Project

Tallaght Stadium North Stand Development

Report Title

Site Specific Flood Risk Assessment

Client

South Dublin County Council

INFRASTRUCTURE

DBFL CONSULTING ENGINEERS

May 2020

Job Title: **Tallaght Stadium North Stand Development**

Job Number: **190179**

Report Title: **Site Specific Flood Risk Assessment Report**

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1.0 INTRODUCTION

1.1 Background

1.1.1 DBFL Consulting Engineers (DBFL) have been commissioned by South Dublin County Council (SDCC) to compile a Site Specific Flood Risk Assessment (SSFRA) for a Part 8 planning application for the proposed development of a new North Stand at Tallaght Stadium, Whitestown Way, Tallaght, Dublin 24. The proposals will increase stadium capacity by 2,416 spectators, from an existing maximum capacity of 8,131 spectators to the proposed maximum capacity of 10,547 spectators.

1.2 Objectives

1.2.1 The objective of this report is to inform the planning authority regarding flood risk for the proposed development. This report assesses the lands and zoning proposals in accordance with the requirements of "The Planning System and Flood Risk Management Guidelines for Planning Authorities". This report clarifies the lands flood zone category and presents information which would facilitate an informed decision of the planning application in the context of flood risk.

1.3 Development Proposals

1.3.1 The Development comprise the construction of a new North Stand with a seating capacity of 2416 at the Northern end of Tallaght Stadium

1.4 Report structure

1.4.1 As introduced above, this SSFRA seeks to clarify the potential level of influence generated by the proposed North Stand development. The structure of the report responds to the various stages of this exercise including the key tasks summarised below:

- **Chapter 2** of this report describes the existing conditions at the proposed development location and surrounding area including geological conditions .
- **Chapter 3** provides a summary of the relevant flood risk planning policies that influence the design and appraisal of the subject stadium proposals.
- **Chapter 4** provides a summary of the proposed development itself.
- **Chapter 5** outlines the initial flood risk assessment
- **Chapter 6** provides a detailed evaluation flood risk assessment and any risk mitigation measures required
- **Chapter 7** provides a conclusion of the SSFRA.

2.0 Receiving Environment

2.1 Site Characteristics

2.1.1 The general location of the subject site in relation to the surrounding road network is illustrated in **Figure 2.1** below, whilst **Figure 2.2** indicatively shows the extent of the subject site boundary and neighbouring lands. The subject site is located in Tallaght, approximately 12.5km southwest of Dublin City Centre.

2.1.2 The subject site is bound by the N81 dual carriageway to the north, Whitestown Way to the west and Sean Walsh Park Depot and Memorial Park to the south. The eastern boundary is formed by Old Bawn Community School and Central Tallaght Football Field. The surrounding area is predominantly a mix of existing residential and commercial development including key commercial areas such as The Square Tallaght Shopping Centre (located north of the subject site) and Tallaght Business Park (located southwest of the subject site).

2.1.3 To the west of the subject site lies a mixed-use development comprising Woodies retail store, Lidl supermarket, Bank of Ireland, The Maldron Hotel and residential apartments. To the south-east of the subject site lies the established Old Bawn residential area, while to the northwest is the established Springfield residential area.

2.1.4 The East stand is the most recent stand to be constructed

2.1.5 There are no watercourses in the immediate vicinity of the site.

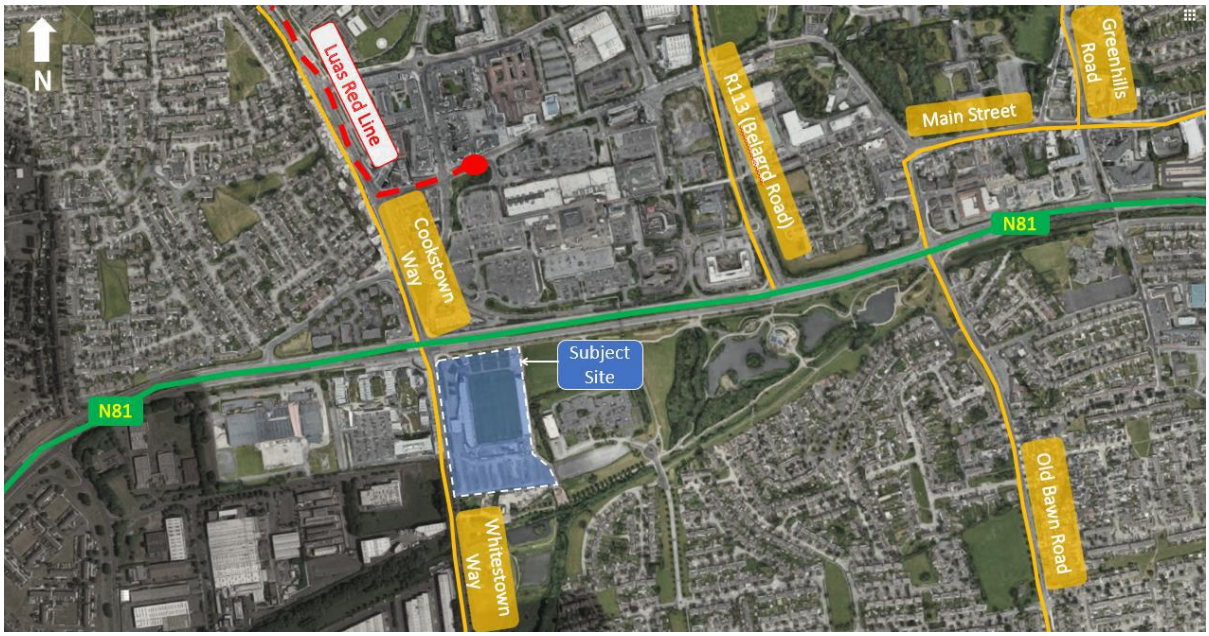


Figure 2.1 Site Location (Google Maps)

Figure 2.2: Indicative Site Boundary and Surrounding Land (Source Google Maps)

2.2 Site Geology

2.2.1 A review of the Geological Survey of Ireland (GSI) maps indicate that the main underlying bedrock indicated on the Geological Survey Ireland geology map are dark limestone and shale(‘calp), refer to Figure 2 below.

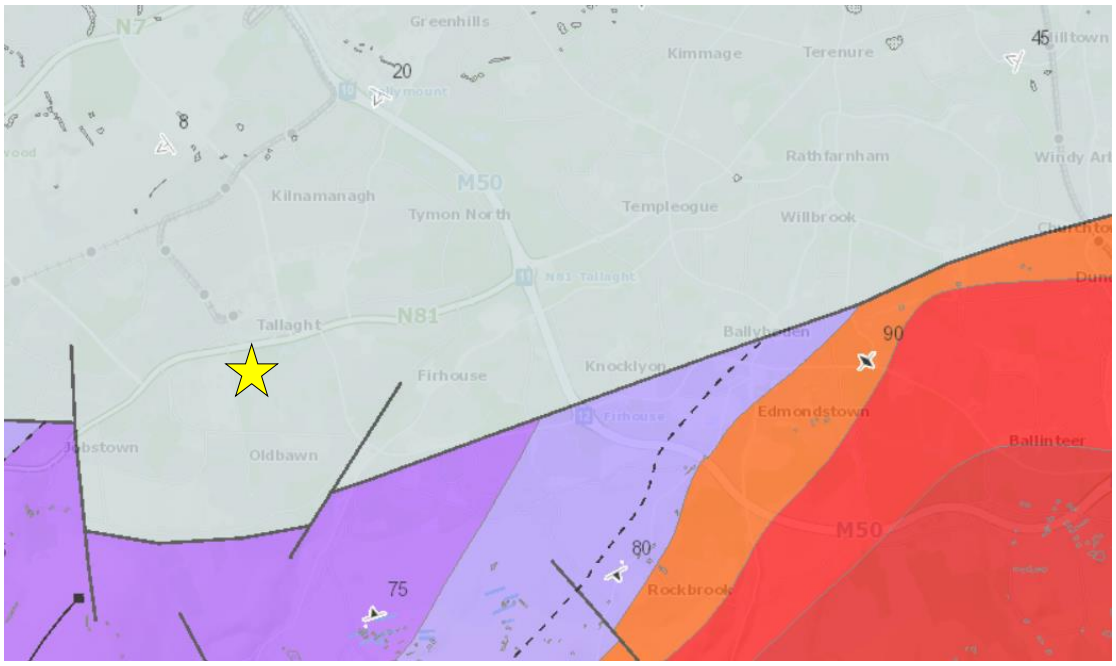


Figure 1 Geological Survey Ireland Map (GSI Maps)

2.2.2 The associated groundwater vulnerability, which indicates the risk to the underlying waterbody for the site is classified as low (Figure 3).

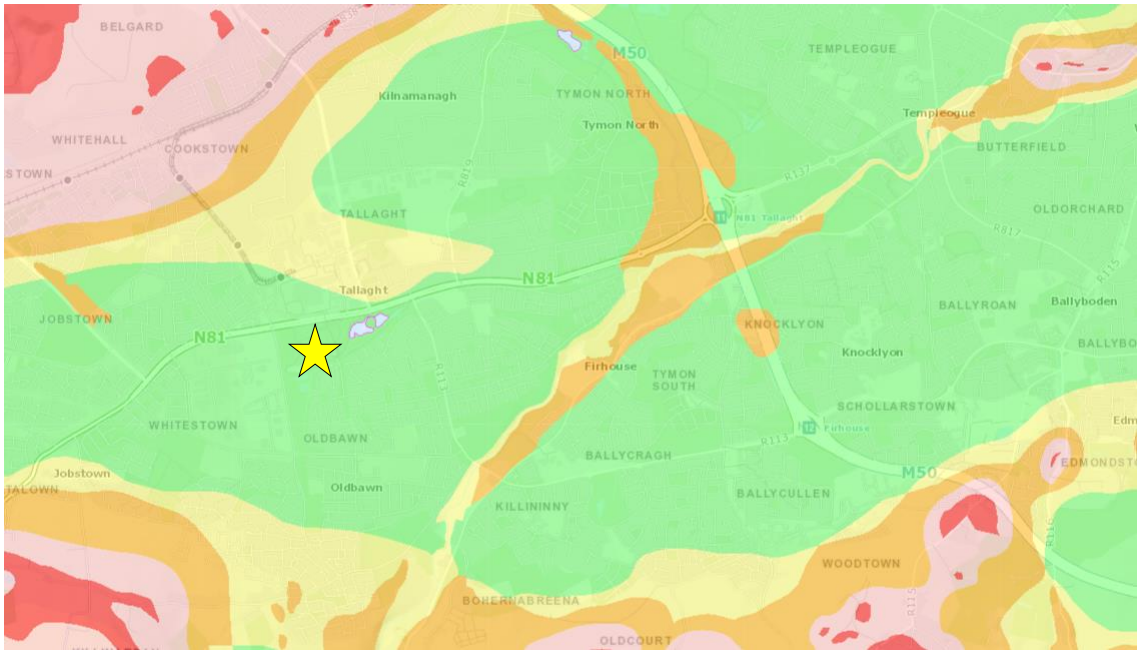


Figure 2 Groundwater Vulnerability Mapping (GSI Maps)

2.2.3 The EPA mapping for aquifers in the area indicates that it is a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. (Figure 4).

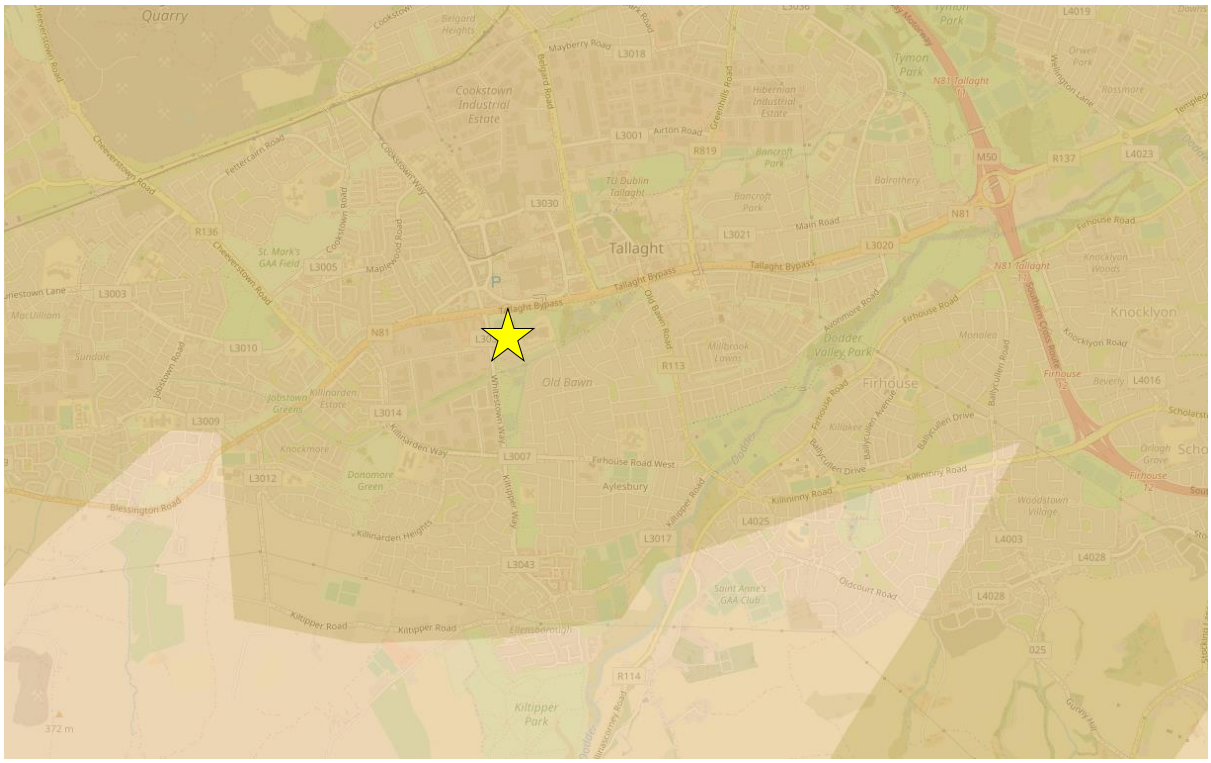


Figure 3 Aquifer Mapping (EPA Maps)

3.0 PLANNING GUIDELINES & FLOOD RISK ASSESSMENT

3.1 The Planning System and Flood Risk Management, Guidelines for Planning Authorities

3.1 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, including that which may arise from surface water run-off;
- 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 FRM Guidelines outlines the key principles that should be adopted by regional and local authorities, developers and their as agents as follows

- 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."

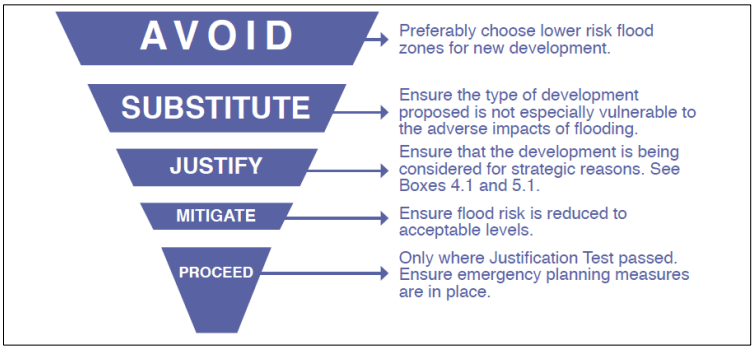


Figure 4 Sequential Approach Principles in Flood Risk Management (Extracted from FRM Guidelines)

The Sequential Approach in the Management of Flood Risk is included in Figure 5. Where the avoid and substitute principles of the sequential approach are not appropriate, then the Guidelines allow application of a Justification Test to assess the appropriateness or otherwise, of developments under consideration in areas of moderate or high flood risk.

3.2 Flood Risk Appraisal & Assessment

3.2.1 General

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).

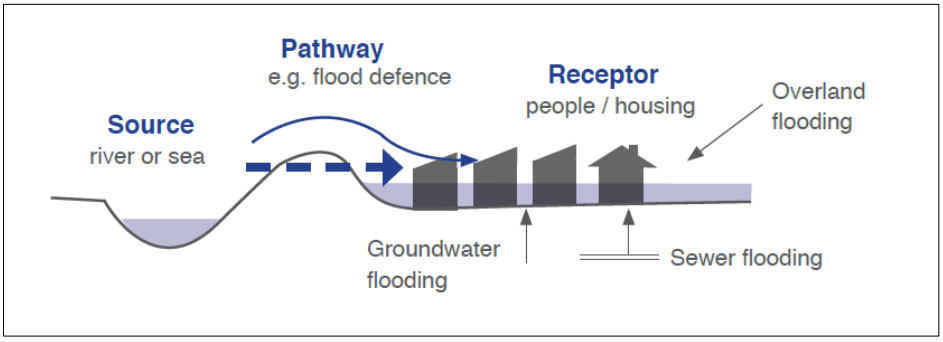


Figure 5 Source-Pathway-Receptor Model (Extracted from FRM Guidelines)

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.

The Guidelines further state that "*A staged approach should be adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the regional, development and local area plan levels, and also at the site-specific level. The stages of appraisal and assessment are":*

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible

mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3 Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

This SSFRA includes Stages 1, 2 and 3 Flood Risk Appraisal and Assessments related to the planned development.

3.3 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 1% AEP (Annual Exceedance Probability) for rivers and 0.5% AEP for coastal;
- 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,
- Vulnerable e.g. retail, commercial or industrial buildings, local transport infrastructure,
- Water Compatible e.g. flood infrastructure, docks, amenity open space.

3.4 Vulnerability v Flood Zone

The FRM Guidelines states that "*a sequential approach to planning is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding*".

The Sequential Approach restricts development types to occur within the flood zone appropriate to their vulnerability class, as outlined below in Table 1. Alternatively, a Justification Test can be completed to justify development in higher risk areas, (refer to Figure 7 below).

	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

Table 1 Matrix of Vulnerability versus Flood Zone to illustrate where development appropriate for flood zone or where justification test required (Extract from FRM Guidelines)

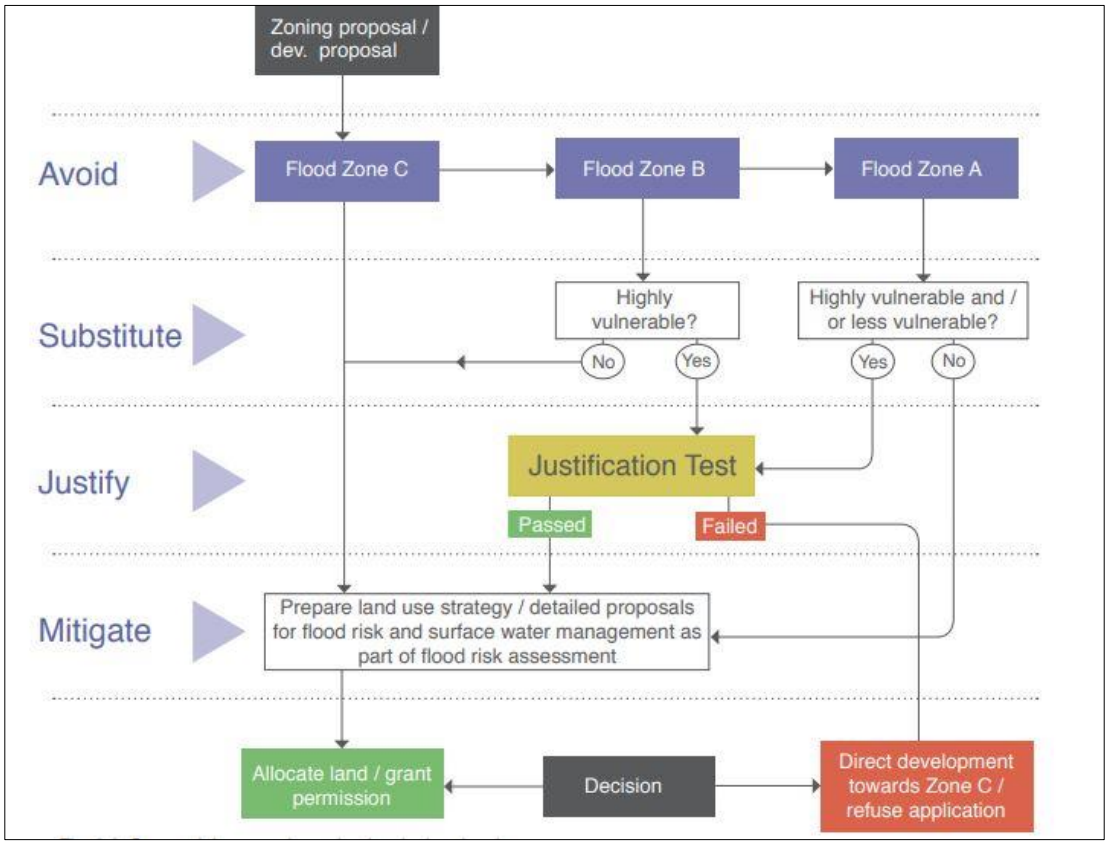


Figure 6 Sequential Approach & Justification Test Mechanism in the Planning Process (FRM Guidelines)

The proposed development is classified as a highly vulnerable development (residential and essential infrastructure) in the Guidelines. This class is appropriate to flood zone 'C'.

4.0 FLOOD RISK IDENTIFICATION

4.1.1 The initial flood risk identification stage uses predictive and historical information to identify and confirm whether there may be flooding or surface water management issues for the site in question which may warrant further investigation. Findings from the flood risk identification stage are outlined below:

4.2 Predictive Flood Data

4.2.1 OPW ECFRAMS Flood Extent Mapping 2017

The OPW's ECFRAM Study assessed fluvial and coastal flood risk. Flood maps indicate that fluvial flooding associated with the River Dodder for 10% and 1% AEP return periods do not impact the site and it is not at risk of flooding from the 0.1% AEP flood event.

4.2.2 County Development Plan 2016-2022 Strategic Flood Risk Assessment

No flooding identified within the site.

4.3 Flood History

4.3.1 OPW Historic Flood Records & Benefitting Lands

No records of flooding on the lands. No benefitting lands indicated.

4.3.2 Historical and Recorded Flood Events

A search for recorded flood events near the subject site was carried out using the OPW's *floodinfo.ie* website and using a general internet search. The *floodinfo.ie* website provides information on recorded flood events nationwide. There are no historical flood incidences recorded for the subject site or in the immediate vicinity of the site.

5.0 INITIAL FLOOD RISK ASSESSMENT

5.1 Sources of Flooding

5.1.1 Fluvial

In addition the Dodder Catchment Flood Risk Assessment and Management Study completed mapping of flood risk in the Tallaght area in November 2010. The study indicates that Tallaght Stadium is in Flood Zone C, as defined by the "Guidelines" with a very low (less than 1 in 1000 year) risk of flooding.

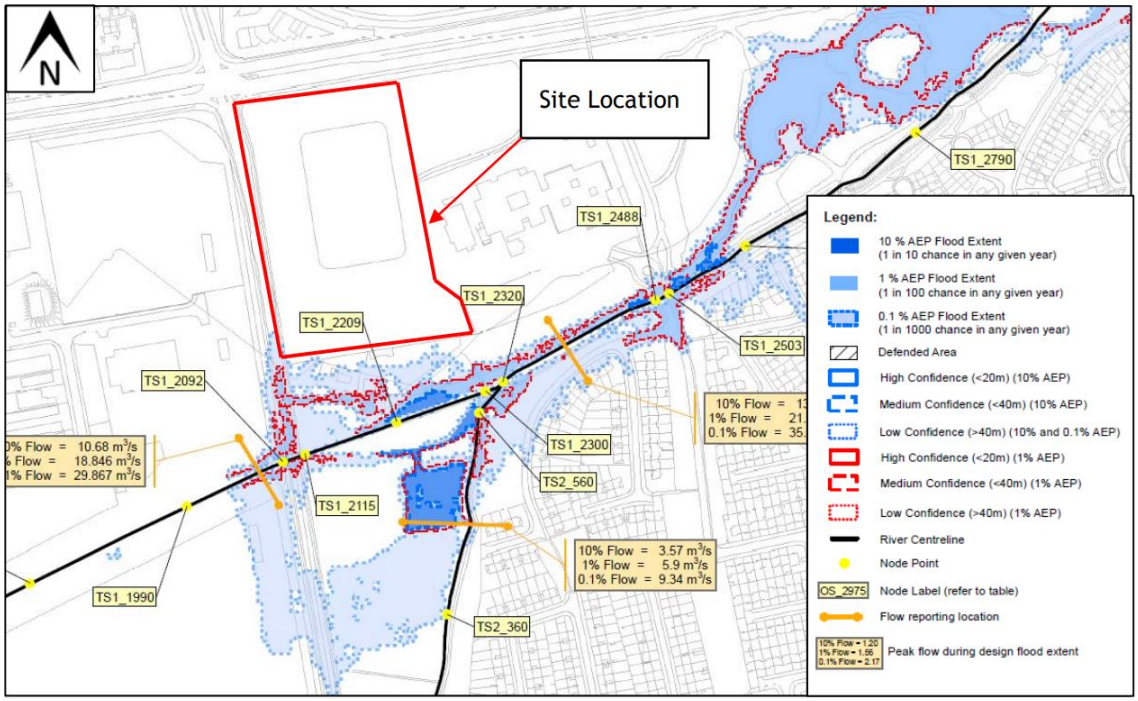


Figure 5.1: CFRAM Mapping indicating Fluvial Flooding adjacent to the site

5.1.2 Pluvial

Pluvial or surface water flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer.

The proposed development may be subject to pluvial flood risk from the developments proposed surface water drainage system. The comprehensive and detailed design of the surface water system, design of road, ground levels, finished floor levels, and SuDs measures will mitigate pluvial flood risk to a site.

5.1.3 Coastal

The site is located approximately 12km west of the coast. Therefore, coastal flooding is not considered a source of flood risk to the site.

5.1.4 Groundwater

The OPW PFRA mapping does not indicate any groundwater flooding at the site or surrounding area. The GSI groundwater vulnerability for the site is classified as low. Furthermore, there are no karst features in the area which would indicate areas at risk of groundwater flooding. There is no known risk of groundwater flooding in this area, therefore groundwater should not be considered as a likely source of flood risk to the site.

5.2 Source-Pathway-Receptor Model

A source-pathway-receptor model has been produced to summarize the possible sources of floodwater, the receptors and the pathways by which floodwater could reach the receptors.

Table 2 Source- Pathway- Receptor- Analysis

Source		Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	T1	Tidal flooding from coast, circa 4km away.	Entire Site	Remote	-	-
Fluvial	F1	From the River Dodder	Residents/industrial workers (**people**), dwellings, apartments, vehicles, roads;	Remote	-	
Surface Water Drainage (Pluvial)	P1	Flooding from the surcharging of the development's drainage systems	Residents/Industrial Workers (**people**) of the residential development. Dwellings, apartments and vehicles within the development. Roads, pathways / cyclepaths and open space and play areas within the development. The greatest risk is to low lying areas of the site;	Possible	Medium	Moderate Loss of Life / Drowning and Injury;
Groundwater Flooding	G1	Rising GWL on the site	-	Remote	-	-
Human or Mechanical Error (Pluvial)	H1	New drainage network blocks	Areas of development draining to the surface water network. Residents/Industrial Workers (**people**) of the residential development. The dwellings, other residences and vehicles within the development. Roads, pathways / cyclepaths and open space and play areas within the development.	Possible	Medium	Moderate Injury to people and damage to vehicles and property

The above table indicates that there is a moderate risk of pluvial flooding on site from the potential surcharging and blockage of the new drainage network.

6.0 MANAGEMENT OF FLOOD RISK AND FLOOD RISK MITIGATION

Flood risk to the proposed development will be managed using different strategies as outlined below.

6.1 Drainage Design

6.1.1 Surface Water Sewer & SuDS

A new surface water drainage system will be constructed to accommodate surface water runoff from the proposed development. The drainage system will be designed in accordance with the recommendations of the GDSDS (Greater Dublin Strategic Drainage Study) and EN752 and will included traditional drainage features and SuDS features, including the attenuation of surface water runoff and storage of runoff from a 1% AEP event.

The surface water drainage network is designed for a 50%AEP (1 in 2-year return period) storm event and is "flood checked" for a 1%AEP (1 in 100-year return period) event, i.e. it is designed to accommodate runoff from a 1%AEP rainfall event under surcharged conditions. The surface water drainage system was modelled using the 'NETWORK module of 'Microdrainage', for a range of storms with returns periods of 1 in 30 and 1 in 100 years. For a 1 in 100-year return period storm (1% AEP event), while the surface water drainage system surcharges there is no 'out of system / pipe' flooding on site.

SuDS features proposed for the development include Green Roofs and permeable paving and permeable surfacing.

6.1.2 Surface Water Attenuation & Storage

Surface water runoff from the proposed development is managed using both traditional drainage (i.e. a standard gully and pipe-work collection system) and Sustainable Urban Drainage Systems (SuDS) where appropriate.

Surface water runoff from the development is attenuated to "Greenfield Runoff", Qbar with runoff exceeding this stored on site for up to a 1% AEP (Annual Exceedance Probability).

Surface water storage will be provided in 'Stormbloc' underground storage units. In accordance with the recommendations of the GDSDS, a minimum 500mm buffer is provided between the top water level in the storage system and the lowest floor level within the development.

6.2 Climate Change

The potential impact of climate change has been allowed for in the design of the surface water drainage network and storage system, with an allowance for a 10% increase in rainfall intensities.

6.3 Foul Drainage

A new foul drainage system will be constructed to collect flows from the proposed development and built in accordance will all relevant codes of practice and standards. Reference should be made to Infrastructure Design report for these proposals.

6.4 Maintenance

The proposed drainage system to be maintained on a regular basis by South Dublin County Council to reduce the risk of a blockage. Maintenance of SuDS features should also be carried out in accordance with the recommendations of "The SuDS Manual" (CIRIA).

6.5 Site Layout

Finished floor levels of proposed buildings are minimum 500mm above the estimated top water level in the surface water storage system.

6.6 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance.
2. Pluvial flooding from the development's drainage system for storms exceeding the design capacity.

Mitigation measures to address residual flood risks are as follows:

1.0 Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance:

- **Mitigating Measure M1:** The proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.

2.0 Pluvial flooding from the development's drainage system for storms exceeding the design capacity:

Mitigating Measure M2:

- The drainage network is designed in accordance with the recommendations of the GDSDS and provides attenuated outlets and associated storage up to the 1% AEP (1 in 100-year return period event). The drainage network for the site has been designed to ensure that it can accommodate the 1 in 100-year rainfall event in surcharged conditions.
- Overland Flow Paths are maintained to direct runoff to the hockey pitch to the morth during extreme events (i.e. exceeding the 1% AEP event.

7.0 CONCLUSION

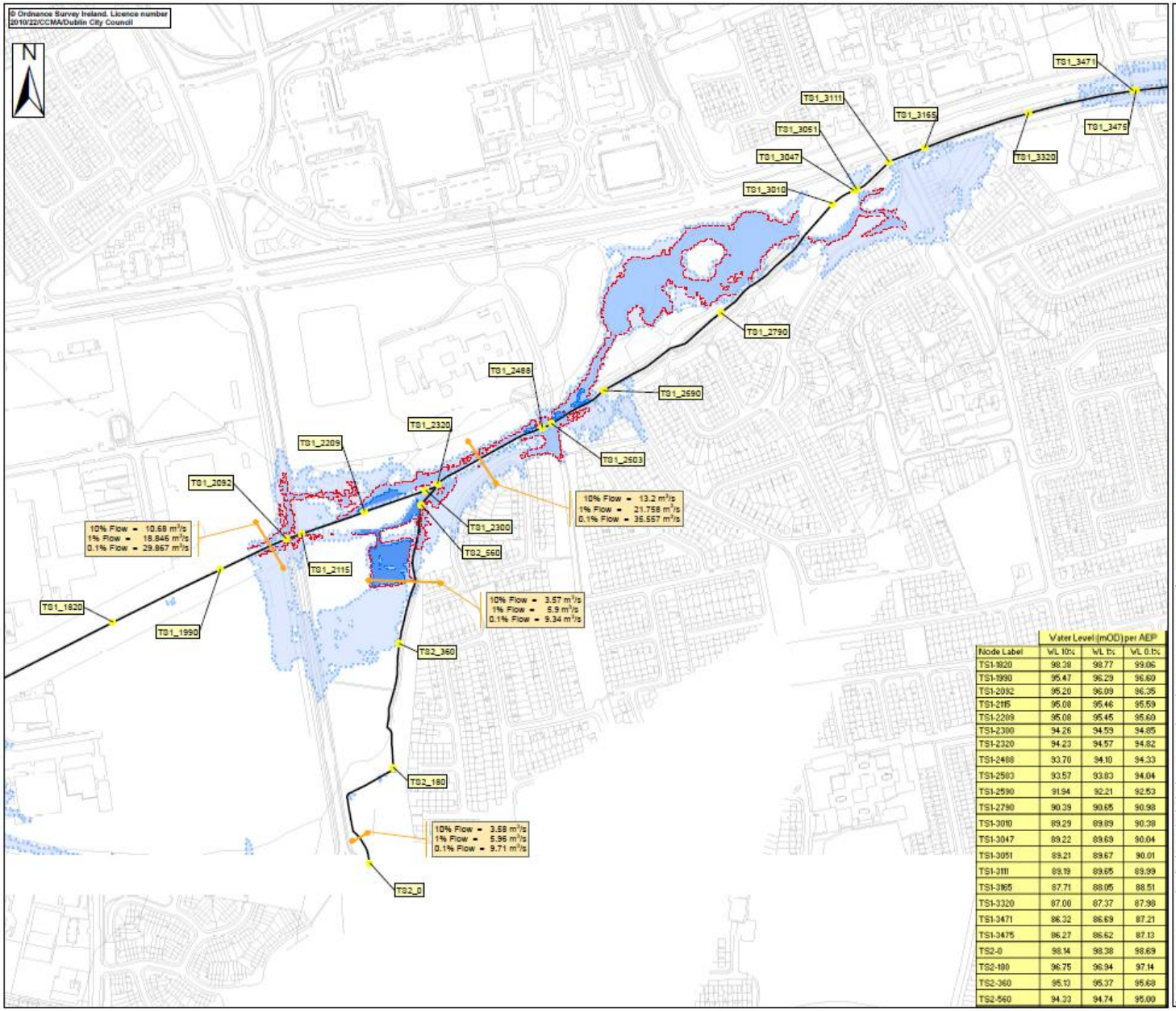
7.1 We consider that the proposed development, can be delivered on the site in the context of flood risk to same and that the implementation of mitigation measures, as outlined in this report, can be accommodated by the site's detailed design and the surface water drainage design.

7.1.1 The OPW document "The Planning System and Flood Risk Management Guidelines (November 2009)" requires that the proposed development be compatible with flood risk for the site. In accordance with these guidelines, the subject site is located within Flood Zone 'C'. Flood Zone C lands are suitable for all types of land use, including residential developments which are classified as "highly vulnerable" in the "Guidelines". Therefore, the proposed development is suitable for this type of flooding zoning and the Planning Guidelines Sequential Approach is passed (refer to *Figure 5*).

7.1.2 *It is concluded that the development meets the requirements of The FRA Guidelines and that the proposed development is appropriate to this flood zoning and a justification test is not required.*

APPENDIX A

FLOOD MAPPING



	Water Level (mOD) per AEP		
Node Label	WL 10%	WL 1%	WL 0.1%
TS1-1820	98.38	98.77	99.06
TS1-1990	95.47	96.29	96.69
TS1-2092	95.20	96.09	96.35
TS1-2115	95.08	95.46	95.59
TS1-2209	95.08	95.45	95.60
TS1-2300	94.26	94.59	94.85
TS1-2320	94.23	94.57	94.82
TS1-2488	93.70	94.10	94.33
TS1-2503	93.57	93.83	94.04
TS1-2590	91.94	92.21	92.53
TS1-2790	90.39	90.65	90.98
TS1-3010	89.29	89.89	90.38
TS1-3047	89.22	89.69	90.04
TS1-3051	89.21	89.67	90.01
TS1-3111	89.19	89.65	89.99
TS1-3165	87.71	88.05	88.51
TS1-3320	87.00	87.37	87.98
TS1-3471	86.32	86.69	87.21
TS1-3475	86.27	86.62	87.13
TS2-0	98.14	98.38	98.69
TS2-180	96.75	96.94	97.14
TS2-360	95.13	95.37	95.68
TS2-560	94.33	94.74	95.09

Location Plan:

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)
- River Centreline
- Node Point
- 06_2975 Node Label (refer to table)
- Flow reporting location
- Peak flow during design flood extent

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Client:

Project:
DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:
PRESENT DAY TALLAGHT STREAM

Map Type: FLOOD EXTENT
Source: FLUVIAL FLOODING
Map Area: URBAN AREA
Scenario: CURRENT

Drawn By : A.A.B Date : 26 November 2010
Checked By : A.J. Date : 26 November 2010
Approved By : A.G.B Date : 26 November 2010

Figure No. :
TS/EXT/UA/CURS/102

Map Series : Page 2 of 3

Drawing Scale : 1: 5,000 Plot Scale : 1:1 @ A3

0 0.1 0.2
Kilometers

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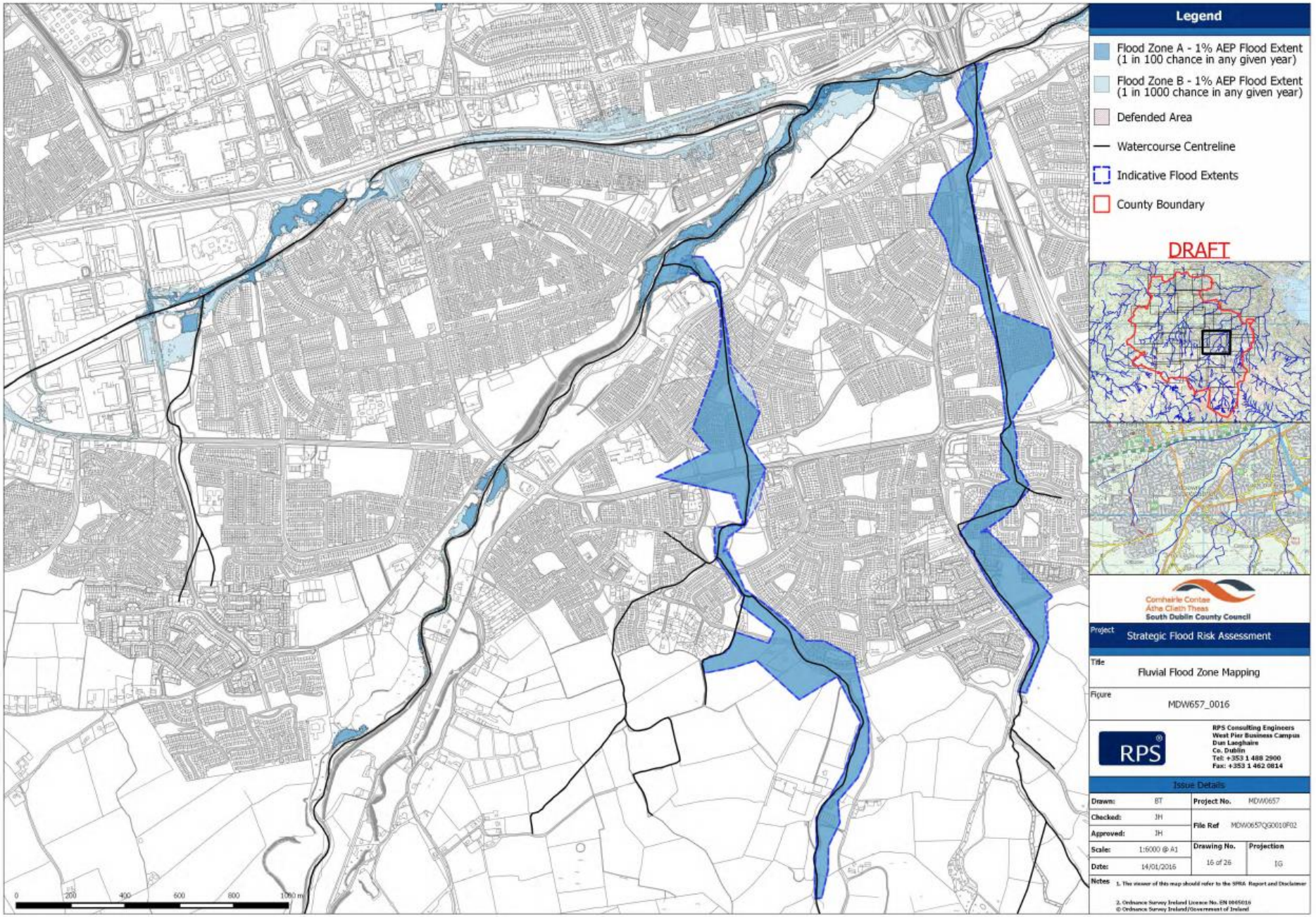
Legend
Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
Flood Zone B - 1% AEP Flood Extent (1 in 1000 chance in any given year)
Defended Area
Watercourse Centreline
Indicative Flood Extents
County Boundary
DRAFT
0
200
400
600
800
1000 m
Comhairle Contae Átha Cliath Theas
South Dublin County Council
Project
Strategic Flood Risk Assessment
Title
Fluvial Flood Zone Mapping
Figure
MDW657_0016
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Checked: JH
Approved: JH
Scale: 1:6000 @ A1
Date: 14/01/2016
Project No. MDW0657
File Ref MDW0657QG0010F02
Drawing No. 16 of 26
Projection IG
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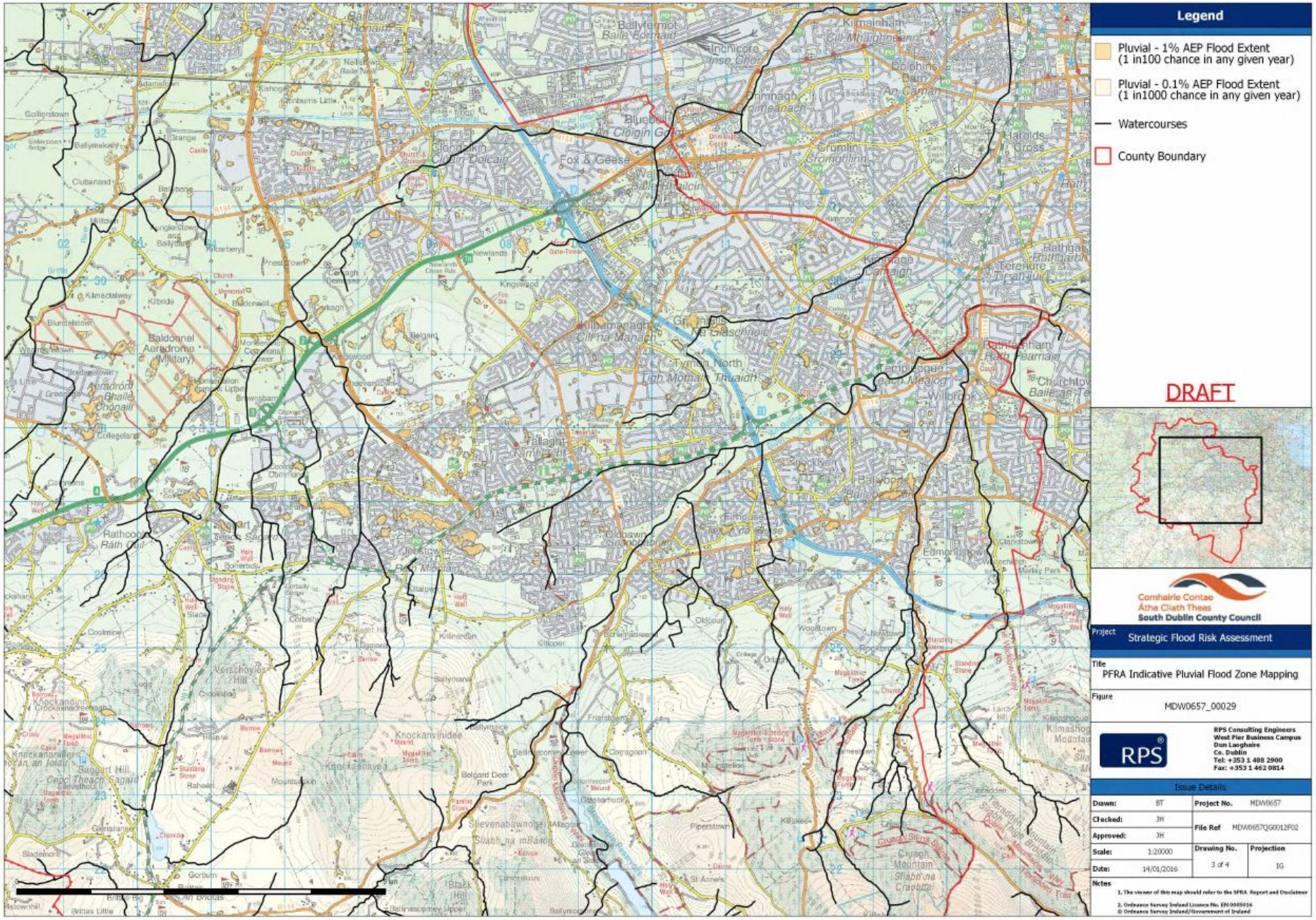
Legend
Pluvial - 1% AEP Flood Extent
(1 in100 chance in any given year)
Pluvial - 0.1% AEP Flood Extent
(1 in1000 chance in any given year)
Watercourses
County Boundary
DRAFT
Comhairle Contae
Átha Cliath Theas
South Dublin County Council
Project
Strategic Flood Risk Assessment
Title
PFRA Indicative Pluvial Flood Zone Mapping
Figure
MDW0657_00029
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Drawing No. 3 of 4
Projection IG
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