event is 6.75m AOD. On this basis the site would be protected.

The design life for the development has been evaluated at 100 years with Wyre Estuary water level predications to the year 2121. The tidal flood levels for the Wyre Estuary to 2121 for a 200 year is 7.97m AOD including climate change scenario of 1.066m and 150mm wave action. In this scenario the site would be at risk as will the majority of the peninsular, as this exceeds the average defence height of 7.0 AOD along the length of the Wyre.

The tidal graph provided below shows that with the Stanah defence height of 7.5m AOD would protect the site from a 1 in 1000 year event based on existing sea levels

## Tidal curves for the wyre estuary



### 5.0 Breach Analysis

Despite the level of protection provided by the existing flood defences it is a requirement of the flood Risk and coastal changes strategy 2015 that a breach analysis also needs to be undertaken.

In the unlikely event, of such a breach of the existing flood defences during an extreme return period tidal flood. Inundation of the Fleetwood and Thornton area and potentially the development may occur.

The flood risk to the development would be dependent upon a number of factors including the magnitude of the event, location and extent of the breach and the timing of the emergency response.

It is important to highlight that the likelihood of such a potentially catastrophic event is extremely remote and significant areas within the united kingdom are also located directly adjacent to key flood defences. The key to risk minimization is a suitable flood management plan incorporating appropriate inspection and maintenance of the flood defences immediate to the site. As the Stanah defences are the most important defences, this is reliant on continued monitoring by the EA.

In the event of a breach the site would still be at low risk. The analysis provided below is derived from the Wyre BC Thornton Cleveley Strategic Flood Risk Model produced by CES Engineering in 2007. The Assessment looks at breach scenarios in the following circumstances.

- 1 in 200 year flood event
- 1 in 1000 year event with predicted climate change allowance of 1.066m rise in sea level by 2121

For the 1 in 200 year event the breach implications are highlighted below



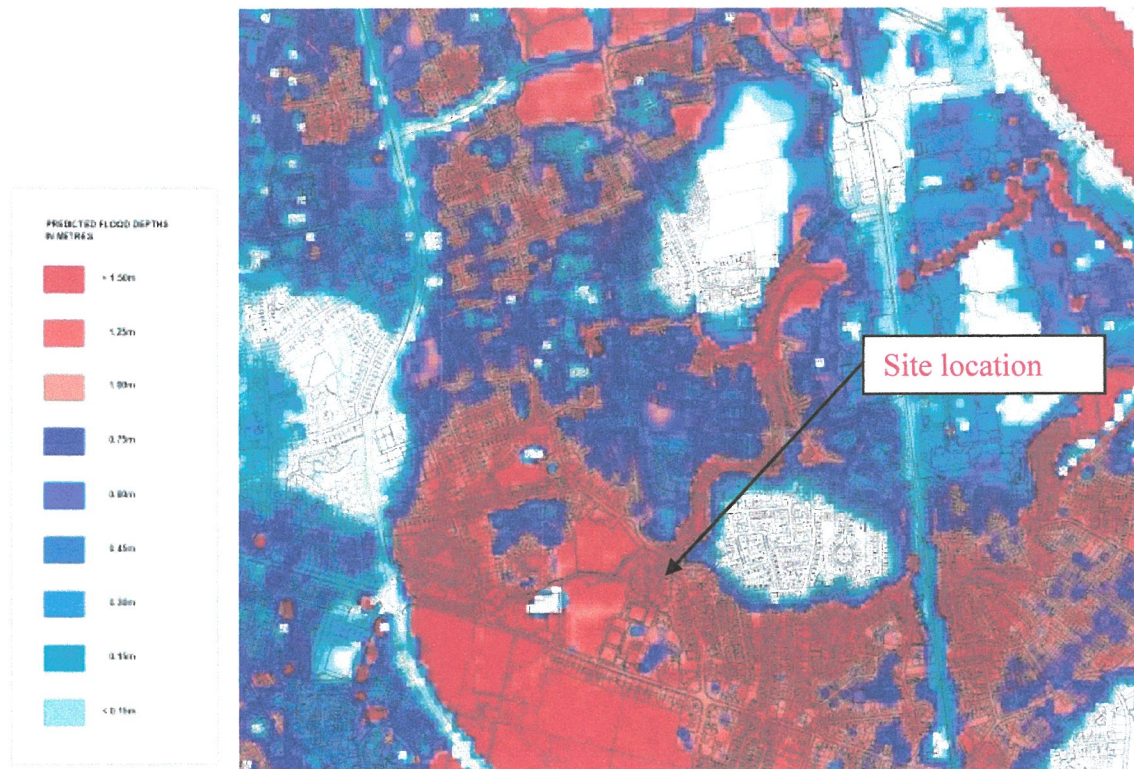
## Thornton Cleveleys Strategic Flood Risk Model : Wyre Estuary Breach Event 1 in 200 Year Event



The analysis shows that in the event of a flood following a breach in a 1 in 200 year event the site will be partially affected with flooding at 0.15m above datum. This is still significantly below the height of the ground floor

For a 1 in 1000 year event with an allowance for sea level rise the implications are highlighted below

## Thornton Cleveleys Strategic Flood Risk Model : Wyre Estuary Breach Event 1 in 1000 Year Event



The level of flooding in this area is set at an average datum of 5.2 AOD. The final floor finish of the property will be 5.98 AOD. The analysis demonstrates that the surrounding site will be affected with potential minor flooding to a maximum depth of 480cm at the 5.2 AOD.

The site is therefore under slight threat from a breach scenario under a 1:1000yr scenario

The danger created by a defence breach should not be underestimated, however the site does have the advantage of being located 2km from the Stanah defences which are the most critical location in relation to the site. In the event of a breach significant notice should be possible. In addition the velocity of flood-water will be significantly reduced due to the distance from the sea defence.

The Notice period and rate of flow should allow for emergency actions to be taken

### **6.0 Flood records**

Historical research has not indicated any flooding history at the site location. The last major flooding incident in the area was in 1977. Flooding was caused by the overtopping of the sea defences, through a combination of tide and storm surge. This event was estimated as a 1:100 year event. Since that time the sea defences have been significantly improved.

### **Flood Precaution and Mitigation**

The FRA indicates that despite the site being within flood zone 3, the main risk relating to coastal defence breach, would have minimal impact on the site in any of the scenarios, including a 1:1000 year event.



Despite the mitigation, measures will be incorporated into the design that will further reduce flood risk. These include the following:

- Provide removable stanking boards to all external doors on the ground floor
- All drainage and waste water systems should be designed and installed with non return valves to prevent surcharge backup in the case of flooding to the surrounding sewage network
- Surface water discharge will be discharged to the existing network

Occupiers will have access to the Wyre BC's existing flood early warning system. Occupiers will also be issued with guidance on what actions to take in the event of a warning including the closest area of high ground.

## **Conclusions**

The site is located within Flood Risk Zone 3, although the EA level of risk is categorized as 'low' due to the network of sea defences surrounding the site. The main length of defence impacting on the site is located to the east along the Wyre and the western coast defences to the west.

The Stannah defences were one of the weak links within the Wyre Estuary coastal defence system. Following improvements made since 2008 they are now significantly higher than the required 1 in 200 year event scenario. They would also be sufficient to mitigate flood risk from a 1 in 1000 year event at present sea levels.

Despite the very low risk of flooding the development will still include additional flood mitigation measures.

On this basis it is suggested that the site meets the requirements.



