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**Proposed Residential Development at Puttaghan  
Lands, Tullamore**

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**Report on Site-Specific Flood Risk Assessment**

<b>John Flanagan Developments Ltd</b> Block 6 Central Business Park Clonminch, Tullamore, Co. Offaly R32F8K0	<b>Document Ref. No.</b>  <b>22009-R-SSFRA Issue PL1</b>	<b>Kilgallen &amp; Partners Consulting Engineers</b> <b>Well Road, Portlaoise Co. Laois</b>
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<b>Title</b>	Report on Site-Specific Flood Risk Assessment

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## **1. INTRODUCTION**

John Flanagan Developments Ltd [‘the Applicant’] intend to apply for planning permission for development of lands known as Puttaghan Lands off Tinnycross Road, Tullamore [‘the Site’].

The Applicant has appointed Kilgallen and Partners Consulting Engineers to carry out a Site-Specific Flood Risk Assessment [‘SSFRA’] in accordance with the ‘Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) to support its application to the Planning Authority.

This report presents the findings of the SSFRA. It has been prepared for planning purposes only. It is not to be used for any other purpose.

## 2. PROCESS FOR SITE SPECIFIC FLOOD RISK ASSESSMENT

In September 2008 “The Planning System and Flood Risk Management Guidelines for Planning Authorities” (The 2009 Guidelines) were published by the Department of Environment, Heritage and Local Government in Draft format. In November 2009, the adopted version of the document was published.

The 2009 Guidelines provide guidance on flood risk and development. A precautionary approach is recommended when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk.

The objective of an SSFRA is to assess all types of flood risk to a development. It investigates potential sources of flood risk and includes for the effects of climate change. The assessment is required to examine the impact of the development and the effectiveness of flood mitigation and management procedures proposed. It also presents the residual risks that remain after those measures are put in place.

The initial stage of the SSFRA comprises an assessment of available flood risk data to identify flood risk indicators that might affect the Site; if the Site is identified to be at risk of flooding, the SSFRA will proceed to a detailed assessment.

### 2.1 Potential Sources of Flood Risk

Potential flood risk mechanisms are summarised in Table 2-1.

Source	Mechanism
Fluvial:	Overtopping of Rivers and Streams
Pluvial:	The intensity of rainfall events is such that the ground cannot absorb rainfall run-off effectively or urban drainage systems cannot carry the run-off generated.
Groundwater:	Rising water table
Coastal:	Tidal levels and / or wave action
Infrastructure	Failure of flood protection or drainage infrastructure

**Table 2-1 Flood Risk Mechanisms**

For an inland site of this nature with no flood protection measures, coastal flood and Infrastructure are not a concern. Accordingly, the assessment will consider the following mechanisms:

- Fluvial;
- Pluvial;
- Groundwater.

## 2.2 Flood Risk Indicators

Indicators of flood risk are identified using available data, most of which is historically derived. Typically, this data is not prescriptive in relation to flood return periods and, in many cases being historical, neither predictive nor inclusive of climate change analysis.

Flood risk indicators include:

- Records available on the OPW's National Flood Risk Website. As part of the National Flood Risk Management Policy, the OPW developed the [www.floodinfo.ie](http://www.floodinfo.ie) web-based data set, which contains information concerning historical flood data and displays related mapped information and provides tools to search for and display information about selected flood events;
- PFRA & CFRAM mapping produced under the CFRAM programme;
- Strategic Flood Risk Assessment carried out to inform the making of County Development Plans / Local Area Plans;
- Geological Survey of Ireland (GSI) mapping - hydrogeological mapping maintained by the GSI and made available through its website [www.gsi.ie](http://www.gsi.ie);
- Ordnance Survey mapping - Ordnance Survey maps include areas which are marked as being "Liable to Floods". Generally, these areas are only shown identified indicatively and suggest historical flooding, usually recurrent. In addition, the maps indicate areas of wet or hummocky ground, bog, marsh, springs, rises and wells as well as surface water features including rivers, streams, bridges, weirs and dams;
- Topographical survey information;
- Ground Investigation information;
- Records of previous floods from other sources;
- Flood Studies, Reports and Flood Relief Schemes carried out in the vicinity of the Study Area;
- Site Walkover.

## 2.3 Identification of the Presence and Extent of Fluvial Flood Risk

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of flooding, the study progresses to the next stage, which is a detailed flood risk assessment. This is based on field measurements and hydrological modelling and enables mapping of the zones of Flood Risk within the Site to be established.

In accordance with the FRM Guidelines, flood risk zones are categorized as follows:

Flood Zone A where the probability of flooding in any year is greater than 1% (i.e. Flood Zone in respect of a flood with a return period of 100years). Throughout this report this is referred to as the 1% AEP flood, where AEP stands for Annual Exceedance Probability.

Flood Zone B where the probability of flooding in any year is between 0.1% and 1% (i.e. Flood Zone in respect of a flood with a return period of between 100years and 1,000years). Throughout this report this is referred to as the 0.1% AEP flood.

Flood Zone C where the probability of flooding in any year is less than 0.1% (i.e. Flood Zone in respect of a flood with a return period of greater than 1,000years).

## 2.4 Identification of the Presence and Extent of Pluvial Flood Risk

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of pluvial flooding, the study progresses to the next stage, which is a detailed assessment to establish the extent of pluvial flood risk at the Site.

**2.5 Identification of the Presence and Extent of Groundwater Flood Risk**

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of flooding from groundwater, the assessment progresses to the next stage, which is a detailed assessment to establish the extent of groundwater flood risk at the Site.

**2.6 Assessment of Proposed Development**

As described in the previous paragraphs, the first stages of the assessment process are concerned with identifying whether the Site is at risk of pluvial, fluvial or groundwater flooding and establishing the extent of any such flood risks.

The next stage of the assessment process is concerned with the following:

- Determination of the impact that any of the identified flood risks will have on the proposed Development;
- Determination of any impact that the Development itself might have in terms of increasing the level of flood risk elsewhere outside the Site;
- Identification of mitigation measures in respect of any such impacts and identification of any residual risks after those mitigation measures are put in place.

Table 3.1 of the FRMG classifies different types of development in terms of their vulnerability to flooding. Figure 2-1 contains an extract from this table which shows residential development classified as Highly Vulnerable.

<b>Less vulnerable development</b>	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
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**Figure 2-1 Classification of development type by vulnerability to flooding**

Table 3.2 of the FRMG provides a matrix of development vulnerability versus Flood Zone which illustrates the appropriateness of a development type for each Flood Zone. This table is reproduced in Figure 2-2 and shows the FRMG regards Highly Vulnerable development requiring the Justification Test for Sites in Flood Zone A

Proposed Residential Development at Puttaghan Lands, Tullamore

	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 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

**Figure 2-2 Matrix of vulnerability versus Flood Zone**

**2.7 Climate Change Adaption**

This assessment’s consideration of the effects of climate change is guided by the climate change adaption plan published by OPW (*Flood Risk Management - Climate Change Sectoral Adaptation Plan* Sep 2019).

For the purposes of the CFRAM Programme, the OPW adopted two indicative potential futures for flood risk assessment; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). These were selected to reflect, based on information available at the time, a future in the latter part of the century that would be:

- (i). typical or near to the general average of the future climate projections (MRFS), and,
- (ii). a more extreme future based on the upper end of the range of projections of future climatic conditions and the impacts such changes would have on the drivers of flood risk (HEFS).

Table 2-2 reproduces climate change adaption factors for each of these scenarios from Table 5-5 of the OPW plan. The OPW plan considers these factors acceptable as plausible futures for use in assessing potential requirements for climate adaption.

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Land Movement	-0.5mm / year	-0.5mm / year
Urbanisation	No general allowance – review on a case-by-case basis	No general allowance – review on a case-by-case basis

**Table 2-2 OPW climate adaption allowances in flood parameters for the Mid-Range and High-End Future Scenarios**

This assessment will apply the MRFS factors in its general consideration of flood risk. The potential effects of the HRFS will be considered in terms of residual risk (Section 9).



### **3. SITE DESCRIPTION AND PROPOSED DEVELOPMENT**

#### **3.1. Site Description**

Figure 3-1 shows the Site in context of its immediate surroundings.

The Site is located in the eastern outskirts of Tullamore off the Tinnycross Road. It is bounded:

- to the south and northwest by residential estates;
- to the north east and east unused partially developed lands;
- to the west by Tullamore Regional Hospital.

There are sheds and a former playing pitch at the eastern side of the Site. The western side of the Site is undeveloped.

The general context undeveloped lands surrounded by suburban development.

The Site measures 4.20 hectares.

#### **3.2. Land-Use Classification**

The land is classified for residential land-use in the Offaly County Development Plan 2021 – 2027.

#### **3.3. Proposed Development**

The proposed development will comprise the demolition of existing buildings and the construction of large scale residential development comprising 148 dwellings, a Creche; and all ancillary site development works including access, roads and footpaths, landscaping and boundary treatments, public and private open space areas, car parking, bicycle parking, ESB substations, bin and bicycle stores, replacement waste water pumping station and drainage connections; and all ancillary site development works.

#### **3.4. Proposed Surface Water Drainage System**

The surface water drainage system for the proposed development was designed by Kilgallen and Partners Consulting Engineers in accordance with the Greater Dublin Regional Code of Practice, the GSDSDS and CIRIA Report c753 "The SuDS Manual" 2015.



Figure 3.1 Site Details

## 4. FLUVIAL FLOOD RISK – INITIAL ASSESMENT

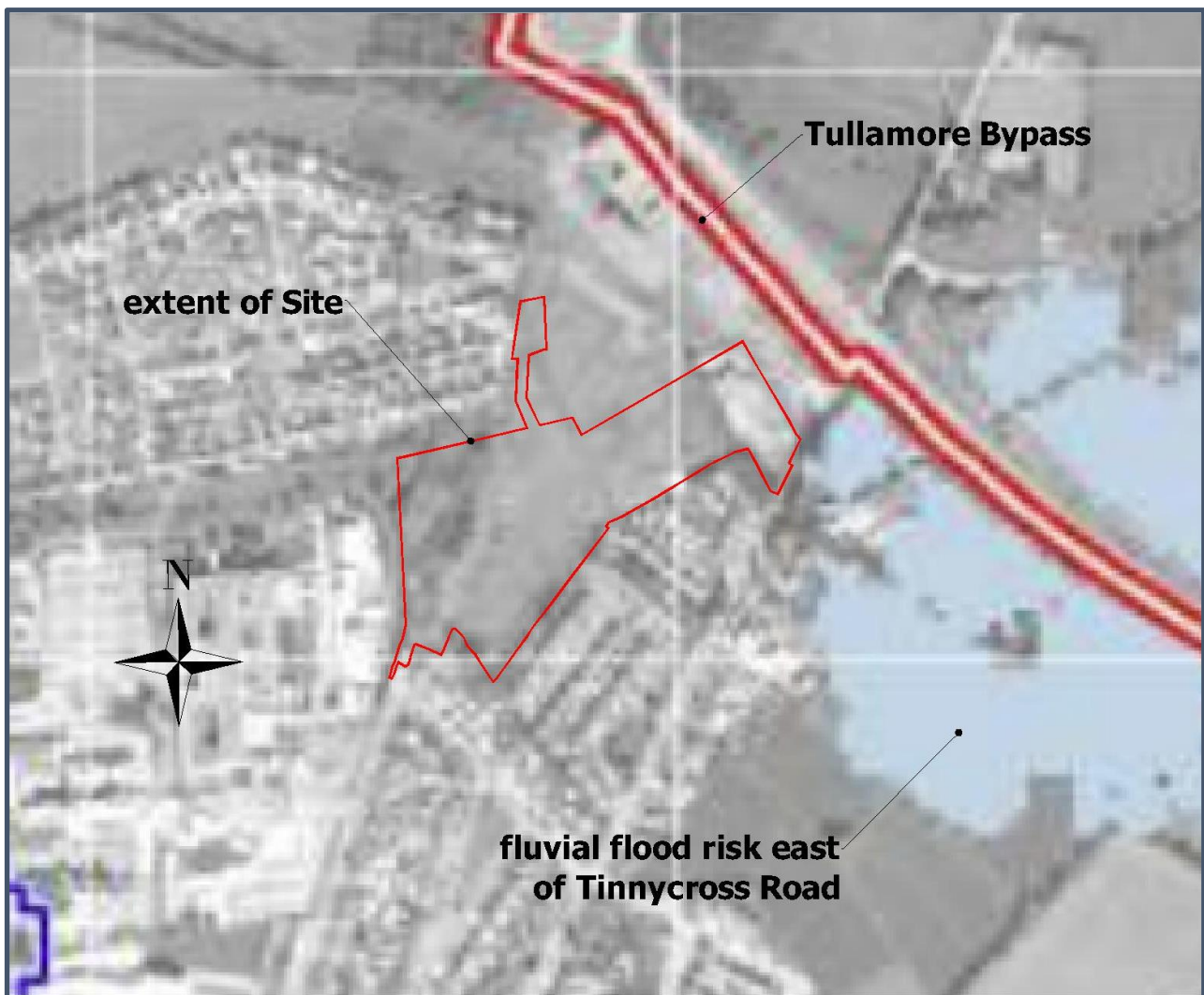
### 4.1 Flood Risk Indicators - Desktop

A number of datasets were interrogated for indicators of fluvial flood risk:

(i) *SFRA for County Development Plan 2021 - 2027*

The Strategic Flood Risk Assessment for the County Development Plan shows the Site to be unaffected by fluvial flood risk.

Fluvial flood risk zones are shown east of Tinnycross Road



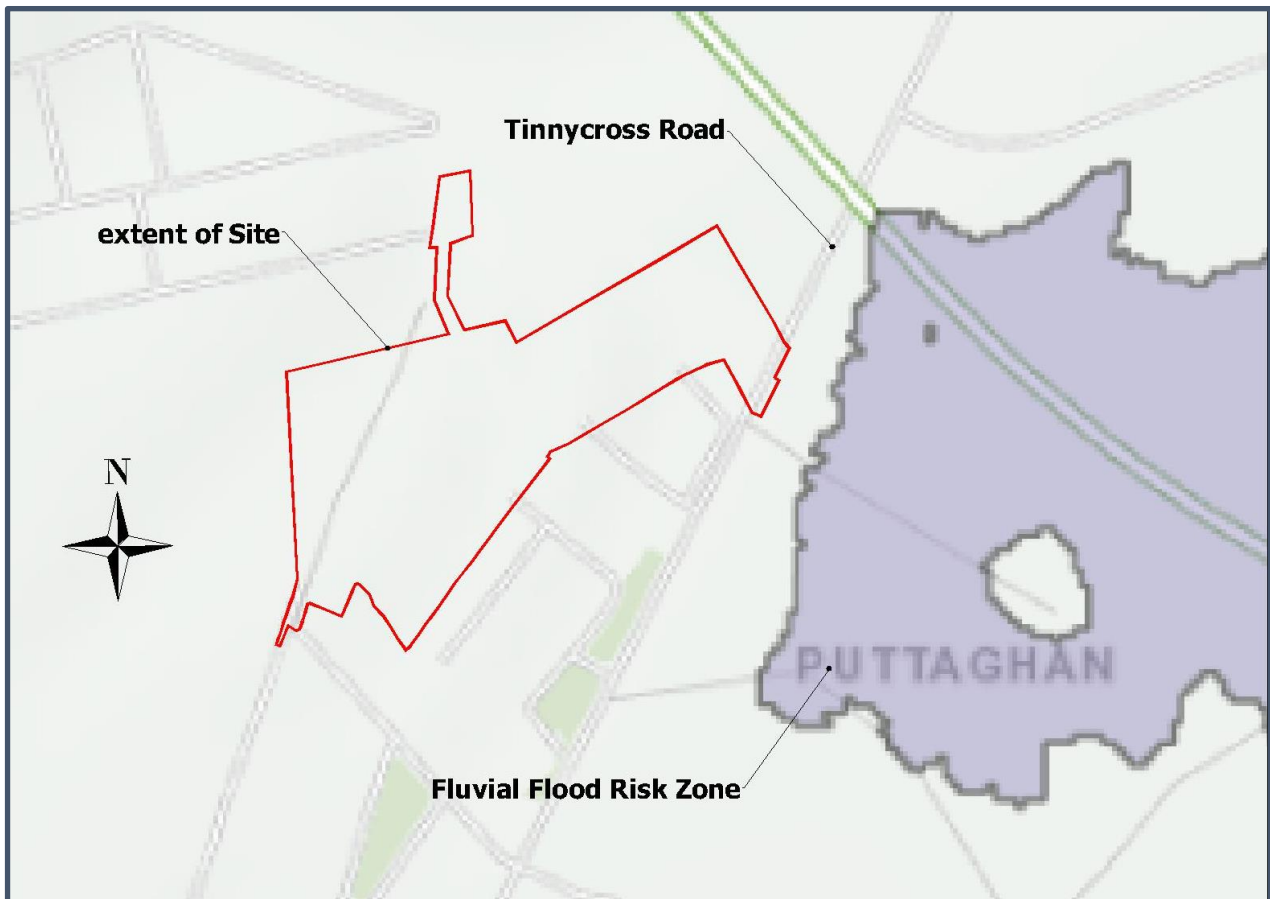
**Figure 4.1 Extract from SFRA**

(ii) *OPW National Flood Hazard Mapping Website*

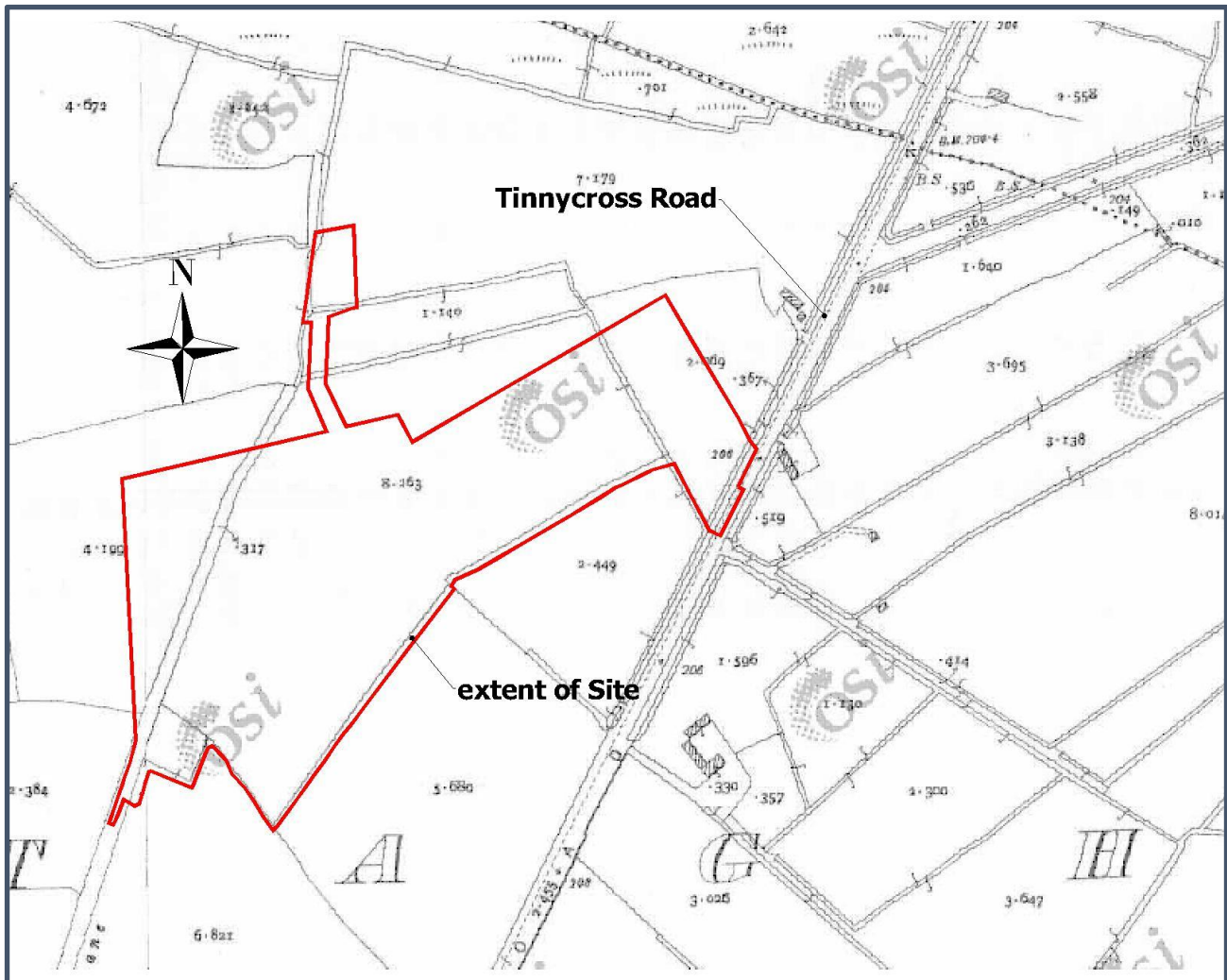
The OPW maintains the National Flood Hazard Mapping website ([floodinfo.ie](http://floodinfo.ie)) which contains information about locations that may be at risk from flooding. The source of this information includes Local Authorities and other historic records such as newspaper articles and other documentation about reported floods. This source does not register any previous flood events at the Site.

*(iii) CFRAM*

Figure 4-2 shows an extract from CFRAM mapping for the Mid-Range Future Scenario. The Site remains unaffected by flood risk in this scenario.

*(iv) Ordnance Survey Mapping*

Historic OS mapping for the Site shows the environs of the Site to have a relatively dense network of open land drains, particularly so east of Tinnycross Road. This is consistent with flat areas with poorly draining soils. The mapping does not show any streams or rivers in the vicinity of the Site.



**Figure 4-3 Extract from OS mapping**

#### **4.2 Flood Risk Indicators - Site Walkover**

No watercourses were observed at the Site during a Site walkover. No evidence of fluvial flood risk was observed.

#### **4.3 Surface Water Drainage**

The surface water drainage system for the development incorporates SUDS measures to facilitate infiltration to ground of surface water run-off.

Discharge of surface water run-off is restricted in accordance with the GSDS to ensure the development will not give rise to an increase in flood risk elsewhere.

The lands east of the Tinnycross Road shows as subject to flood risk on CFRAM mapping comprise a flat area with a dense network of open drains with water standing in these drains. The vegetation is suggestive of poorly draining land. The flood risk zone is extensive but, given the flat terrain, floodwater depth would be shallow and significant freeboard to the Tinnycross Road would be available.



**Figure 4-4 Typical open drain in lands east of Tinnycross Road**

#### **4.4 Initial Assessment**

Based on the indicators described in Section 4.1 and on the Site walkover described in Section 4.2, the initial assessment indicates the Site is not at risk from fluvial flooding during extreme rainfall events and so detailed assessment of this mechanism is required.

## **5. FLOOD RISK FROM GROUNDWATER**

### **5.1 Flood Risk Indicators - Desktop**

A number of datasets were interrogated for indicators of flood risk from Ground Water. These comprised:

(i) *OPW National Flood Hazard Mapping*

Records from the National Flood Hazard Mapping website maintained by the OPW do not contain any evidence of flood events at the Site associated with fluctuations in groundwater level.

(ii) *Geological Survey of Ireland (GSI)*

The GSI maintains a web portal which contains information on groundwater flooding. (<https://www.gsi.ie>). The portal shows groundwater vulnerability to be moderate and does not show any groundwater flooding at the Site. No wells or springs are noted in the vicinity of the Site.

(iii) *Historical Ordnance Survey Mapping*

Historical OS maps do not contain any indicators of flood risk from ground water.

### **5.2 Flood Risk Indicators – Site Walkover**

No indicators of groundwater flood risk were observed during a Site walkover.

### **5.3 Initial Assessment**

The indicators described above do not provide any indication of flood risk from groundwater and so further detailed assessment of flood risk from this mechanism is not required.

## 6. PLUVIAL FLOOD RISK

### 6.1 Flood Risk Indicators - Desktop

A number of datasets were interrogated for indicators of pluvial flood risk:

*(i) SFRA*

The Strategic Flood Risk Assessment for the County Development Plan 2021 – 2027 does not show pluvial flood risk at the Site.

*(ii) OPW National Flood Hazard Mapping Website*

The OPW maintains the National Flood Hazard Mapping website (floodinfo.ie) which contains information about locations that may be at risk from flooding. The source of this information includes Local Authorities and other historic records such as newspaper articles and other documentation about reported floods. This source does not register any previous flood events associated with pluvial flood risk at the Site. However, as much of the Site is away from the public road, the absence of historic flood records is not a strong indicator that there is no flood risk.

*(iii) CFRAM study programme undertaken by the OPW*

The CFRAM study programme does not show and indicators of pluvial flood risk at the Site.

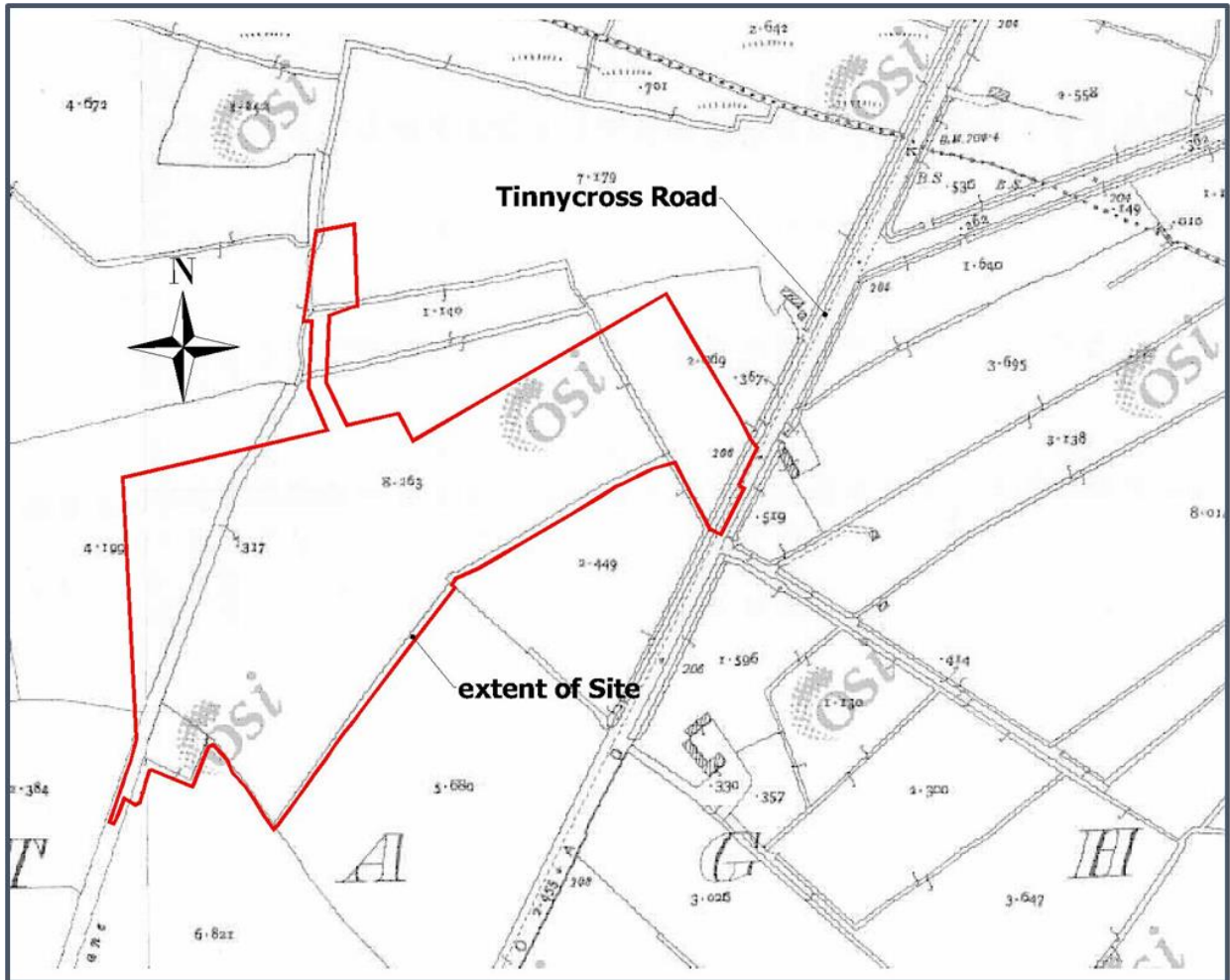
*(iv) Surface Water Drainage for the Proposed Development*

The surface water drainage system for the proposed development is designed in accordance with the recommendations of GSDSDS (refer to Section 3.4). Compliance with GSDSDS ensures the surface water drainage system for the development will not lead to pluvial flood risk within the development and will not cause an increase in pluvial flood risk elsewhere.

*(v) OS Mapping*

Historic OS mapping for the Site shows the environs of the Site to have a relatively dense network of open land drains, particularly so east of Tinnycross Road. This is consistent with flat areas with poorly draining soils. This mapping also shows an open drain towards the northeast of the Site.





**Figure 6.1 Historic OS mapping**

**6.2 Flood Risk Indicators – Site Walkover**

No evidence of open drains or surface water pipes entering the Site was observed.

Manholes were observed at the Site and subsequent examination of Irish Water records confirmed these to be associated with Irish Water Sewers.

**6.3 Initial Assessment**

Historic OS mapping indicated an open drain through the Site, however this is not present today. The line of this drain should be exposed and, if not already done, the channel backfilled with a free draining uniformly graded rockfill with no fines, thus maintaining the drainage path.

There are no indicators of pluvial flood risk at the Site and detailed assessment of this mechanism is not required.

## **7. RESIDUAL FLOOD RISK**

Residual risk is the risk that remains after all mitigation measures to reduce the frequency of flooding have been taken.

### **7.1 Climate Change**

As described in Section 2.7, the assessment considered flood risk associated with the Mid-Range Future Scenario (MRFS).

The OPW has adopted a second indicative potential futures for flood risk assessment; the High-End Future Scenario (HEFS). The HEFS is based on a more extreme future based on the upper end of the range of projections of future climatic conditions. It is considered as a residual flood risk.

## **8. DEVELOPMENT MANAGEMENT JUSTIFICATION TEST**

The Guidelines require a Justification Test for development of Sites being considered in areas of moderate or high flood risk.

This assessment has been found to be not at risk of flooding and so the Justification Test is not required.

## **9. SUMMARY AND CONCLUSION**

### **9.1 Summary**

This report presents the findings of a Site-specific flood risk assessment (SSFRA) carried out by Kilgallen and Partners for a proposed residential development of lands off Old Golf Links Road, Dundalk [‘the Site’]. The SSFRA was carried out in accordance with the document *‘Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)’*.

For an inland Site of this nature and for which there are no existing flood defence mechanisms that could affect flood risk at the Site, the potential flood risk mechanisms are Fluvial, Groundwater and Pluvial.

Initial assessment of existing flood risk indicators indicate the Site is not at risk from Groundwater, Pluvial or Fluvial flooding.

The surface water drainage system for the development incorporates SUDS measures to facilitate infiltration to ground of surface water run-off. Discharge of surface water run-off is restricted in accordance with the GSDSDS to ensure the development will not give rise to an increase in flood risk elsewhere.

### **9.2 Conclusion**

The proposed development is not at risk of flooding and will not increase flood risk elsewhere. The proposed development is therefore appropriate from a flood risk perspective.