Flood Risk Assessment

Proposed Residential Development at Skerries Road, Palmer Road, Palmer Avenue, and St. Maur’s Park, Rush, Co. Dublin

Client: The Skerries Road Partnership

Job No. R067

August 2019
FLOOD RISK ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT

AT SKERRIES ROAD, PALMER ROAD, PALMER AVENUE, AND ST. MAUR’S PARK,
RUSH, CO. DUBLIN

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File Location: J:\R_JOBS\Job-R067\B_Documents\C_Civil\A_CS Reports\Planning Documents\FRA

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<th>Authorised By</th>
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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by The Skerries Road Partnership to prepare a Flood Risk Assessment for a proposed residential development at Skerries Road, Palmer Road, Palmer Avenue, and St. Maur’s Park, Rush, Co. Dublin.

In preparing this report, CS Consulting has made reference to the following:

- Fingal County Council Development Plan 2017–2023;
  (including Strategic Flood Risk Assessment)
- Kenure Rush Local Area Plan May 2009 – February 2019 (expired);
- Greater Dublin Regional Code of Practice for Works;
- Office of Public Works Flood Maps;
- Department of the Environment Flooding Guidelines;
- Geological Survey of Ireland Maps; and
- Local Authority Drainage Records.

The Flood Risk Assessment is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team.
2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The site of the proposed development is located on at Skerries Road, Palmer Road, Palmer Avenue, and St. Maur’s Park, Rush, Co. Dublin. The site is bounded to the north and south by existing housing developments, to the south-east by Rush Nursing Home, to the east by Skerries Road, and to the west by Palmer Avenue. The site has a total area of 4.845ha and is located in the administrative jurisdiction of Fingal County Council.

Figure 1 – Location of proposed development site
(map data sources: EPA, OSM Contributors)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in figure 2.
2.2 Existing Land Use

The subject site is greenfield and predominantly in agricultural use. The existing site has no physical features of note and does not contain any water courses passing through it.
2.3 Description of Proposed Development

The development will consist of a residential development of 165no. units, comprising 117no. houses and 48no. apartments. The houses comprise 28no. 2-bed units, 65no. 3-bed units, and 24no. 4-bed units. The houses include 7no. housing typologies comprising 2-storey typologies (typologies 1, 2, 3, 4, 5, and 6) and a 3-storey typology (typology 7). The apartments comprise 19no. 1-bed units and 29no. 2-bed units located in 2no. three-storey blocks to the north-west of the application site, bounded by Palmer Road and Palmer Avenue.

The development also includes 294no. surface car parking spaces, 118no. bicycle parking spaces, public open space including a children’s playground, new vehicular entrances to Skerries Road and Palmer Avenue including new signalised junction at Skerries Road, internal vehicular routes including a new east-west link street, the widening and upgrade of Palmer Avenue to include footpaths and cycleways, ESB substations, all site services, refuse/bin stores, public lighting, boundary treatment, pedestrian/cycle linkages to St. Maur’s Park to the south and to Palmer Court to the north, repair and making good of retained elements of the existing boundary wall to Skerries Road, re-use on-site of material from the boundary wall to Skerries Road required to be removed to facilitate the site entrance, removal of existing bus stop on Skerries Road adjacent to site, and all other associated and ancillary development/works. The total gross floorspace of the development is circa 16,983m$^2$. 
3.0 LEVEL OF SERVICE

There is an existing inherent risk of any flood event occurring during any given year. Typically, this likelihood of occurrence was traditionally expressed as a 1-in-100 chance of a 100-year storm event happening in any given year.

A less ambiguous expression of probability is the Annual Exceedance Probability (AEP), which may be defined as the probability of a flood event being exceeded in any given year. Therefore a 1-in-100-year event has a 1% AEP; similarly, a 100% AEP can be expressed as a 1-in-1-year event.

3.1 The Planning System and Flood Risk Management, Guidelines for Planning Authorities set out the best practice standards for flood risk assessment in Ireland. These are summarised in Table 1 below.

<table>
<thead>
<tr>
<th>Flooding Source</th>
<th>Drainage</th>
<th>River</th>
<th>Tidal/Coastal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1% AEP</td>
<td>0.1% AEP</td>
<td>0.1% AEP</td>
</tr>
<tr>
<td>Commercial</td>
<td>1% AEP</td>
<td>1% AEP</td>
<td>0.5% AEP</td>
</tr>
<tr>
<td>Water-compatible (docks, marinas)</td>
<td>-</td>
<td>&gt;1% AEP</td>
<td>&gt;0.5% AEP</td>
</tr>
</tbody>
</table>

Table 1 - Summary of Level of Service – Flooding Source.

Under these guidelines, a proposed development site has first to be assessed to determine the flood zone category it falls under.

3.2 It is a requirement of both Fingal County Council’s and the Department of the Environment, community & Local Government flooding guidelines, The Planning System and Flood Risk Management, Guidelines for Planning Authorities, that the predicted effects of climate change are incorporated into any proposed design. Table 2 below indicates the predicted climate change variations.
<table>
<thead>
<tr>
<th>Design Category</th>
<th>Predicted Impact of Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>10% Increase in rainfall</td>
</tr>
<tr>
<td>Fluvial (River flows)</td>
<td>10% Increase in flood flow</td>
</tr>
</tbody>
</table>

Table 2 - The predicted climate change variations

3.3 The flooding guidelines categorise the risks associated with flooding into three areas, Zone A, B & C. This categorisation is indicated below.

- **Zone A** – High Probability of Flooding. Where the average probability of flooding from rivers and sea is highest (greater than 1% annually or 1 in 100 for river flooding or 0.5% annually or 1 in 200 for coastal flooding).

- **Zone B** – Moderate Probability of Flooding. Where the average probability of flooding from rivers and sea is moderate (risk between 0.1% annually or 1 in 1000 years and 1% annually or 1 in 100 years for river flooding, and between 0.1% or 1 in 1000 years and 0.5% annually or 1 in 200 for coastal flooding).

- **Zone C** – Low Probability of Flooding. Where the probability of flooding from rivers and sea is moderate (risk is less than 0.1% annually or 1 in 1000 years for both rivers and coastal flooding).

In accordance with the Planning Systems and Flood Risk Management Guidelines for Planning Authorities, dwellings are classified as ‘highly vulnerable developments’.

3.4 Reviewing the Fingal County Council flood maps, the subject site is located in Flood Zone C. Please see Appendix A.
3.5 The flooding guidelines have developed an ‘appropriateness’ matrix for various developments and their potential risk factors. The table indicates if further analysis is required in the form of a justification test. Table 3 below outlines the conditions that require a justification test.

<table>
<thead>
<tr>
<th></th>
<th>Flood Zone A</th>
<th>Flood Zone B</th>
<th>Flood Zone C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Vulnerable</td>
<td><strong>Justification Test</strong></td>
<td><strong>Justification Test</strong></td>
<td>Appropriate</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Vulnerable</td>
<td><strong>Justification Test</strong></td>
<td>Appropriate</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water-compatible</td>
<td>Appropriate</td>
<td>Appropriate</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 - Flood Zone Vs Justification Test Matrix

As noted above, the site is located within Flood Zone C. As such a justification test is not required.
4.0 FLOOD RISKS & MITIGATION MEASURES

4.1 Fluvial Flooding

The site is located approximately 500m from the Irish Sea to the east of the development. A review of the Office of Public Works flood maps database, www.floodmaps.ie, for the area does not indicate historical flooding at the site. See the OPW Map-report included in Appendix B.

Recent modelling of the area as part of the Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) conducted by the OPW, indicates that the subject site is deemed to be located outside of the 0.1% AEP fluvial floodplain, based on the currently available maps, see Appendix C.

Therefore, the risk of fluvial flooding is not an issue and no mitigation measures are required.

Kenure Stream

The proposed site development will require the relocation of a culverted stream, known locally as the Kenure Stream. This stream is presently culverted in a piped system which passes through the subject lands. See CS drawing R067/002 for details. It is proposed to re-lay this sewer, while maintaining the current capacity to public lands to the north of the subject site. Local evidence indicates that the open section of the Kenure Stream, approximately 50m to the north west of the site, has flooded in the past, due to the physical constraint of the culvert under the road. These flood waters have never affected the subject lands, and the re-location of the sewer will not impede the conveyance of storm water sin the sewer.
4.2 Tidal Flooding

The subject site proximity to the coast indicates that the potential for on-site flooding due to tidal action needs to be considered. Recent modelling of the area as part of the FEM FRAMS, indicates that the subject site is deemed to be located outside the 0.5% AEP tidal floodplain based on the currently available maps, see Appendix D.

The coast of Ireland has also been modelled by the OPW as part of the Irish Coastal Protection Strategy Study – Phase 3. This study looked at the potential future flooding should climate change have a dramatic effect on sea levels. The study took a ‘mid-range’ level for sea level rise of 500mm above current levels and a ‘high end’ level of 1000mm above existing levels and then re-modeled the effects. The effects indicate that the site would be outside of the flooded area. See Appendix E for ICPSS Maps.

The site’s location is such that it is not affected by tidal water bodies and as such tidal flooding is negligible.

4.3 Pluvial Flooding

Pluvial flooding is flooding which has originated from overland flow resulting from high intensity rain fall. Previous flood events in the area can be reviewed on the Office of Public Works website (www.floodmaps.ie). The historical flood mapping does not indicate flood events in the area. See Appendix B.

4.4 Potential for Site to Contribute To Off-Site Flooding

In accordance with the requirements of Fingal County Council, the proposed development will contain an attenuation system designed to retain storm water generated on site for the predicted 1-in-100-year extreme
storm event, increased by 10% for the predicted effects of climate change. The storm water will be restricted to a flow of 2l/sec for all storm events.

4.5 Existing Off Site Drainage

The subject site will only discharge a restricted flow into the existing public storm water sewer thereby reducing the hydraulic pressure on the existing public storm water sewer during extreme rainfall events.

4.6 Groundwater Flooding

According to the Geological Survey of Ireland (GSI) interactive maps, the subject site is underlain with Dark limestone & shale, which is part of the Lucan Formation. The groundwater vulnerability assessment of the site shows that the vulnerability of groundwater in the area is between low and high. The local aquifer is described as poor aquifer which is generally moderately productive for local zones. The proposed alteration to the existing site will not increase the potential for groundwater flooding as such the risk is deemed acceptable. See Appendix F for GSI mapping information for background groundwater & geology data for the subject site.
5.0 CONCLUSION

- Historically, the subject site has not experienced flooding from past events, as noted by the OPW’s historical flood maps.

- Pluvial flooding has been assessed and the proposed use of an attenuation tank to limit the storm water discharge rate from the site to 2l/s/Ha will aid in increasing the capacity of the storm water sewer adjacent to the site.

- The risk of the site contributing to offsite flooding, or the site’s vulnerability to flooding from the public drainage network, is mitigated by the installation of an attenuation tank to retain the storm volumes experienced on site during high intensity storm events & the existing topography of the site.
Appendix A:
Fingal County Council Flood Zone Mapping
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.

2. All levels are referred to Ordnance Datum, Malin Head.

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NOTE:

Drawn By:
Checked By:
Approved By:
Scale:
Date:

Project:
Title:
Figure:

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Flood Zone Mapping
Map 10 of 24

Watercourses
Fingal County Boundary
Defended Area
Flood Zone A - 1% AEP (Fluvial) or 0.5% AEP (Coastal) Flood Extent (1 in 100 chance in any given year)
Flood Zone B - 0.1% AEP Flood Extent (1 in 1000 chance in any given year)
Indicative Flood Extents

Client
Title
Figure

Issue Details

NOTES:
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Project
Title
Figure

Issue Details
Appendix B:
Office of Public Works Historic Flood Report
Summary Local Area Report

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:
County: Dublin
NGR: O 263 548

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.

Map Legend
- Flood Points
- Multiple / Recurring Flood Points
- Areas Flooded
- Hydrometric Stations
- Rivers
- Lakes
- River Catchment Areas
- Land Commission *
- Drainage Districts *
-Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

Map Scale 1:17,873

6 Results

1. Crescent South Shore Rd Rogerstown Feb 2002
   Count...
| 6. Whitestown Road Rush Recurring | Start Date: |
| County: Dublin | Flood Quality Code: 3 |

Additional Information: Reports (4) More Mapped Information
Appendix C:

Fingal East Meath Flood Risk Assessment and Management Mapping – Fluvial Flood Extent Map
Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map.

Figure No. RSW/HPW/EXT/CURS/T/001

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<table>
<thead>
<tr>
<th>Node Label</th>
<th>Water Level (mOD)</th>
<th>Water Level (mOD)</th>
<th>Water Level (mOD)</th>
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</thead>
<tbody>
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<td>11WA1189D</td>
<td>3.37</td>
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<td>3.50</td>
</tr>
</tbody>
</table>

Legend:
- High Confidence (>40m) (10% AEP)
- Medium Confidence (>20m) (10% AEP)
- Low Confidence (<20m) (10% AEP)
- High Confidence (>40m) (1% AEP)
- Medium Confidence (>20m) (1% AEP)
- Low Confidence (<20m) (1% AEP)
- Low Confidence (>40m) (0.1% AEP)

Map Type: Flood Extent
Source: Fluvial Flooding
Map Area: High Priority Watercourse
Scenario: Current
Figure No.: RSW/HPW/EXT/CURS/001
Appendix D:
Fingal East Meath Flood Risk Assessment and Management Mapping – Tidal Flood Extent Map
Fluvial flooding may also occur within the area shown on this map. Please refer to the fluvial flood extent map. Figure No. LIS/HPW/EXT/CURS/001
Appendix E:

Irish Coastal Protection Strategy Study – Phase III – North East Coast Flood Extent Map
NOTE: MORE DETAILED MAPS SHOWING COMBINED TIDAL AND FLUVIAL FLOOD HAZARD FOR THIS AREA HAVE BEEN PREPARED UNDER THE FINGAL EAST MEATH FRAMS STUDY. PLEASE REFER TO WWW.FINGALEASTMEATHFRAMS.IE FOR MORE INFORMATION.
Appendix F:

Geological Survey of Ireland – Hydrogeology & Bedrock Geology Maps