# Cuckoo's Nest
# Tallaght

## Water Services and Flood Risk Assessment

**June 2022**

**21816**

***Issue No.1***


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CONSULTING ENGINEERS

## Table of Contents

# 1 Introduction

## 1.1 General

This report addresses the foul and surface water drainage, water supply and flood risk for the proposed development of a pre-developed site into a Public House, Grocery Shop, and 11no. apartments at Cuckoo's Nest, Greenhills Road, Kilnamanagh, Dublin 24.

The site is currently occupied by a partially demolished Public House. The original Pub is to be retained, with previous extensions to be demolished.

It is proposed to develop the existing site with the redevelopment and extension of the Pub, and a shop at Ground Floor level, with 11no. apartments across 1st,2nd, and 3rd Floor levels, along with associated vehicular access, parking, and site works.

## 1.2 Proposed Drainage Scheme

In order to comply with the Greater Dublin Drainage Strategy requirements, it is proposed to drain the foul and surface water generated from the property using completely separate systems. The site is served with private foul and storm sewers within the adjacent Temple Woods development, with the foul connecting to the public foul sewer running along the south of the site, and the storm connecting to the public storm sewer on Greenhills Road.

The roof of the new building shall be a mix of extensive green roof, intensive green roof, and impermeable finishes as per the Architectural drawings, with run-off directed to the ground level where permeable paving and soft landscaping shall be used. Below ground water treatment systems comprising of Wavin Aquacell shall act to store water during heavy rainfall events and improve water quality before slowly discharging to the ground where possible and to the public sewers at a limit of 2.0l/s.

The foul sewage generated will be discharged via the foul drainage network and discharge to the public sewer via a new 225mm diameter connection to the site.

## 1.3 Reference Publications used in the production of this Report

Greater Dublin Strategic Drainage Study – Volumes 1 to 6
Greater Dublin Regional Code of Practice for Drainage Works – Version 6.0
Technical Guidance Documents – Part C and H
OPW National Flood Hazard Mapping
Irish Water Codes of Practice for Wastewater
Irish Water Codes of Practice for Water services.
Dublin City Development Plan 2016-2022 – Volume 7 Strategic Flood Risk Assessment

# 2 Foul Waste Discharge

The total foul discharge from the site is calculated using the Irish Water Codes of Practice for Waste Water based on the proposed use of the development.

The development comprises of a gastro pub with an allowance for 10no. staff, 100no. customers, a shop with 5no. staff, 5no. One-Bed Apartments (2pax/apt.), 6no. Two-Bed Apartments (4pax/apt.). A peak wastewater discharge is calculated at 0.522 l/s.

A pre-connection enquiry has yet to be submitted to Irish Water using the above population equivalent. A Confirmation of Feasibility letter has not been issued by Irish Water

# 3 Surface Water Discharge

The site is covered by intensive and extensive green roof, impermeable roofs, permeable paving, non-permeable paving, and a small area of soft landscaping. Most surface water run-off will be discharged directly or indirectly to the public sewers.

The ground level shall have a combination of soft landscaping, permeable paving and non-permeable surfacing which shall also act as a treatment stage for surface water on the site.

Surplus run-off from the roofs and surrounding ground level shall be directed to a Wavin Aquacell treatment system which further treats and slows down the run-off from the site.

The combined treatment train works to slow the run-off rate and improve water quality run-off from the site. Any run-off shall be limited to 2 l/s with the attenuation volume designed for a 1 in 100 year storm with a 20% allowance for climate change.

# 4 Water Supply

The proposed water supply will be taken from the public network via an existing connection.

6455 litres of water storage shall be provided on the site in accordance with Irish Water codes of practice.

Fire hydrants & fire fighting strategy shall be covered by the project fire consultant as part of the fire certificate application for the development, however new fire hydrants can be provided within the site boundary to ensure the recommended 46m distance to serve the site.

# 5 Flood Risk Assessment

## 5.1 Objectives

The objectives of this section are to inform the planning authority regarding flood risk for the potential development of the lands. The report will assess the site and development proposals in accordance the requirements of "*The Planning System and Flood Risk Management Guidelines for Planning Authorities*".

The report will provide the following;

- The site's flood zone category.
- Information to allow an informed decision of the planning application in the context of flood risk.
- Appropriate flood risk mitigation and management measures for any residual flood risk.

## 5.2 Flood Risk Assessment Scope

This SSFRA relates only to the proposed development site in the vicinity of Cuckoo's Nest, Greenhills Road, Kilnamanagh, Dublin 24 and its immediate surroundings. This report uses information obtained from various sources, together with an assessment of flood risk for the existing land and proposed development. The report follows the requirements of '*The Planning System & Flood Risk Management – Guidelines for Planning Authorities*', (referred to as the *Guidelines* for the remainder of this report) and the South Dublin County Council Development Plan 2016-2022 Strategic Flood Risk Assessment (SFRA).

## 5.3 Existing Site

The proposed site is located at Cuckoo's Nest, Greenhills Road, Kilnamanagh, Dublin 24.

Generally, the site is flat with a ground level of +70.4m AOD.

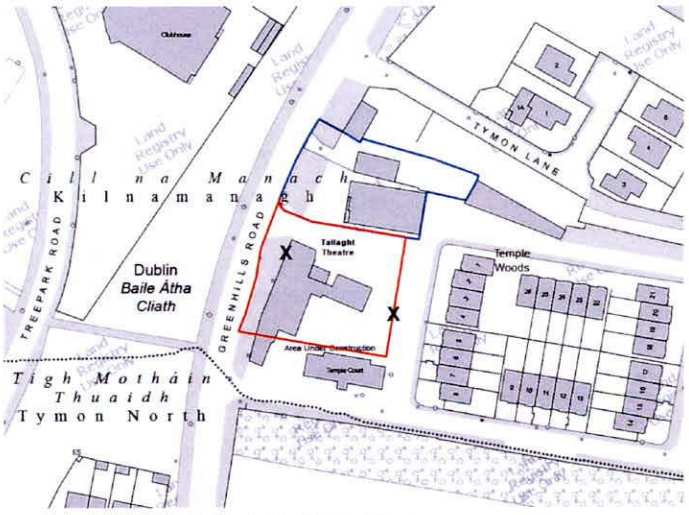



**Figure 5.1 - Site Location**

## 5.4 Proposed Development

It is proposed to develop the existing site with the redevelopment and extension of the Pub, and a shop at Ground Floor level, with 11no. apartments across 1st,2nd, and 3rd Floor levels, along with associated vehicular access, parking, and site works.

# 6 Planning Guidelines and Flood Risk Assessment

## 6.1 The planning System and Flood Risk Management, Guidelines for Planning Authorities

The FRM Guidelines provide "mechanisms for the incorporation of flood risk identification, assessment and management into the planning process...." They ensure a consistent approach throughout the country requiring identification of flood risk and flood risk assessment to be key considerations when preparing development plans, local area plans and planned development.

"The core objectives of The FRM Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure the requirements of EU and national law in relation to the natural environment and nature conservation are complied with for flood risk management."

The key principles of The FRM Guidelines are to apply the Sequential Approach to the planning process i.e.;

- "Avoid the risk, where possible,
- Substitute less vulnerable uses, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible."

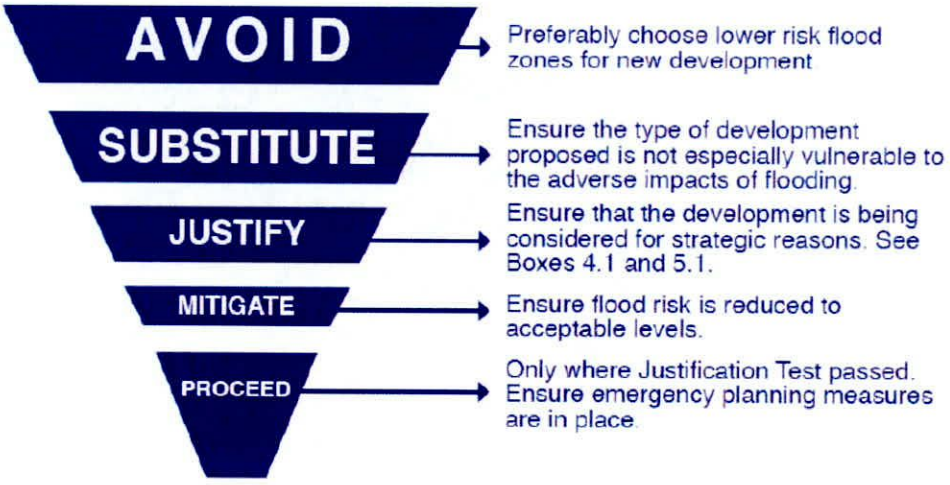



***Figure 6.1 - Sequential Approach Principles in Flood Risk Management***

Where the *Sequential Test's* **avoid** and **substitute** principals are not appropriate then the FRM Guidelines propose that a *Justification Test* be applied to assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk.

### 6.1.1 Flood Risk Assessment

The assessment of flood risk requires an understanding of where water comes from (the source), how and where it flows (the pathways) and the people and assets affected by it (the receptors).

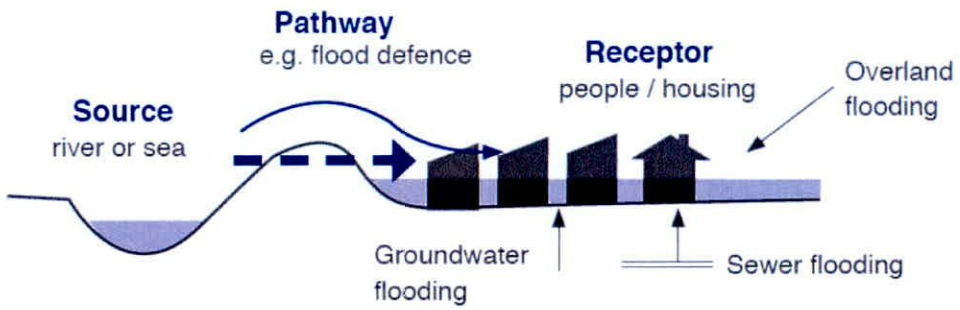



***Figure 6.2 - Source - Pathway - Receptor Model***

The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment. All three elements are examined as part of the flood risk assessment including the vulnerability and exposure of receptors to determine potential consequences. Mitigation measures typically used in development management can reduce the impact of flooding on people and communities e.g. by blocking or impeding pathways. The planning process is primarily concerned with the location of receptors and potential sources and pathways that might put those receptors at risk.

Risks to people, property and the environment should be assessed over the full range of probabilities, including extreme events. Flood risk assessment should cover all sources of flooding, including effects of run-off from a development locally and beyond the development site.

## 6.2 Flood Risk Assessment Stages

The FRM Guidelines outline that a staged approach should be adopted when carrying out a flood risk appraisal or assessment. "These stages are:

- *Stage 1 Flood risk identification*
- *Stage 2 Initial flood risk assessment*
- *Stage 3 Detailed flood risk assessment*

The FRA Guidelines require a SSFRA be undertaken to assess flood risk for individual planning applications. This SSFRA comprises Stages 1, 2 and 3 involving both identification and more detailed assessment of flood risks and surface water management related to the planned development site.

## 6.3 Flood Zones

The FRM Guidelines use flood zones to determine the likelihood of flooding and for flood risk management within the planning process. The three flood zones levels are:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% AEP (Annual Exceedance Probability) or 1 in 100 for river flooding;
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas outside zones A and B.

The FRM Guidelines categorises all types of development as either;

- Highly Vulnerable e.g. dwellings, hospitals, fire stations, essential infrastructure,
- Less Vulnerable e.g. retail, commercial or industrial buildings, local transport infrastructure.
- Water Compatible e.g. flood infrastructure, docks, amenity open space.

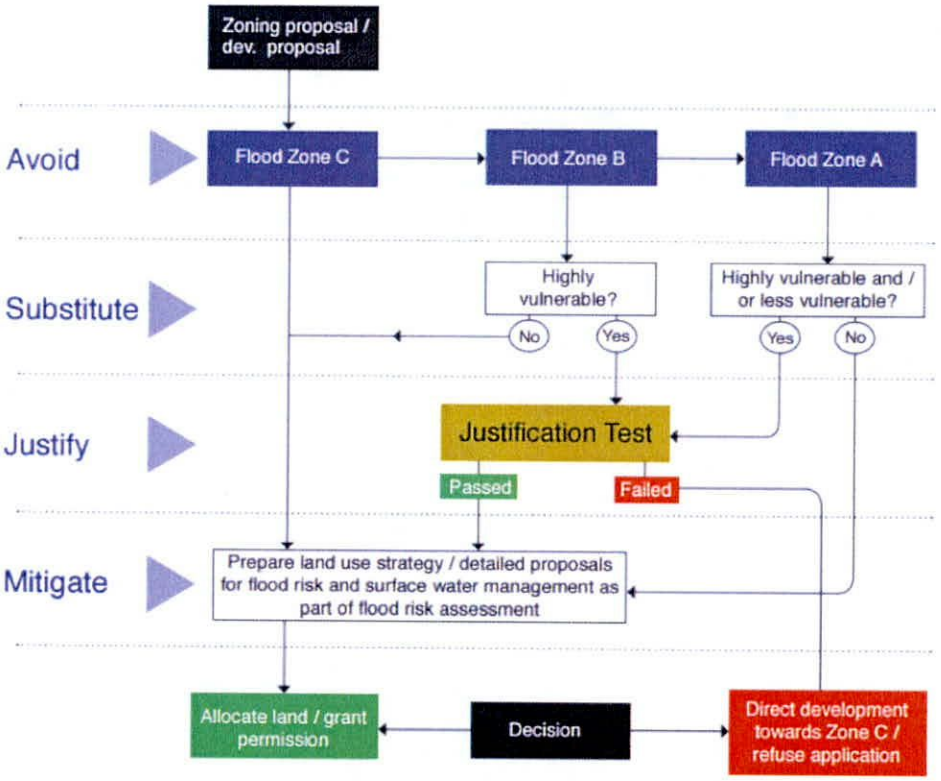



***Figure 6.3 - Sequential Approach Mechanism in the Planning Process***

The Sequential Approach restricts development types to occur within the flood zone appropriate to their vulnerability class, see Table 2.1.

| | Flood Zone A | Flood Zone B | Flood Zone C |
|---|---|---|---|
| Highly vulnerable development (including essential infrastructure) | Justification Test | Justification Test | Appropriate |
| Less vulnerable development | Justification Test | Appropriate | Appropriate |
| Water-compatible development | Appropriate | Appropriate | Appropriate |

***Figure 6.4 - Table 3.2 from the FRA guidelines - Matrix of Vulnerability versus Flood Zone to illustrate appropriate development and that required to meet the Justification Test***

## 6.4 Proposed Development's Vulnerability

The proposed type of development for this site is to be residential. Enterprise and commercial are categorised by the Guidelines as **less vulnerable developments** and appropriate to be located within Flood Zone B and C. Residential developments are categorised as **highly vulnerable** and appropriate to be located just within Flood Zone C. To provide highly vulnerable and less vulnerable type development within Flood Zone A requires a **Justification Test** to be completed to justify development in this flood risk area.

## 6.5 Site Specific Flood Risk Assessment for Development.

The FRM Guidelines require a SSFRA to "gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal". It should "quantify the risks and the effects of any necessary mitigation, together with the measures needed or proposed to manage residual risks". It considers the nature of flood hazard, taking account of the presence of any flood risk management measures such as flood protection schemes and how development will reduce the flood risk to acceptable levels. A detailed assessment for a development application should conclude that core flood risk elements of the Justification Test are passed and that residual risks can be successfully managed with no unacceptable impacts on adjacent lands.

## 6.6 SSFRA Key Outputs

Key outputs of an SSFRA are:

- Plans showing the site and development proposals including its relationship with watercourses and structures which may influence local hydraulics;
- Surveys of site levels and comparison of development levels relative to sources of flooding and likely flood water levels;
- Assessments of;
    - Potential sources of flood risk;
    - Existing flood alleviation measures;
    - Potential impact of flooding on the site.

- How the layout and form of the development can reduce those impacts, including arrangements for safe access and egress.
- Proposals for surface water management and sustainable drainage.
- The effectiveness and impact of any mitigation measures.
- The residual risks to the site after the construction of any necessary measures and the means of managing those risks; and
- How flood risks are managed for occupants / employees of the site and its infrastructure.

# 7 Stage 1 Flood Risk Identification

## 7.1 Available Flood Risk Information

The initial flood risk identification stage uses existing information to identify and confirm whether there may be flooding or surface water management issues for the lands in question that may warrant further investigation.

To initially identify potential flood risks for the existing Site and surrounding area a number of available data sources were consulted, these are listed in Table 8.1 below.

| | Information Source | Coverage | Quality | Confidence | Identified Flood Risks | Flood Risk |
|---|---|---|---|---|---|---|
| Primary Data Source and Modelled Data | OPW ECFRAM – Fluvial https://www.floodinfo.ie/map/floodmaps/ | Regional | High | High | Flood maps indicate that the development is not at risk of Fluvial Flooding | N |
| | OPW ECFRAM – Tidal https://www.floodinfo.ie/map/floodmaps/ | Regional | High | High | Tidal flood maps indicate that the subject site is outside the 0.1% AEP. | N |
| | SDCC Development Plan SFRA | Local | High | High | Development is located within Flood Zone C. | N |
| Secondary Data Source | Walkover Survey | Local | Varies | Varies | Level site throughout. | N |
| | OPW Historic Flood Records | Nationwide | Varies | Varies | No records of site flooding. | N |
| | Historic OSI Maps | Nationwide | Moderate | Low | Developed site in a suburban area. Existing pub is over 250 years old. | N |
| | Drainage Records | Nationwide | Moderate | Moderate | Existing public sewers on adjacent public roads are below the lowest floor level of the proposed development. | N |
| | Geological Survey Ireland Maps | County | Moderate | Low | Made ground, on till derived from limestone, on bedrock. | N |
| | Topographic Surveys | Local | High | High | Suburban site with ground level at +70.4m AOD. | N |

***Table 8-1 - Review of Available Information***

## 7.2 Identified Flood Risks/ Flood Sources

### 7.2.1 OPW Predictive, Historic & Benefitting Land Maps and Flood Risk Information

From consultation of flood information from the OPW's floodinfo.ie website the site has not suffered from flooding in the past nor have flood events occurred near the site.

Fluvial Flood Risk

The OPW's Eastern CFRAM study produced flood risk maps and the assessment of fluvial flood plains over the eastern region of Ireland. The OPW have consolidated this information onto https://www.floodinfo.ie/map/floodmaps/ website. The figures below show that the site is outside the 0.1% AEP, 1.0% AEP and 10% AEP fluvial flood events.

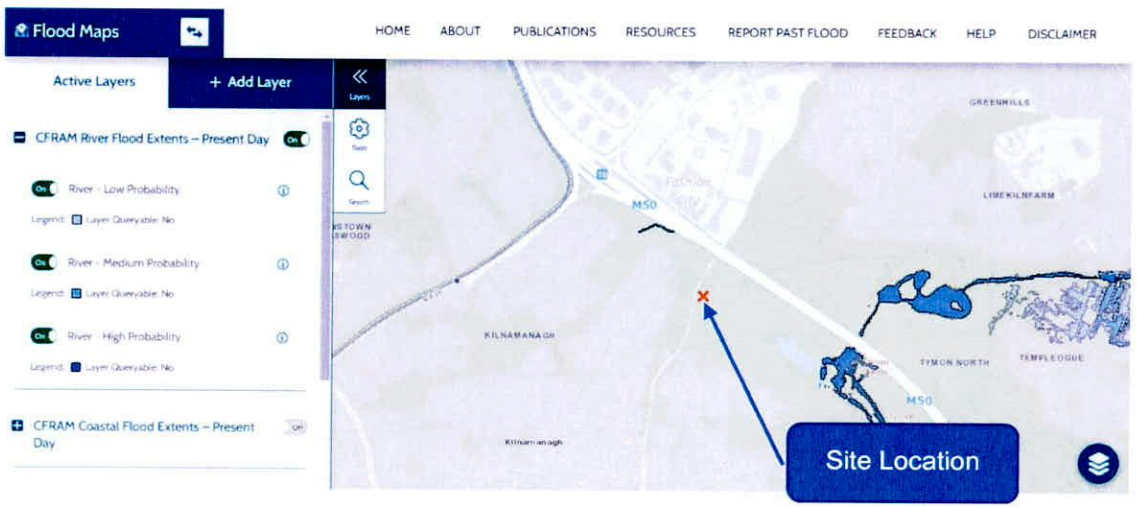



***Figure 8.1 - Fluvial Flooding (0.1%, 1.0% and 10% AEP)***

Tidal Flood Risk

The OPW ECFRAM coastal flood risk analysis for 10%, 0.5% and 0.1% AEP return periods show the site is outside the extents of the 0.1% AEP coastal flood event as seen in fig 8.2. The site is located around 30km from the tidal effects of the Irish Sea.

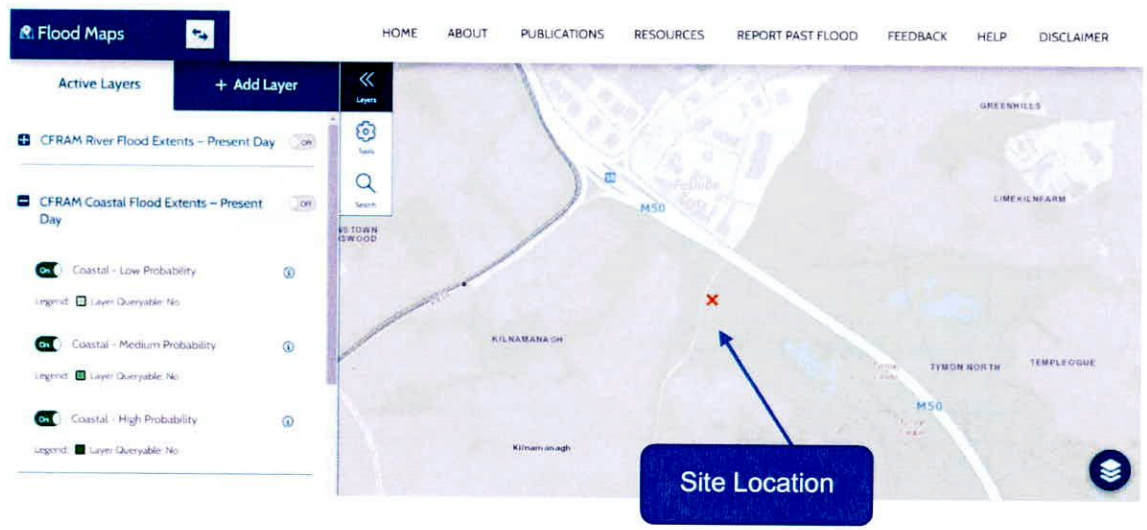



***Figure 8.2 - Tidal Flooding (0.1%, 1.0% and 10% AEP)***

Pluvial Flood Risk

The risk to the building from pluvial flooding will be low due to the proposed ground floor level being approx. 150mm above external ground level. Any pluvial flooding on the site outside the building will be dealt with by the surface water drainage system.

### 7.2.2 South Dublin County Council Strategic Flood Risk Assessment

SDCC County Development Plan 2016-2022 contains the Strategic Flood Risk Assessment (SFRA) which uses the draft ECFRAM mapping as its basis for identifying areas at flood risk. The site is located in Flood Zone C where the proposed development is permitted.

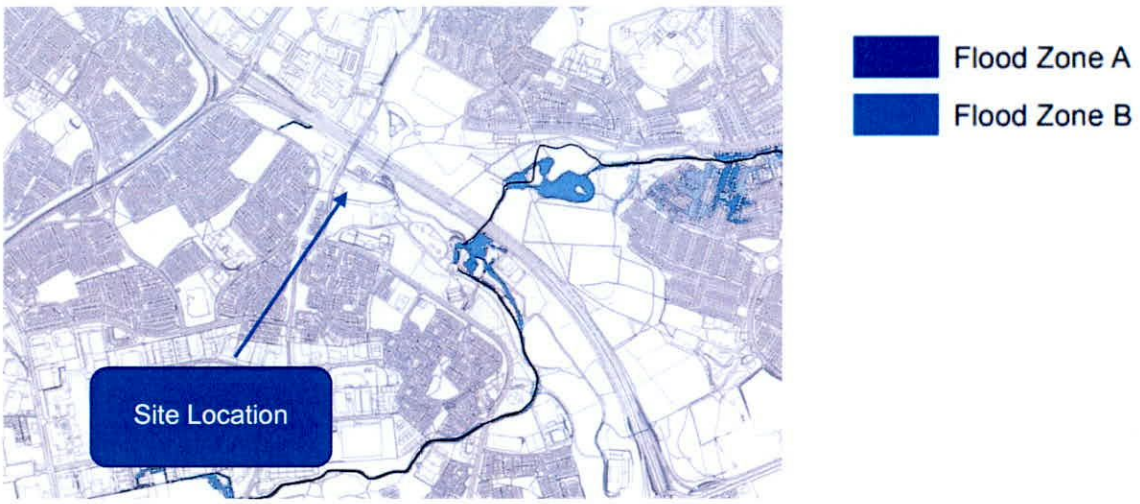



***Figure 8.5 - Extract from SDCC Strategic Flood Risk Assessment, Development Plan 2016-2022, Estimated Flood Events***

### 7.2.3 Topographical Survey

A Topographical survey is yet to be completed; however, the ground floor level of the proposed building is to be approx. 150mm above the existing ground level outside.

### 7.2.4 Walkover Survey

From a walkover of the site, it is as expected and ties in with the desk study.

### 7.2.5 Other Sources

Other information sources were consulted to determine if there was any additional flood risk to the subject site, these included;

- Soil data from GSI – The entire site consists of made ground, on till derived from limestone, on bedrock.
- Groundwater information from GSI –There is no record of evidence of groundwater flooding for the proposed site.
- Existing Local Authority Drainage Records – The surrounding area uses separate drainage networks.
- Historic Maps - The Cuckoo's Nest Pub has been located on this site for over 250 years.

## 7.3 Source-Pathway-Receptor Model

A Source-Pathway-Receptor model was produced to summarise the possible sources of floodwater, the people and assets (receptors) that could be affected by potential flooding (with specific reference to the proposals), see Table 8.2. It provides the probability and magnitude of the sources, the performance and response of pathways and the consequences to the receptors in the context of the mixed-use development proposal. These sources, pathways and receptors will be assessed further in the initial flood risk assessment stage.

| Source | Pathway | Receptor | Likelihood | Impact | Risk |
|---|---|---|---|---|---|
| **Tidal** | Subject Site is outside the Tidal Flood Zone | Ground Floor | Very unlikely | Medium | Low |
| **Fluvial** | Proposed development site outside fluvial flood zone | - | Very unlikely | Medium | Low |
| **Surface Water Drainage (Pluvial)** | Invert levels of local drainage is well below the site levels and adequate capacity is known to exist. | Ground Floor | Very Unlikely | Medium | Low |
| **Groundwater Flooding** | Ground water levels are known to be well below the proposed ground floor level and no basement is proposed. | Ground Floor | Very unlikely | Medium | Low |
| **Infrastructural – Human or Mechanical Error** | Blockage of new drainage network | Ground Floor | Possible | Low | Low |

***Table 8-2 - Source-Pathway-Receptor Analysis***

The following paragraph provides a summary of the results of this Source-Pathway-Receptor flooding model for the subject site.

## 7.4 Source-Pathway-Receptor Model Results

As it can be seen in the above flooding analysis, the proposed development site is not at risk of tidal or fluvial flooding.

The risk to the site form pluvial flooding is low due to the proposed ground floor level being approx. 150mm above external ground level. Any pluvial flooding on the site outside the building will be dealt with by the surface water drainage system.

Consequently, an initial flood risk assessment will follow to provide further detail on the causes, effects and possible mitigation measures for the sources of flood risk identified above.

# 8 Stage 2 – Initial Flood Risk Assessment

From stage 1 no flood risks were identified and so the site is not considered at risk of flooding from any source.

# 9 Conclusion

This Flood Risk Assessment concludes the following:

- The site is not subject to tidal or fluvial flooding given the topography and location of the site.

- Pluvial flooding from localised spots can be mitigated by creating local ramps at the site entry and to ground level thresholds. Furthermore, the proposed ground level is above the localised ground level of the street kerb channels where any water may accumulate for the short term following a storm.

# Appendix A – Foul Drainage Calculations

5no. One-Bed Apartments (2 Pax.), 6no. Two-Bed Apartments (4 Pax.)
Consumption = 150litres/person/day = 5100litres/day

Shop – 5 members of Staff
Consumption = 60litres/person/day = 300litres/day

Gastro Pub – 10 members of Staff
Consumption = 60litres/person/day = 600litres/day
100 Customers
Consumption = 15litres/person/day = 1500litres/day

Overall Consumption = 7500litres/day

Hourly water requirement = 312.5l/Hr.

Average flow rate = 0.087l/s.

Peak = 6 x 0.0042 = 0.522l/s.

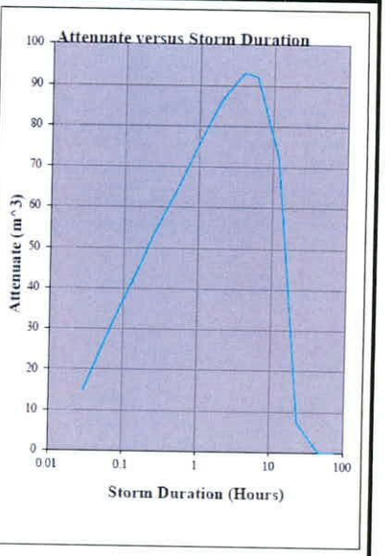
# Appendix B – Surface Water Drainage Calculations

| CORA Consulting Engineers | | | |
|---|---|---|---|
| Behan House<br>10 Mount St Lower, Dublin 2, Ireland<br>t: 01-6611100 e: info@cora.ie | Project: Cuckoos Nest | | Job No: 21816 |
| | | | Page No: 1 |
| | Date: 16/06/2022 | Calc'd by: C Glennon | Checked by: J McMenamin |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Intensive Green Roof Area | 189.5 m² | Extensive Green Roof Area | 218.5 m² | Imp. Roof Area | 431 m² | Total Area: | 1618 m² | Attenuated Flow Rate: | 2 l/s |
| I. Factor: | 0.50 | I. Factor: | 0.70 | I. Factor: | 0.8 | | | | |
| Paving | 508 m² | Perm. Paving | 702 m² | - | m² | Equivalent Impermeable Area | 1541.1 m² | | |
| I. Factor: | 0.90 | I. Factor: | 0.70 | I. Factor: | | | | | |

Factors: Climate Change: 1.2 Simplification of Head/Discharge Relationship: 1.25 Hydrobreak

| Storm Duration (Hours) | Rainfall (mm) | Total Surface Water ($m^3$) | Allowable Discharge ($m^3$) | Attenuate ($m^3$) |
|---|---|---|---|---|
| 0.03 | 7.80 | 12.02 | 0.216 | 14.76 |
| 0.08 | 17.52 | 27.00 | 0.576 | 33.03 |
| 0.166 | 24.36 | 37.54 | 1.1952 | 45.43 |
| 0.25 | 28.68 | 44.20 | 1.8 | 53.00 |
| 0.50 | 35.40 | 54.55 | 3.6 | 63.69 |
| 1.00 | 43.80 | 67.50 | 7.2 | 75.38 |
| 2.00 | 54.12 | 83.40 | 14.4 | 86.26 |
| 4.00 | 66.96 | 103.19 | 28.8 | 92.99 |
| 6.00 | 75.84 | 116.88 | 43.2 | 92.10 |
| 12.00 | 93.72 | 144.43 | 86.4 | 72.54 |
| 24.00 | 115.92 | 178.64 | 172.8 | 7.31 |
| 48.00 | 129.12 | 198.99 | 345.6 | 0.00 |
| 72.00 | 133.20 | 205.27 | 518.4 | 0.00 |




Note: This spreadsheet calculates the Volume of Attenuate based on a Return Peroiod of: 100 years.