

# Flood Risk Assessment

**Bremore Castle Car Park, Drogheda Street,  
Balbriggan, Co. Dublin**

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APPENDIX C OPW / FINGAL CC FLOOD MAPS

## 1 INTRODUCTION

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### 1.1 Terms of Reference

This Flood Risk Assessment (FRA) was commissioned by Fingal County Council to assess the potential risk of flooding at the existing Bremore Castle Car Park, Drogheda Street, Balbriggan, Co. Dublin (hereafter referred to as 'the site').

### 1.2 Statement of Authority

This assessment has been completed and reviewed by qualified professionals with appropriate experience in flood risk, drainage, wastewater, and hydraulic modelling studies. The key staff members involved in this project are as follows:

- Duncan Hartwick *BEng (Hons) BSc (Hons) MIEI* – Project Engineer with experience in flood risk assessment, hydrology, and hydraulic modelling.
- Paul Singleton *BEng (Hons) MSc CEng MIEI* – Associate Director and Chartered Engineer specialising in flood risk assessment, hydrology, drainage design and Sustainable Drainage Systems (SuDS); a recognised industry professional providing training courses on these topics to the public and private sectors in Ireland and the UK.

### 1.3 Purpose

This report is intended to produce a detailed site-specific (Stage 3) assessment that identifies potential sources of flooding at the site and determines the suitability of the proposed development in relation to 'Flood Zones' as defined in the relevant flood risk management planning policy. It is also intended to assess the adequacy of existing flood risk data, present any analysis undertaken to supplement the existing data, and recommend design and mitigation measures to be considered as part of the proposed development, including outline SuDS measures.

### 1.4 Approach to the Assessment

#### 1.4.1 Method of Assessment

The method of assessment complies with the Source-Pathway-Receptor model and provides a spatial assessment of flood risk to people, property, and the environment at the site. Consideration has been given to the source and extent of all potential flood mechanisms at the site, including fluvial, coastal, pluvial, and urban drainage flooding.

For the purposes of this assessment, the primary stakeholders are the Office of Public Works (OPW) and Fingal County Council (CC). OPW and Fingal CC data has been used to form the basis of this assessment and is presented in line with the relevant guidance and requirements.

#### 1.4.2 Hydraulic Model Status

As part of the pilot Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS), areas in Fingal and East Meath that were identified as being prone to flooding were modelled in detail. The site and surrounding area are covered by the detailed FEM FRAMS fluvial and coastal flood maps titled 'Balbriggan North Stream Model Flood Extent Map', as presented in Section 3.3.1 of this report.

### 1.4.3 Planning Guidelines

The requirements for flood risk assessments are generally as set out in the 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities', published by the OPW and Department of the Environment, Heritage and Local Government in November 2009 (hereafter referred to as 'the OPW Guidelines'). The OPW Guidelines are supplemented by Departmental Circular PL 2/2014 issued by the Department of Environment, Community and Local Government on 13<sup>th</sup> August 2014, which relates to use of OPW flood mapping in assessing planning applications and clarifications of advice contained within the OPW Guidelines. Further guidance is also provided in the CIRIA Research Project 624 'Development and Flood Risk: Guidance for the Construction Industry'.

Planning guidelines applicable to the site are set out in the Fingal County Development Plan 2017-2023, specifically through the Strategic Flood Risk Assessment (SFRA) published to inform the plan.

The SFRA was prepared in accordance with the requirements of the OPW Guidelines and adopts an identical Flood Zone standard. Flood Zones are the extents of design flood events that determine whether development is appropriate from a flood risk point of view. They are defined in the OPW Guidelines and Development Plan as follows:

- **Flood Zone A** - where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone B** - where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 and 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone C** - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

The OPW Guidelines clarify that Flood Zones are to be used to determine the suitability of proposed developments and are to be derived from 'present day' hydrological estimates. The OPW Guidelines also state that Flood Zones are generated without the inclusion of climate change and that, in addition to flood zoning, developments should be designed to be resilient to the effects of climate change.

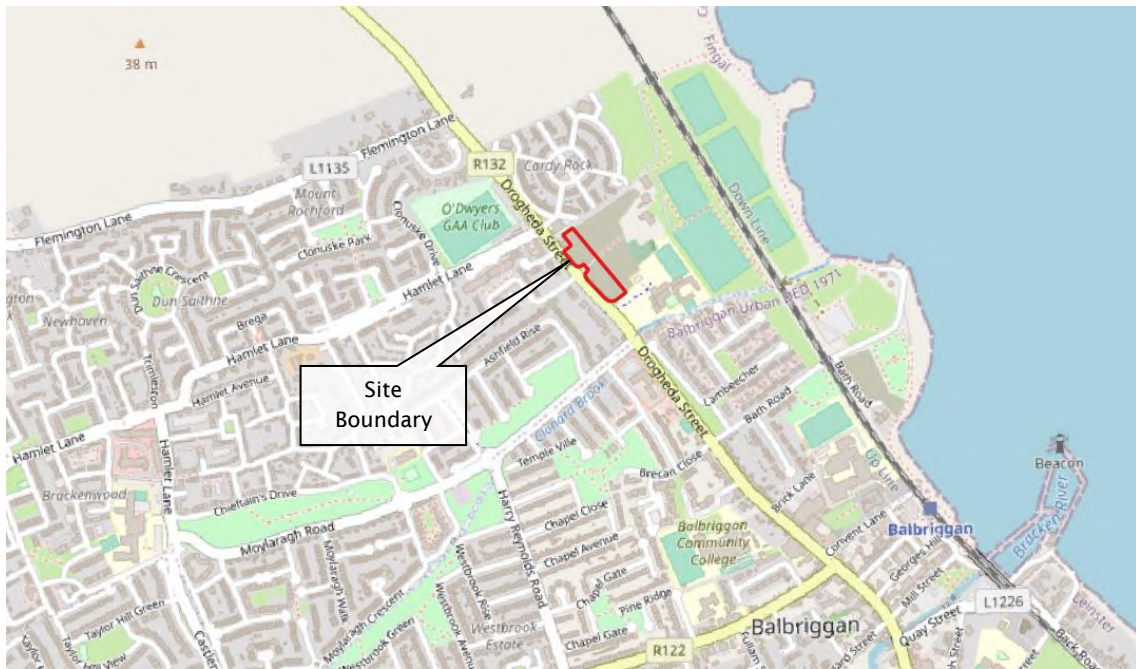


## 2 SITE AND PROPOSAL DETAILS

### 2.1 Site Location

The application site is located at Bremore Castle approximately 800 m north-west of Balbriggan town centre. The site location and context are shown in Figure 2.1 and Figure 2.2, respectively.

**Figure 2.1: Site Location**



**Figure 2.2: Site Context**



## 2.2 Site Description

Relevant information related to the site is as follows:

- The site currently comprises the Bremore Castle Car Park with pedestrian and vehicular access from Drogheda Street (R132).
- A watercourse titled 'Bremore River' on the EPA watercourse dataset flows c. 80 m to the south-east of the site before discharging to the Irish Sea.
- The topography of the site is flat with surrounding areas lying at similar elevations.

## 2.3 Development Proposals

The development proposals described in the planning application that this assessment is intended to support are as follows:

*The proposed works for the upgrade of the existing car park at Bremore Castle include:*

- *A car park consisting of 125 no. spaces, including*
  - *9 universally accessible parking bays.*
  - *19 EV ready parking bays including 5 universally accessible EV bays.*
  - *Bicycle parking for 64 bicycles to include sheltered spaces and infrastructure for shared bike schemes, cargo bikes and adapted bikes.*
- *All parking bays will be constructed in permeable paving such as grasscrete or similar and approved. Vehicular circulation routes will be constructed in permeable asphalt.*
- *Public lighting, consisting of LED public lighting throughout the car park to an approved lighting design.*
- *Landscaping works incl. tree planting in constructed tree pits, pollinator friendly plant species suitable for raingarden planting, and soil regrading.*
- *All other ancillary site works including electricity connections. The proposed development works are within the boundaries of the current temporary car park at Bremore Castle, Drogheda Street, Balbriggan.*

Relevant proposal drawings are included in Appendix A.

## 2.4 Vulnerability Classification

Based on the classification criteria set out in the OPW Guidelines, the proposal comprises development with the vulnerability classification shown in Table 2.1.

**Table 2.1: Proposed Development Vulnerability Classification**

Part	Use	Classification
Car Park	Local Transport Infrastructure	Less Vulnerable
Landscaping Works	Open Amenity Space	Water Compatible Development

### 3 BACKGROUND INFORMATION REVIEW

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A background information review based on existing flood risk data was carried out to build an understanding of the potential sources of flooding at the site. This section outlines the key findings of a background information review.

#### 3.1 Initial Background Search

Based on an initial internet / media background search, there is no evidence of flooding at the site from any source.

#### 3.2 Fingal CC Data

##### 3.2.1 [Fingal Development Plan 2017-2023](#)

The Fingal Development Plan 2017-2023 has been reviewed as part of this assessment and the following objectives are considered pertinent to this FRA:

- Objective GI30 – Ensure the provision of new green infrastructure addresses the requirements of functional flood storage, the sustainable management of coastal erosion, and links with provision for biodiversity, Sustainable Drainage Systems (SuDS) and provision for parks and open space wherever possible and appropriate.
- Objective GI31 – Seek the creation of new wetlands and/or enhancement of existing wetlands through provision for Sustainable Drainage Systems (SuDS).
- Objective GI32 – Seek the provision of green roofs and green walls as an integrated part of SuDS and which provide benefits for biodiversity, wherever possible.

##### 3.2.2 [SFRA for the Fingal Development Plan 2017-2023](#)

The Strategic Flood Risk Assessment (SFRA) for the Fingal Development Plan 2017-2023 outlines the following relevant guidance:

- Flood Zones (as outlined in Section 1.4.3) are generated without the inclusion of climate change factors and should ignore flood defences.
- A precautionary approach to climate change includes recommendations to ensure that levels of structures designed to protect against flooding (such as flood defences or raised floor levels) are sufficient to cope with the effects of climate change over the lifetime of the development.
- The minimum design level for highly vulnerable development should be above the Flood Zone B level plus suitable freeboard, whereby the recommended level of freeboard is 500 mm over and above the adjacent Flood Zone B fluvial and / or coastal flood level.
- The minimum design level for less vulnerable development should be above the Flood Zone A level plus suitable freeboard, whereby the recommended level of freeboard is 500 mm over and above the adjacent Flood Zone A fluvial and / or coastal flood level.

#### 3.3 OPW Data

##### 3.3.1 [FEM FRAMS](#)

Extracts from the Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) detailed fluvial and coastal flood maps are shown in Figure 3.1 and Figure 3.2, respectively. Full flood maps are included in Appendix C.

The site is shown to not be affected by fluvial or coastal flooding.

Figure 3.1: Extract from OPW FEM FRAMS Fluvial Flood Map

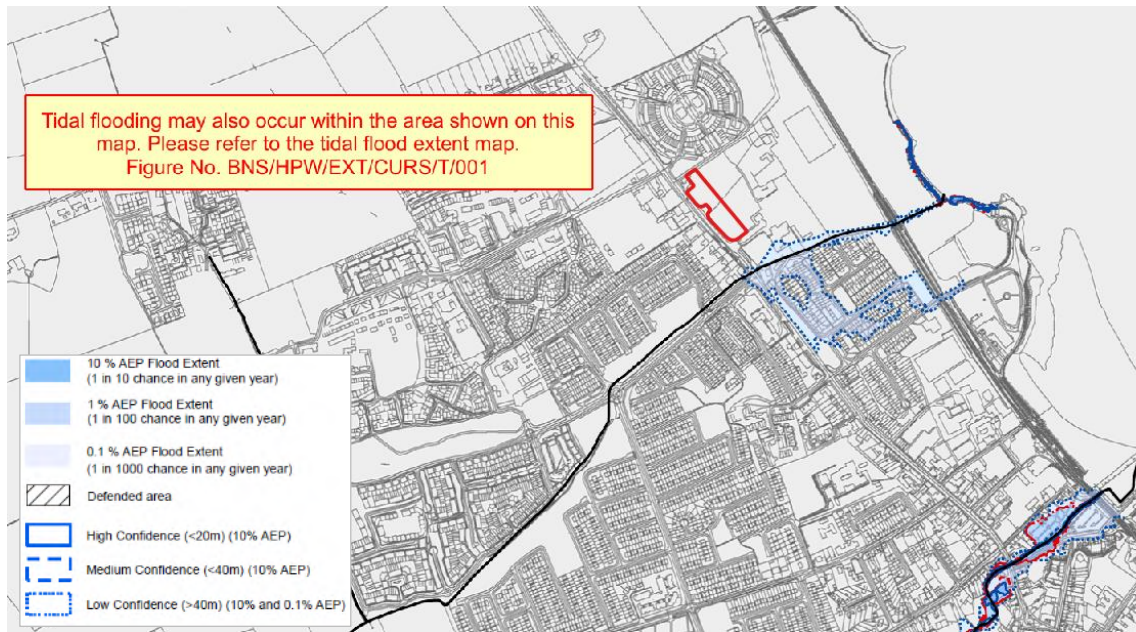
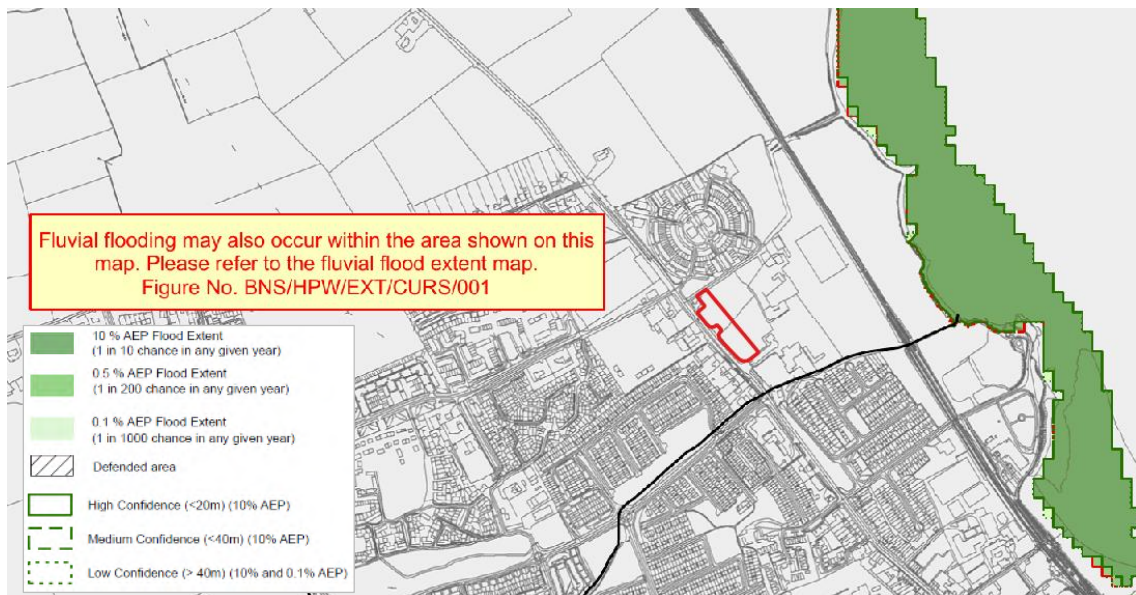


Figure 3.2: Extract from OPW FEM FRAMS Coastal Flood Map



### 3.3.2 Past Flood Events

OPW 'Past Flood Event' mapping indicates recurring flooding at Bremore Court (c. 150 m to the south of the site) due to surface water drainage incapacity. There is no record of past flooding at the site.

## 4 ASSESSMENT OF FLOOD MECHANISMS

### 4.1 Preamble

Development control procedures aim to avoid 'inappropriate' development, as defined in the OPW Guidelines, in areas that are at risk of flooding. They also aim to prevent new development that would increase flood risk elsewhere. This section aims to determine the suitability of the site for the proposed development in accordance with development control procedures by assessing all possible sources of flooding at the site and their associated risk people, property, and the environment.

### 4.2 Initial Assessment

Table 4.1 presents a screening assessment of the site for potential flooding mechanisms requiring further detailed assessment. It is based on the background information review and consultations.

Flooding mechanisms screened as being significant or possibly significant and requiring further assessment have been assessed further in the following sections. Mitigation of flood hazards, where required, is detailed in Section 5.2.

**Table 4.1: Potential Flooding Mechanisms at the Site**

Source / Pathway	Significant?	Reason
<b>Fluvial Flooding</b>	No	OPW FEM FRAMS flood mapping indicates that the site is not in an area at risk of fluvial flooding.
<b>Coastal Flooding</b>	No	OPW FEM FRAMS flood mapping indicates that the site is not in an area at risk of coastal flooding.
<b>Urban Drainage Flooding</b>	Possible	No indication of urban drainage flooding / sewer incapacity within the site boundary was identified in an initial background search. There is however existing drainage through and in the vicinity of the site and a past flood event to the south of the site referenced drainage capacity issues.
<b>Surface Water Flooding</b>	Possible	Surface water runoff could potentially flow towards the site from adjacent areas that lie at higher elevations.
<b>Groundwater Flooding</b>	No	Due to the site topography, there are no areas that would cause impoundment of groundwater.
<b>Artificial Sources of Flooding</b>	No	There are no impoundments or reservoirs in close proximity to or that drain towards the site.

### 4.3 Urban Drainage

Sewer infrastructure is known to serve existing developments in the vicinity of the site. No records of local drainage have been provided as part of this assessment.

Lands to the north, south, and east of the site are at similar or lower elevations. Surcharging / flooding from urban drainage in those areas would therefore not flow towards the site.

Lands to the west of the site are at higher elevations, so out-of-sewer flooding originating from these lands could result in water flowing towards the site. In the unlikely event of urban drainage failure, rates and volumes of surcharged flow are likely to be limited, and water would tend to follow preferential flow paths provided by the public roads and spread over a relatively large area.

Therefore, in the context of the proposed water compatible development, the risk of urban drainage flooding is not considered to be significant.

### 4.4 Surface Water (Pluvial) Flooding

#### 4.4.1 [Pluvial Flooding onto the Site](#)

As stated in Section 4.3, lands to the north, south, and east of the site are at similar or lower elevations. Surface water runoff from these areas would therefore not be directed towards the site.

Surface water originating from the west, if not intercepted by local drainage, would flow in the direction of the site. However, as with urban drainage failure, overland flow would tend to follow preferential flow paths provided by the public roads and spread over a relatively large area.

Therefore, the site is not considered to be at significant risk of pluvial flooding originating from surrounding lands.

#### 4.4.2 [Pluvial Flooding from the Site](#)

Development proposals have the potential to increase the impermeable footprint of the site and increase the rate and volume of surface water runoff accordingly.

The proposed development shall include SuDS to mitigate surface water runoff from the site, as discussed in Section 5.2.4.

## 5 SUMMARY OF FINDINGS AND RECOMMENDATIONS

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### 5.1 Summary of Findings

The site has been shown to be unaffected by fluvial and coastal flooding. In relation to Flood Zones as defined by the OPW Guidelines, the assessment demonstrates that the site lies wholly in Flood Zone C. The proposed development will therefore have no impact on flood risk elsewhere.

No other significant flood mechanisms are anticipated at the site.

### 5.2 Design Requirements

The following section outlines measures incorporated into proposals submitted in support of the planning application and to be further considered / developed in any detailed design or variation post-determination of the planning application.

#### 5.2.1 [Land Use](#)

This assessment demonstrates that the site lies wholly in Flood Zone C, meaning there is no policy-based restriction on land use within the site boundary and development will not cause an increase in flood risk elsewhere.

#### 5.2.2 [Design Levels](#)

Given the water compatible nature of the proposed development as well as being sited in Flood Zone C, there is no required minimum design level.

#### 5.2.3 [Site Access](#)

Given that the site lies wholly in Flood Zone C, safe access to and egress from the proposed development will be possible during an extreme flood event.

#### 5.2.4 [Drainage Design](#)

Surface water drainage design should be per the requirements of the Fingal Development Plan 2017-2023 and to the standards of the Fingal County Council Water Services Department. The Fingal Development Plan 2017-2023 states that it is an objective to incorporate and promote the use of SuDS and that these are to be designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

The requirements around the application / use of SuDS in Fingal is set out in the 'Green / Blue Infrastructure for Development Guidance Note' published in December 2020. The Guidance Note includes template documents / checklists as follows:

- Surface Water Management Design Statement
- Fingal SuDS Selection Hierarchy Sheet

These elements of the initial SuDS strategy have been completed in consultation with the Client and are included in Appendix B.

SuDS components have been considered in relation to the nature and character of the site and proposed development. The proposed development will include Permeable Pavement (PP) for the car park. The SuDS design will be subject to outline and detailed design at which stages discharge via infiltration and / or attenuation will be confirmed.

It is noted that, in keeping with a 'best practice' SuDS approach, no pipes, gullies or storage tanks are proposed.

## Appendix A

# Site Drawings



# Proposed Bremore Castle Car Park

## Summary of Proposed Works,

- New Car Park (125 Car Spaces including 23 EV ready & 9 Universal spaces)
- Cycle Parking Areas (26 Covered & 26 Open Spaces - 52 in Total)
- 5 Motorbike Spaces
- Associated Pedestrian Path Network
- Planters/Rain Gardens

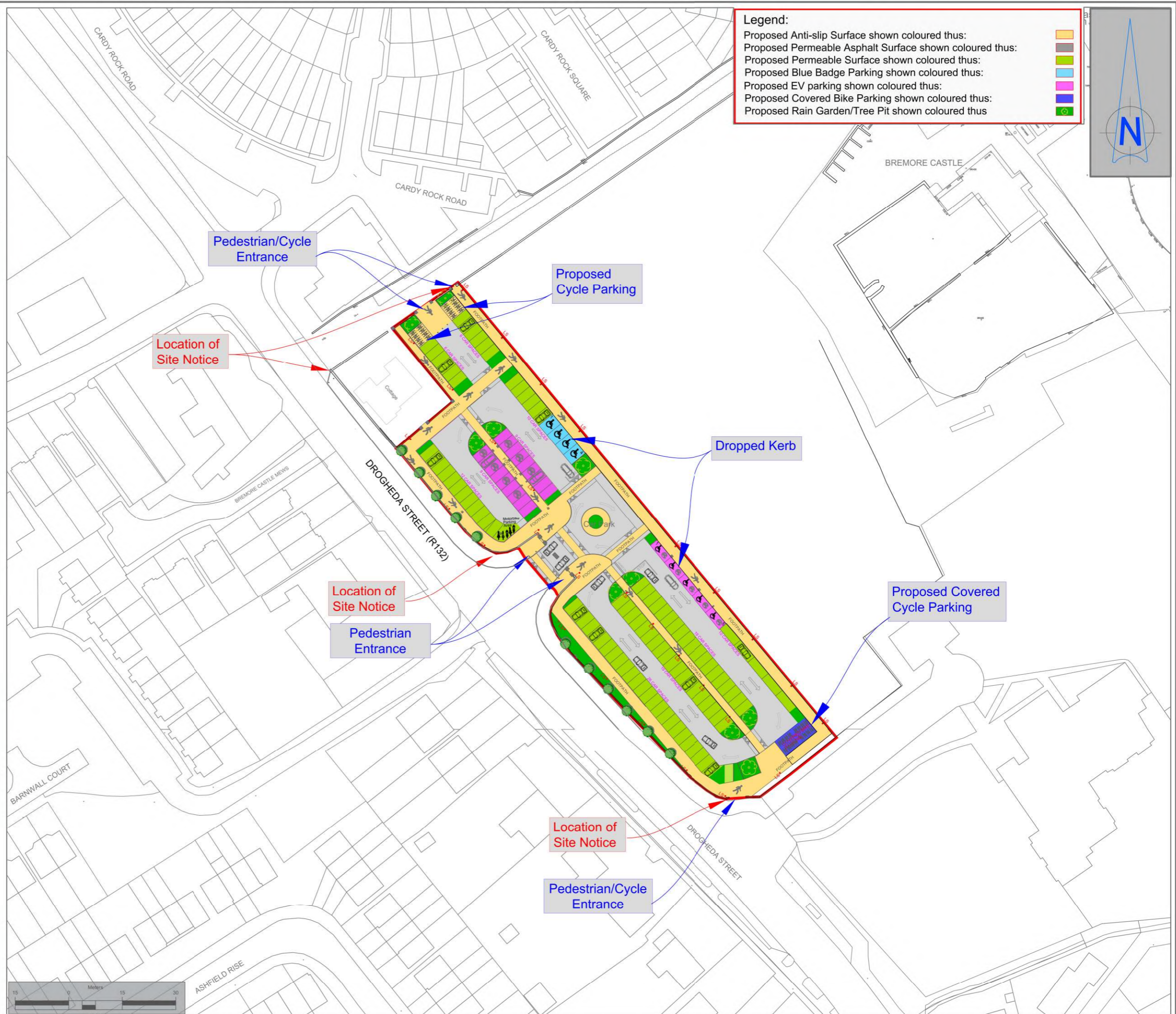
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Planning & Strategic Infrastructure Department,  
Parks & Green Infrastructure Division,  
County Hall,  
Swords.

Matthew McAleese  
Director of Services

Kevin J. Halpenny  
Senior Parks Superintendent

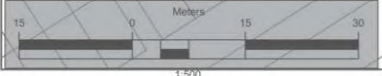
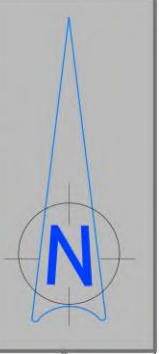
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Comhairle Contae  
Fhine Gall  
Fingal County  
Council



**Legend:**

Proposed Anti-slip Surface shown coloured thus:	
Proposed Permeable Asphalt Surface shown coloured thus:	
Proposed Permeable Surface shown coloured thus:	
Proposed Blue Badge Parking shown coloured thus:	
Proposed EV parking shown coloured thus:	
Proposed Covered Bike Parking shown coloured thus:	
Proposed Rain Garden/Tree Pit shown coloured thus:	



## Appendix B

# SuDS / Green Infrastructure Checklists

## Surface Water Management Design Statement

Existing Scenario	
<p><i>Description of existing subject site outlining the drainage characteristics - topography, ground conditions, suitability for infiltration, natural directions and paths for water movement, existing surface water flood risk.</i></p>	<p>The site currently comprises an existing temporary car park facilitating access to Bremore Castle and surrounding areas.</p> <p>As such, there is currently no formal surface water drainage and rainfall in the vicinity of the site is naturally 'discharged' via infiltration, evaporation and transpiration or, particularly during heavy rainfall events, flows onto the public road to the south west.</p> <p>The site lies at a similar elevation to lands in all directions and there is no identified pluvial flood risk.</p>
Proposed Scenario	
<p><i>This shall be a clear concise summary of the surface water design proposal.</i></p> <p><i>Applicants shall provide a brief explanation of how they have responded to the principles of Sustainable Drainage Systems (SuDS) Design contained in this policy. This could include implications of SuDS on design of other aspects of the development and price comparisons. We encourage that proposals are mindful of future implications from the beginning and present outline designs based on realistic options including maintenance activities and how they are resourced.</i></p> <p><i>Applicants shall be required to clearly demonstrate how the design makes a significant and positive contribution to the amenity value of the open space provision and shall state how the usability of these areas by the public has been addressed. Reference shall also be made on how the design considered the access and use of maintenance machinery in terms of slopes and any hard structures (e.g. head walls) located within the open space areas.</i></p>	<p>The proposed development consists of a car parking area which would be ideally suited to be designed as a Permeable Pavement (PP) structure. This would take the form of a grasscrete or concrete block top layer underlain by a suitable grit layer and open graded stone sub-base. The sub-base would be designed to store the 1% AEP + CC rainfall event and the grit and stone would provide more than sufficient treatment to meet Water Quality requirements.</p> <p>The parking area and associated landscaping works would enhance the amenity value of the wider area and the treatment of water within the PP would contribute to and support biodiversity.</p> <p>SuDS components should be designed to infiltrate as much as possible, subject to detailed design, but discharge of 'clean' water to surface water sewers in the adjacent public road at pre-development (greenfield) rate would also be possible.</p> <p>Maintenance of PP would consist of an annual visual check and surface sweep when required. Planting in any green component (i.e. landscaping) would be maintained in the same manner as the rest of the park.</p>

## SuDS Selection Hierarchy Sheet

SuDS Measures	Measures to be used on this Site	Rationale	Area of Feature (m <sup>2</sup> )	Attenuation Volume of Feature (m <sup>3</sup> )
<b>Source Control</b>				
Swales	-			
Integrated constructed Tree Pits	-			
Rainwater Butts	-			
Downpipe Planters	-			
Soakaways	-			
Infiltration Trenches	-			
Permeable Pavement	Yes	See Design Statement	1,800	810
Green Roofs	-			
Green Wall	-			
Filter Strips	-			
Bio-Retention Systems / Raingardens	-			
Blue Roofs	-			
Filter Drain	-			
<b>Site Control</b>				
Detention Basins	-			
Retention Basins	-			
<b>Regional Control</b>				
Ponds	-			
Wetlands	-			
<b>Other</b>				
Petrol / Oil Interceptor	-			
Attenuation Tank	-			
Oversized Pipes	-			

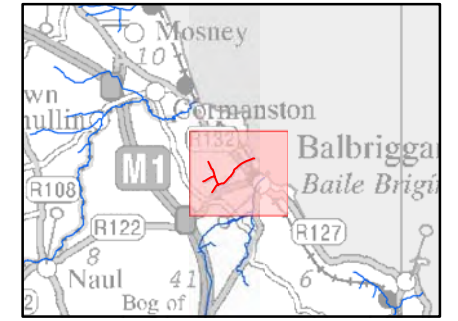
## Appendix C

# OPW / Fingal CC Flood Maps



Fluvial flooding may also occur within the area shown on this map. Please refer to the fluvial flood extent map. Figure No. BNS/HPW/EXT/CURS/001

Location Plan :



**EXTENT MAP**

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 % AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (> 40m) (10% and 0.1% AEP)
- High Confidence (<20m) (0.5% AEP)
- Medium Confidence (<40m) (0.5% AEP)
- Low Confidence (>40m) (0.5% AEP)
- Estimate route of existing drain
- Node Point
- Node label with level data (refer to table)
- Node level with flow & level data (refer to table)

High confidence  
Medium confidence  
Low confidence

refer to table

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.



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Clients :



Project :

FEM FRAMS

Map : BALBRIGGAN NORTH STREAM MODEL  
FLOOD EXTENT MAP

Map Type : FLOOD EXTENT

Source : TIDAL FLOODING

Map area : HIGH PRIORITY WATERCOURSE

Scenario : CURRENT

Figure By : Mara Ruiz Date : 17 January 2011

Checked By : Sergio Herbón Date : 17 January 2011

Approved By : Clare Dewar Date : 17 January 2011

Figure No. : BNS/HPW/EXT/CURS/T/001  
Revision : 1

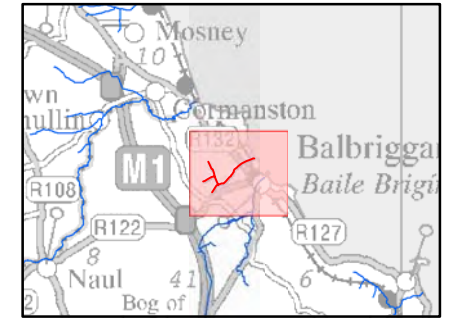
Drawing Scale : 1:10,000 Plot Scale : 1:1 @ A3






















Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map. Figure No. BNS/HPW/EXT/CURS/T/001

Location Plan :



### EXTENT MAP

Legend:

-  10 % AEP Flood Extent  
(1 in 10 chance in any given year)
  -  1 % AEP Flood Extent  
(1 in 100 chance in any given year)
  -  0.1 % AEP Flood Extent  
(1 in 1000 chance in any given year)
  -  Defended area
  -  High Confidence (<20m) (10% AEP)
  -  Medium Confidence (<40m) (10% AEP)
  -  Low Confidence (>40m) (10% and 0.1% AEP)
  -  High Confidence (<20m) (1% AEP)
  -  Medium Confidence (<40m) (1% AEP)
  -  Low Confidence (>40m) (1% AEP)
  -  Estimate route of existing drain
  -  Node Point
  -  Node label with level data (refer to table)
  -  Node level with flow & level data (refer to table)
  -  High confidence
  -  Medium confidence
  -  Low confidence
- refer to table

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

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Clients :



Project :

FEM FRAMS

Map : BALBRIGGAN NORTH STREAM MODEL  
FLOOD EXTENT MAP

Map Type : FLOOD EXTENT

Source : FLUVIAL FLOODING

Map area : HIGH PRIORITY WATERCOURSE

Scenario : CURRENT

Figure By : Mara Ruiz Date : 8 August 2010

Checked By : Sergio Herbón Date : 8 August 2010

Approved By : Clare Dewar Date : 8 August 2010

Figure No. : BNS/HPW/EXT/CURS/001 Revision : 0

Drawing Scale : 1:10,000 Plot Scale : 1:1 @ A3

