

# FLOOD RISK ASSESSMENT

AT

KILBODERRY

CARRICK-ON-SHANNON

CO. LEITRIM



**Prepared for**  
Leitrim County Council

**Prepared by**  
Traynor Environmental Ltd

**Reference Number**  
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Technical Reviewer Signature

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## 1.0 INTRODUCTION

Traynor Environmental Ltd have been appointed to carry out a site-specific flood risk assessment for the proposed development at Kilboderry, Carrick-on-Shannon, Co. Leitrim.

This report is intended to satisfy the requirements of Leitrim County Council, relating to a proposal to Construct a housing development containing 18 no. fully serviced residential units consisting of 12 no. 2 bedroom dwellings (in 2 No. terraced blocks), 6 no. 1 bedroom apartments (in 2 No. blocks), connections to existing foul main, watermain and surface water discharge, landscaped open space and all ancillary and associated works.

### 1.1 Flood Risk Management Guidelines (2009)

As per the Flood Risk Management Guidelines (2009), where flood risk may be an issue for any proposed development, a flood risk assessment (FRA) should be carried out that is appropriate to the scale and nature of the development and the risks arising. The flood risk assessment outlined herein is intended to be sufficiently detailed to quantify the risks and effects of any flooding, necessary mitigation measures, together with recommendations on how to best manage any residual risks.

As per the document 'The Planning System and Flood Risk Management (2009)' the flood risk assessment will consist of the following sections:

- Site description
- Site layout
- S-P-R model; sequential approach; justification test
- Determination of flood level
- Mitigation measures
- Conclusions

Traynor Environmental carried out site inspections on 10<sup>th</sup> November 2022. The inspection consisted of a walkover and visual inspection of the site and in the vicinity of the site.

### 1.2 Methodology

The methodology used for the flood risk assessment is based on '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (2009)' and also incorporating the *Strategic Flood Risk Assessment*. The FRM Guidelines require the planning system at national, regional, and local levels to:

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development.
- Adopt a sequential approach if applicable to flood risk management when assessing the location for new development based on avoid, substitute, justify, mitigate, and proceed; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

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### 1.3 Stages of the Flood Risk Assessment

The detail and complexity of the study required should be appropriate to the scale and potential impact of the development. For the purposes of this study, the following have been considered:

- Available information on historical flooding in the area.
- Site level information.
- Details of structures, which may influence hydraulics of the watercourse and consideration of the effect of blockage of structures.
- Estimates of design levels when works have been completed.

#### **Structure of the Flood Risk Assessment**

The Planning System and Flood Risk Management-Guidelines for Planning Authorities (Department of the Environment & Local Government November 2009) recommend that a staged approach is adopted when undertaking a Flood Risk Assessment (FRA). The recommended stages are briefly described below: -

##### **• Stage 1 – Flood Risk Identification**

To identify whether there may be any flooding or surface water management issues that will require further investigation. This stage mainly comprises a comprehensive desk study of available information to establish whether a flood risk issue exists or whether one may exist in the future.

##### **• Stage 2 - Initial Flood Risk Assessment**

If a flood risk issue is deemed to exist arising from the Stage 1 Flood Risk Identification process, the assessment proceeds to Stage 2, which confirms the sources of flooding, appraises the adequacy of existing information, and determines the extent of additional surveys and the degree of modelling that will be required. Stage 2 must be sufficiently detailed to allow the application of the sequential approach within the flood risk zone.

##### **• Stage 3 - Detailed Flood Risk Assessment**

A detailed FRA is carried out where necessary to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk.

### 1.4 Development Plans and Policy Context

The Leitrim County Development Plan 2015 - 2023 currently in place (Strategic Flood Risk Assessment) has been considered in this SFRA.

## 2.0 SITE DESCRIPTION & LOCATION

### 2.1 Site Description

The application site is located on the north-eastern outskirts of Carrick-on-Shannon town, approximately 1.3km north-east of the town centre. Access to the site will be via the creation of an entrance that is just off a local, third-class road (Summerhill Road). The site is bounded to the south-east by this road, to the south-west by a residential estate, to the north-east by a single, residential dwelling site and to the north-west by agricultural land.

The predominant land-use surrounding the site consists of the urban fabric of Carrick-on-Shannon town (residential, industrial, commercial and amenity areas) whilst agriculture is the dominant land-use on lands on the outskirts of Carrick-on-Shannon and to the north and south of the site.

**Figure 1 - Site Location**



### 2.2 Development Proposal

Part 8 Consultation is being carried out by Leitrim County Council. The proposed new dwellings have a finished floor level of 62.80 – 65.19m.

Figure 2 - Site Layout Plan and levels

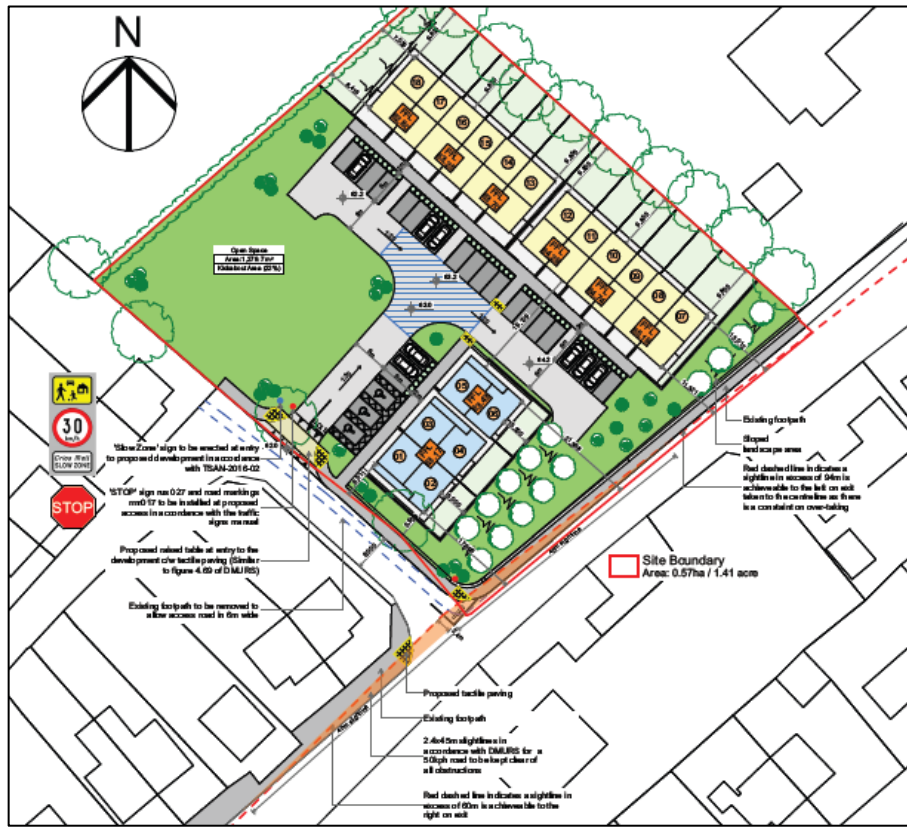


Figure 3 - Topographical Survey



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### 2.3 Site Levels and Topography Survey

A topographical site survey which is incorporated into the site layout plan. All elevations quoted being relative to Malin Head Datum. The proposed finished floor levels of the new dwellings range from 62.80 – 65.19mOD. No area of the proposed site is prone to pluvial and fluvial flooding according to the OPW National Flood Hazard Map, National Flood Hazard Map, GSI Subsoil Mapping, Historical OSI Map, Groundwater Flood Mapping and CFRAM River Flood Extents. Elevations of the site are outlined in Table no. 1 below.

**Table 1.0 Site Elevations**

Location	Proposed Elevation (mOD)
Proposed Dwellings finished floor levels	62.80 – 65.19
Elevation at the development entrance	62.00
Elevation at the northeast boundary	61.29 – 68.61
Elevation at the northwest boundary	58.30 – 61.29
Elevation at the southwest boundary	58.30 – 65.07
Elevation at the southeast boundary	65.07 – 68.61
Level of access road into the site	62.00 – 65.60

Wynne Gormley Gilsenan Architects & Surveyors presented a site layout map which shows the proposed new development to be located on the site see Figure 2 & 3 above. The site is accessed via the southwestern boundary of the site. The lowest part of the site is towards the west corner. A copy of the topographical survey drawing is included in appendix A



### 3.0 GEOLOGY & HYDROGEOLOGY

The hydrogeology of the site was assessed by means of a desk study of relevant literature. This included available geological and hydrogeological information and maps from the Geological Survey of Ireland (GSI) and the EPA. Groundwater can be defined as water that is stored in, or moves through, pores and cracks in subsoils.

#### 3.1 Soils

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the development site. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 4 below illustrates the sub-soils mapping for the general area of the site.

**Figure 4 - GSI Subsoil Mapping**

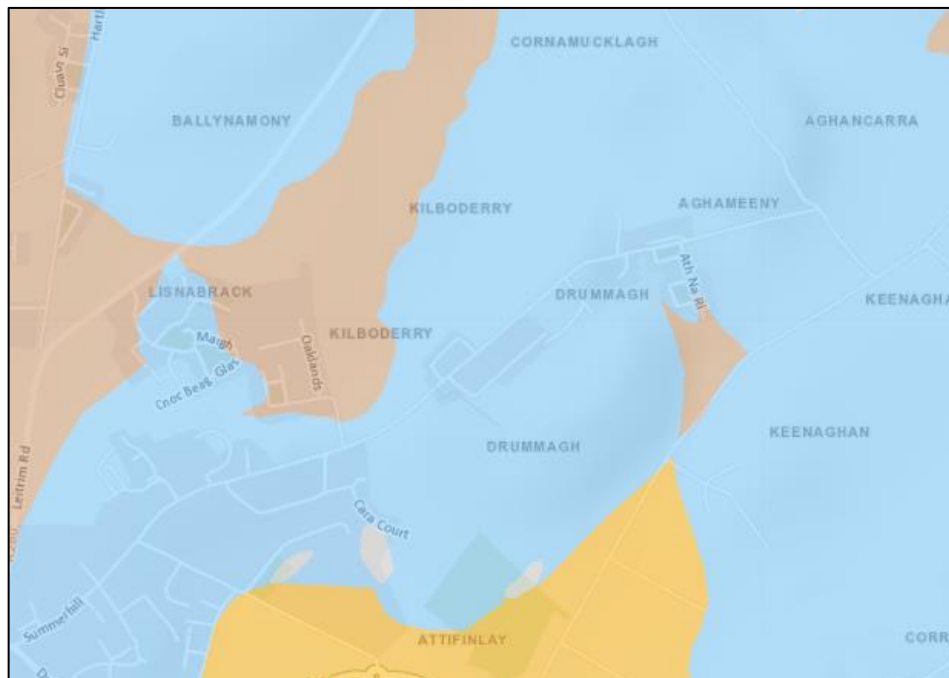


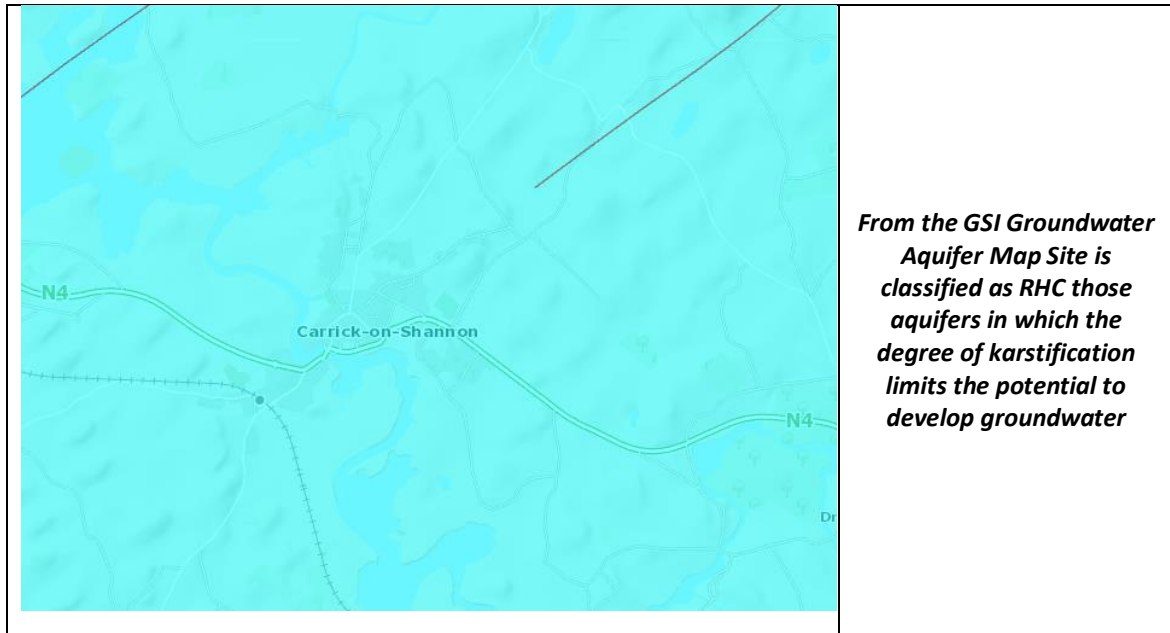
Figure 4 above indicates that the development site is entirely underlain by till derived from limestone. There are no alluvial deposits mapped within the boundary of the site.

#### 3.2 Hydrology

The potential of rock to store and transport water is governed by permeability of which there are two types, intergranular and fissure permeability. The GSI, EPA and the Department of Environment, Heritage, and Local Government (DOEHLG) have developed a Programme of Groundwater Protection Schemes (GPWS), with the aim of maintaining the quality and quantity of groundwater in Ireland, and in some cases improving groundwater quality, by applying a risk assessment approach to groundwater protection and sustainable development.

From the GSI maps for the area it can be seen that the bedrock aquifer underlying the site is located within an area of low groundwater vulnerability.

**Figure 5 Groundwater/Aquifer Map**



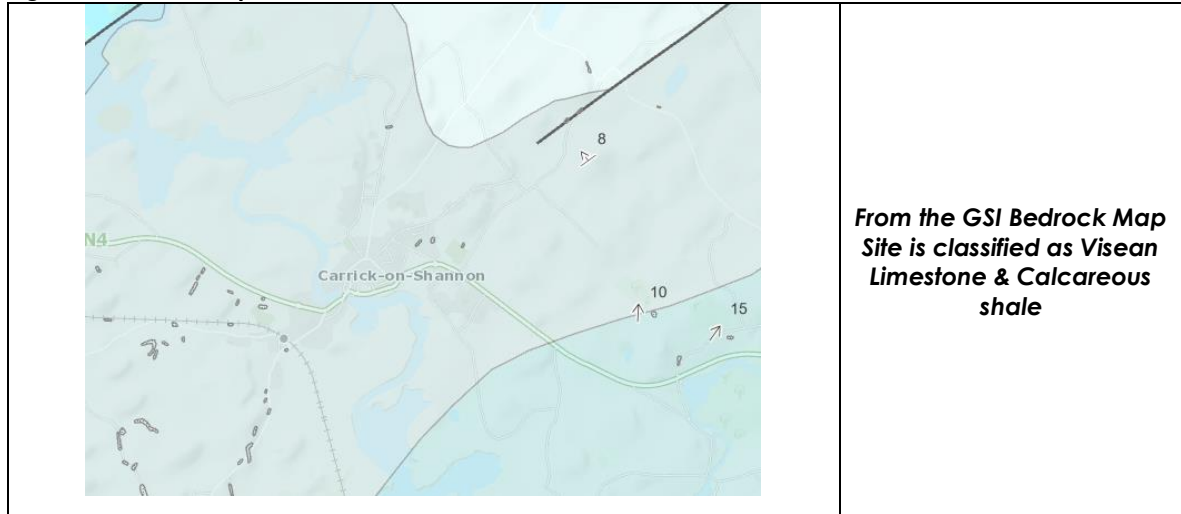
**Figure 6 Vulnerability Map**



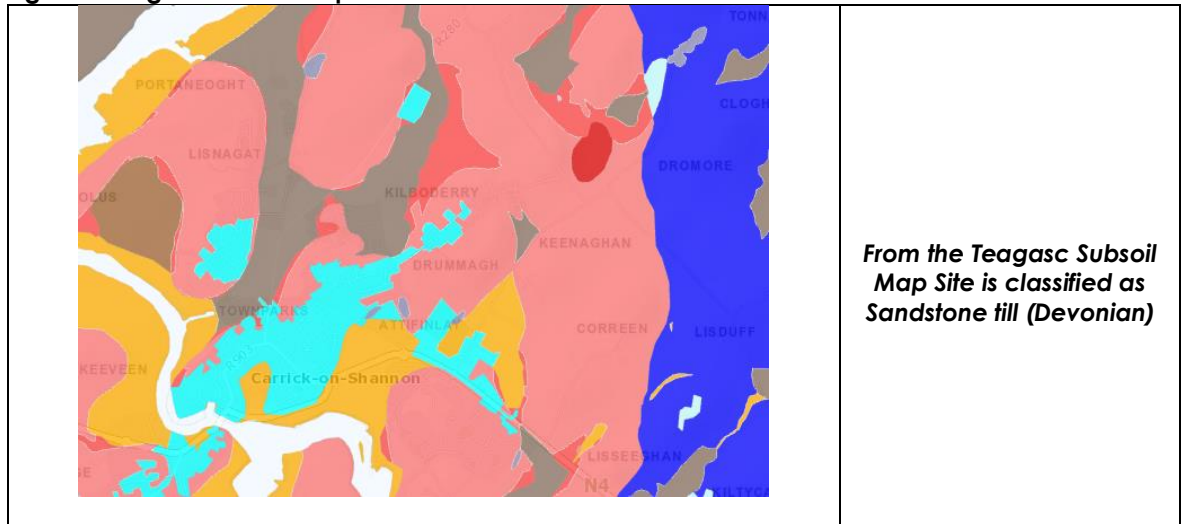
### **3.3 Affected Water bodies**

The application site is located within the Upper Shannon Hydrometric Area (26), Catchment (26C), Sub-Catchment (030) and Sub-Basin (060). During the survey carried out by Traynor Environmental Ltd no drains or streams within or adjacent to the application site. The Attifinlay Stream is 396m south of the application site. This stream flows towards the River Shannon, which is 1.1km south of the application site. There is no connectivity between the site and the Attifinlay Stream or any other watercourse.

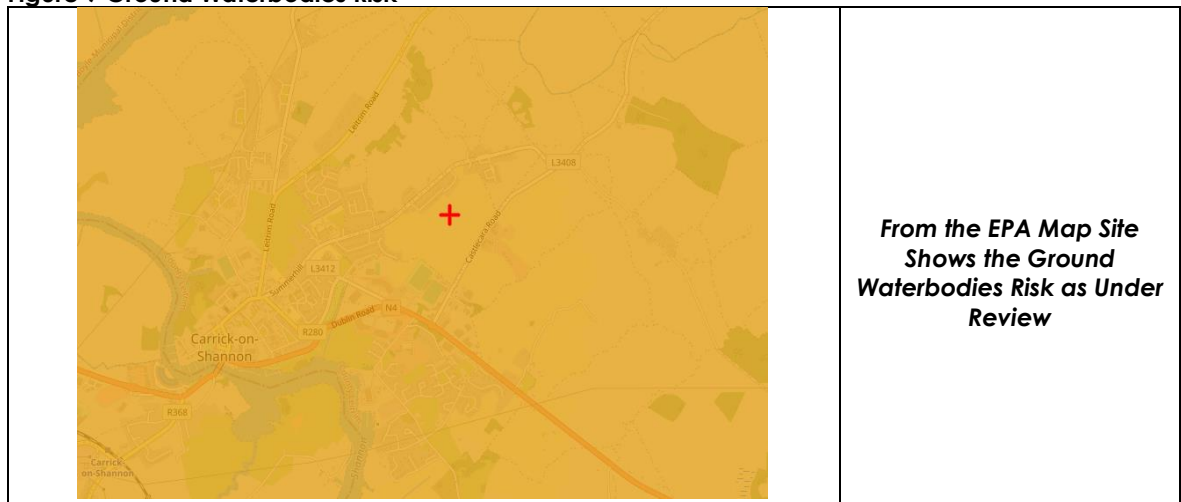
**Figure 7 Bedrock Map**



**Figure 8 Teagasc Subsoil Map**



**Figure 9 Ground Waterbodies Risk**



## 4.0 FLOODING HISTORY

As part of the study data collection phase, a number of available sources of information generally as set out in the *Planning and Flood Risk Management – Guidance for Planning Authorities* were investigated in order to build an understanding of the potential risk of flooding to the site. The following review highlights the key findings of the anecdotal evidence collection exercise.

### 4.1 Published Information

#### 4.1.1 OPW National Preliminary Flood Risk Assessment

The OPW is the lead agency for flood risk management in Ireland and is the national competent authority for the EU Floods Directive. OPW works in close partnership with all Local Authorities in delivering the objectives of the CFRAM Programme.

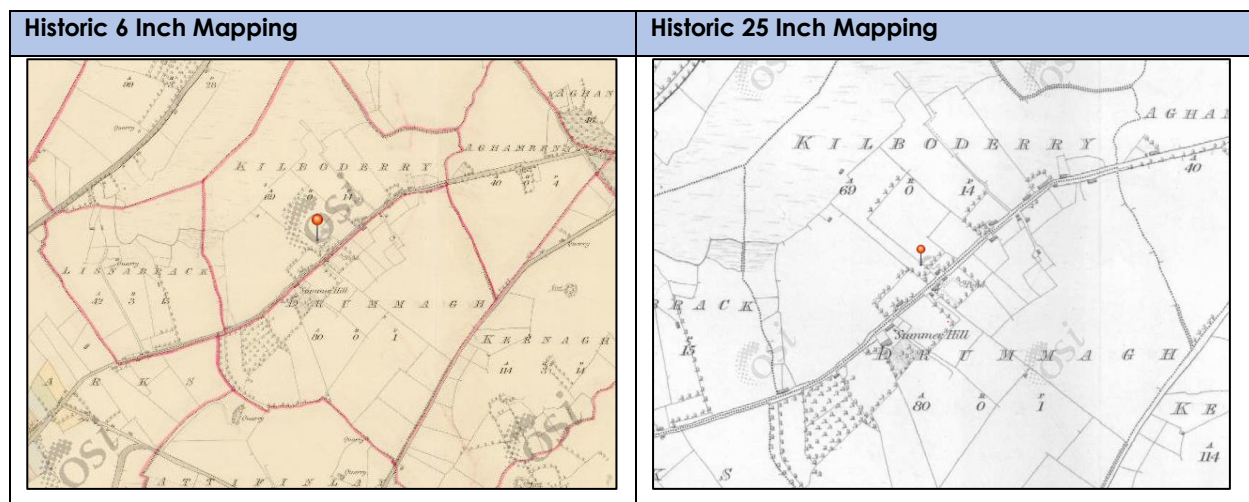
#### 4.1.2 OPW National Flood Hazard Mapping

The OPW's online National Flood Hazard Mapping Database provides information on reported floods, in the form of reports, photographs and newspaper articles. The database provides information on historic flooding events. No flooding events are recorded within the site area.

### 4.2 Historical OSI Maps

The historical 6" OSI maps, dated c.1830-1840, and slightly more detailed 25" OSI maps, dated later c.1900-1910, show no structures on the proposed site. The land would have been typically used for agricultural grazing. There are no indicators of flooding on historical maps.

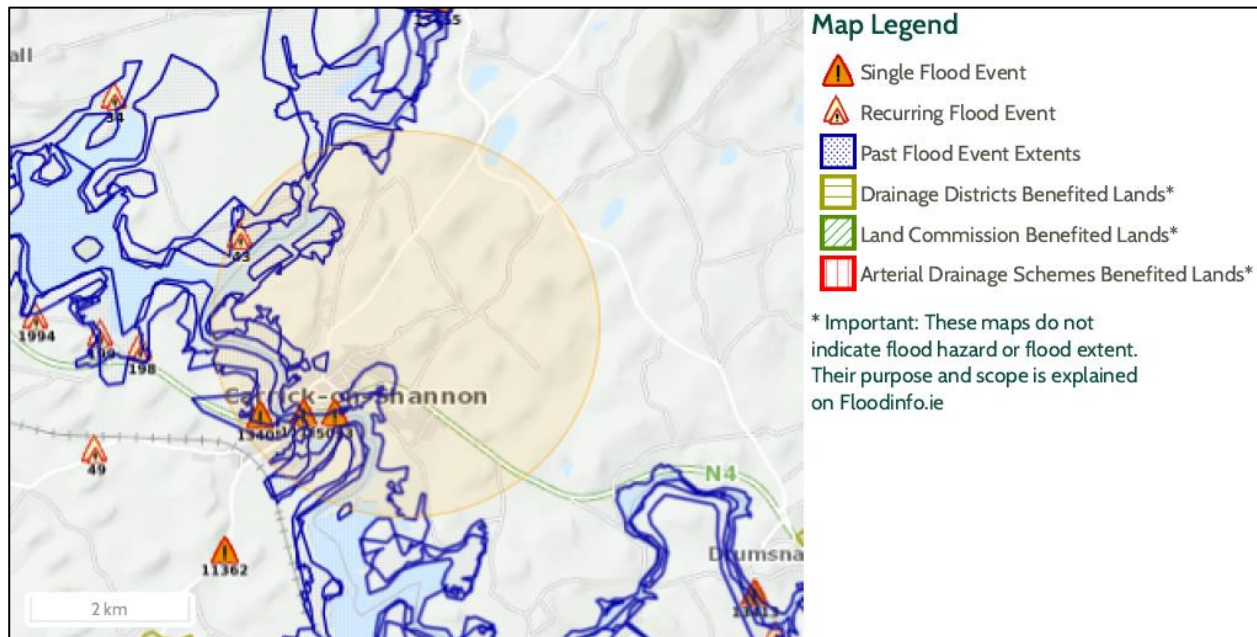
Figure 10 Historical OSI Maps



### 4.3 OPW National Flood Hazard Mapping

The historic flood event data map for Kilboderry, Carrick-on-Shannon, Co. Leitrim area obtained from the OPW flood mapping website is shown in Figure 11. The map provides no evidence of any actual historical flood events occurring at the site. Flooding has occurred within 2.5km of the site. This has mainly occurred along the banks of the River Shannon.

**Figure 11 - OPW National Flood Hazard Map**



In Summary the OPW Flood Mapping indicates that:

- The site is not classified as Benefiting Lands.
- OPW flood maps indicate that no flooding events occurred on the proposed site.

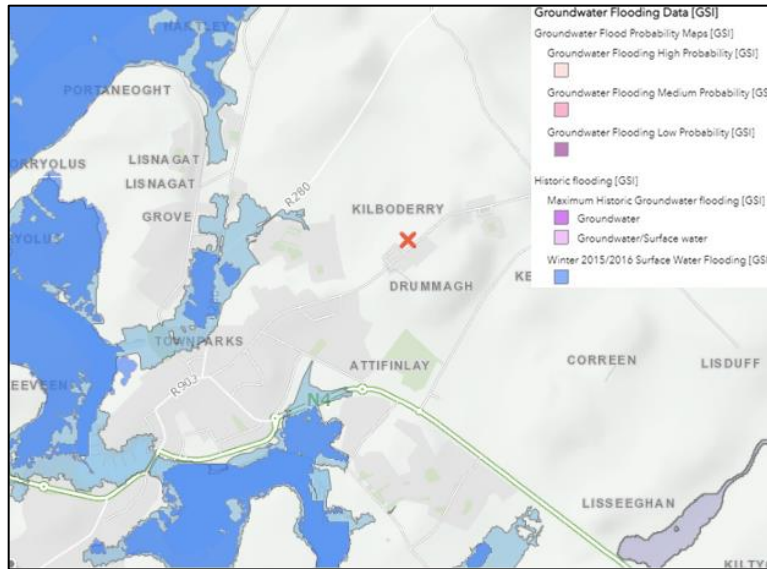
### 4.4 Groundwater Flood Mapping

Historic and Predictive Groundwater Mapping for Ireland was prepared by the GSI Department of Communication, Climate Action, and Environment in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Figure 12 below illustrates an extract from the above groundwater flood mapping in the vicinity of the development site.

The GSI Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located in the vicinity of the development site.

**Figure 12 - Groundwater Flood Map (Site marked +)**



#### 4.5 CFRAM Fluvial Flood Risk Map

This area of County Leitrim has not been included as an Area of Further Assessment as part of the CFRAM Study.

#### 4.6 CFRAM River Flood Extents – Present Day

The below CFRAM River Flood Extents map indicates no areas of predictive flooding located in the vicinity of the development site.

**Figure 13 - CFRAM River Flood Extents (Site marked X)**

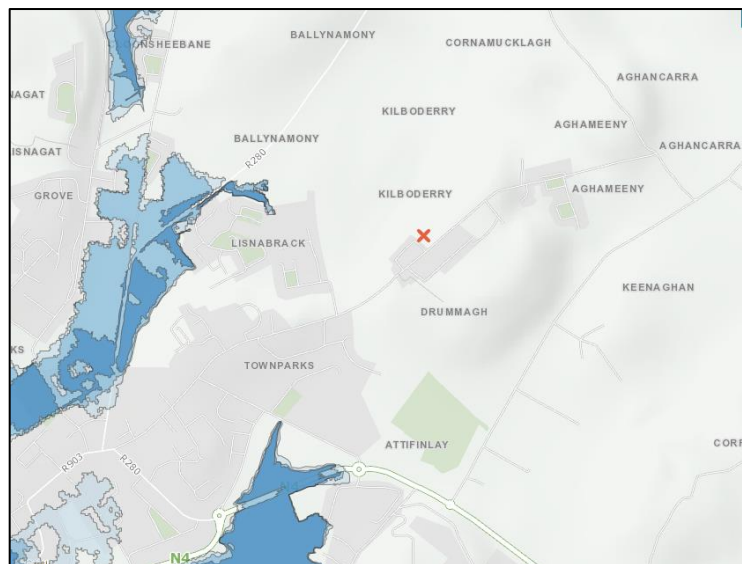


Figure 13 identifies that:

- The proposed site is approximate 500m east of the closest flood modelled area.
- No area of the site is at risk of flooding

## 5.0 Assessment of Flooding Mechanisms

### 5.1 Preamble

The Irish government, as part of its development control procedures, advises against inappropriate development in areas at risk of flooding and the avoidance of new developments increasing flood risk elsewhere in accordance with their Planning Policy Document. The following assessment determines the flood hazards to the life and property at the site in order to subsequently assess the site and proposed development relative to the Flood Risk Framework contained within the Planning Policy Document.

### 5.2 Initial Assessment

The following is a record of the screening assessment of the development site for potential flooding mechanisms requiring subsequent detailed assessment, based on the information obtained from the background information review and consultations.

**Table 2.0 Possible Flooding Mechanisms**

Source/Pathway	Significant	Comment/Reason
<b>Fluvial Flooding</b>		
Flood Plain	No	The site is not located on a floodplain.
Structure Blockage	No	No hydraulic features where noted.
Flood Defence Failure	N/A	There are no flood defences located in the vicinity of the site.
<b>Coastal Flooding</b>		
Tidal/Coastal	N/A	Site is not at affected by tidal/coastal flooding.
<b>Other</b>		
Urban drainage	No	Urban drainage will not be affected.
Fluvial Flooding	N/A	None of the site is affected by Fluvial Flooding.
Groundwater	N/A	Ground water flooding not deemed to be an issue.
Pluvial Flooding	No	None of the site is affected by Pluvial Flooding.
Infrastructure failure	No	Infrastructure failure not expected to be an issue on the site.
Rainfall Ponding	No	Rain fall ponding is not expected to be an issue on the site.
Reservoirs /Canals/ Artificial Sources	N/A	There are no impoundments or reservoirs in close proximity, or which drain to the site.

### 5.3 Flood Mechanisms

Flooding is a natural process and can happen at any time in a wide variety of locations. Flooding can come from rivers and the sea, directly from rainfall on the ground surface and from rising groundwater, surcharging sewers and drainage systems.

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### **5.3.1 Fluvial Flooding**

Fluvial Flooding occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas (the natural floodplains). This can arise where the runoff from heavy rain exceeds the natural capacity of the river channel and can be exacerbated where a channel is blocked or constrained or, in estuarine areas, where high tide levels impede the flow of the river out into the sea.

Different rivers will respond differently to rainfall events, depending on a range of factors such as the size and slope of the catchment, the permeability of the soil and underlying rock, the degree of urbanization of the catchment and the degree to which flood waters can be stored and slowly released into lakes and along the river's floodplains. A storm of a given rainfall depth and duration may cause flooding in one river, but not in another, and some catchments may be more prone than others to prolonged rainfall or a series of rain events. River flooding can occur rapidly in short, steep rivers or after some time, and some distance from where the rain fell, in larger or more gently flowing rivers. Changes in rainfall patterns, such as might be caused by climate change, will have different impacts on flood magnitudes and frequency in different catchments. There are no surface water channels located along the site boundaries. The National Flood Hazard Map also showed no indication of previous fluvial flood events at the site. Fluvial flood risk is therefore not deemed to be a potential source of flooding. GSI Subsoil Mapping, Historical OSI Map and CFRAM River Flood Extents did not identify the site as being at risk of fluvial flooding.

### **5.3.2 Pluvial flooding:**

This type of flooding is defined as flooding from rainfall-generated overland flow before the runoff enters any watercourse or sewer. This mainly occurs when intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems, can run quickly off land and result in local flooding. It can also result when the drainage system is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity. Flood risk from pluvial flooding exists in all areas. Provision of adequate storm water drainage systems will minimise the risk of pluvial flooding sources.

There is no area inside the site boundary being at risk of pluvial flooding according to the GSI Subsoil Mapping, Historical OSI Map, Groundwater Flood Mapping and National Flood Hazard Map. There is no evidence of seasonal flooding within the site boundary. Figures 2 & 3 includes the topographical map for the site. The topographical map show that any accumulation of surface water is likely to drain naturally towards the west corner.

### **5.3.3 Groundwater flooding:**

Groundwater flooding occurs when water levels in the ground rise above surface elevation following prolonged and heavy rainfall. It is most likely to occur in low-lying areas underlain by permeable rocks. Groundwater flooding may take weeks or months to dissipate because groundwater flow is much slower than surface flow and water levels thus take much longer to fall.

There is no history of groundwater flooding at the site. Groundwater flow direction appears to be from east to west and the hydraulic gradient is relatively shallow.



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## 5.4 Benefiting Lands

None of the site or the access road is classified as being in benefiting lands. Benefitting land maps were prepared to identify areas that would benefit from land drainage schemes and typically indicate low-lying land near rivers and streams that might be prone to flooding. The emphasis of these schemes was the improvement of agricultural land.

## 5.5 Flood Risk Zones

The *Planning System and Flood Risk Management Guidelines* (hereinafter referred to as the PSAFRM Guidelines) adopt a sequential approach to managing flood risk by reducing exposure to flooding through land-use planning. The approach adopted by the PSAFRM Guidelines establishes three zones (PSAFRM Guidelines paragraph 2.23) on a sliding scale of flood risk – see Table 3.0.

**Table 3.0: Flood Risk Zones**

<b>Zone A</b>	<b>High Probability of Flooding</b> Where the annual probability of flooding is: greater than 1% AEP for fluvial flooding or greater than 0.5% AEP for coastal flooding
<b>Zone B</b>	<b>Moderate Probability of Flooding</b> Where the annual probability of flooding is: between 0.1% AEP and 1% AEP for fluvial flooding or between 0.1% AEP and 0.5% AEP for coastal flooding
<b>Zone C</b>	<b>Low Probability of Flooding</b> Where the annual probability of flooding is: less than 0.1% AEP for fluvial flooding and less than 0.1% AEP for coastal flooding

The PSAFRM Guidelines classify potential development in terms of its vulnerability to flooding. The types of development falling within each vulnerability class are described in Table 3.1 of the PSAFRM Guidelines.

The 'Planning System and Flood Risk Management Guidelines' list the planning implications for each flood zone, as summarised below.

### 5.5.1 Zone A – High Probability of Flooding

Most types of development would not be considered in this zone. Development in this zone should only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the 'Planning System and Flood Risk Management Guidelines' justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and recreation would be considered appropriate in this zone.

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### **5.5.2 Zone B – Moderate Probability of Flooding.**

Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport, and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general, however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

### **5.5.3 Zone C – Low to Negligible Probability of Flooding**

Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

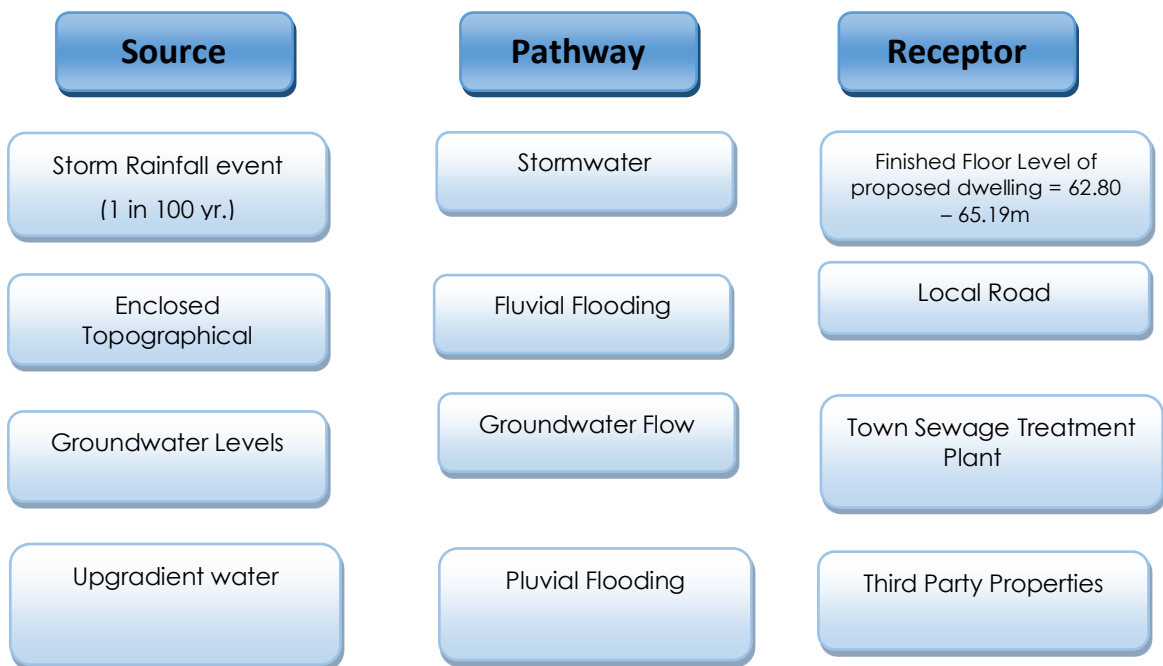
## **5.6 Zone Area of the Site**

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the output and findings of this Site-Specific Flood Risk Assessment indicate that the site falls within Flood Zone C. In accordance with the 'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009' the development is therefore not subject to the requirements of The Justification Test.

## 6.0 S-P-R Model

The flood risk assessment is carried out using the source-pathway-receptor (S-P-R) model, as outlined below. The S-P-R model is used to identify the sources of flood water, the people and assets affected by potential flooding, and the pathways by which the flood water reaches those receptors. Consideration will be given to the predominant sources, pathways, and receptors in terms of the influence they have on site flooding, or the manner in which they may be impacted. The primary water sources on site are as follows:

**Figure 14: Source – Pathway – Receptor Model**



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## **7.0 DESIGN FLOOD LEVELS**

The Flood Risk Guidelines (2008) require a freeboard of 300 mm above extreme flood level, plus a climate change factor. There is no extreme flood level for the proposed site.

The Proposed finished floor levels for the dwellings are 62.80 – 65.19mOD. and the level of the existing access road ranges from 62.00 – 65.60mOD

## **8.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS**

### **8.1 Flood Risk to Proposed Developments**

The proposed development will not cause flooding to any other proposed developments in the area due to the finished floor level of the new buildings.

### **8.2 Flood Risk to Adjacent Developments**

The development will not cause any direct increased flood risk to adjacent properties or land holdings as the ground level is not being raised.

### **8.3 Design Considerations/Mitigation Measures**

#### **8.3.1 Flood Storage Compensation**

No additional flood storage compensation is deemed necessary.

#### **8.3.2 Drainage Design**

Surface water drainage design is to be as per the requirements of Leitrim County Council Water Services Department and any additional Code of practice they may require.

#### **8.3.3 Maintenance**

The developer is to ensure that maintenance of the site drainage which will include management of vegetation, cleaning of obstructions etc. is provided for as part of the overall management plan for the site.

### **8.4 Access and Egress**

The primary exit route is on the southwest boundary of the site which connects to the existing road network.

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## 9.0 CONCLUSION

Based on the flood risk assessment, we conclude that the proposed development:

- Will not be at risk of flooding.
- There will be no need for any additional fill on the site.
- Will not obstruct or impede important flow paths.
- Will not result in residual risks to the area and/or development that cannot be managed to an acceptable level.
- The access road is not at risk of flooding.

**Signed:**



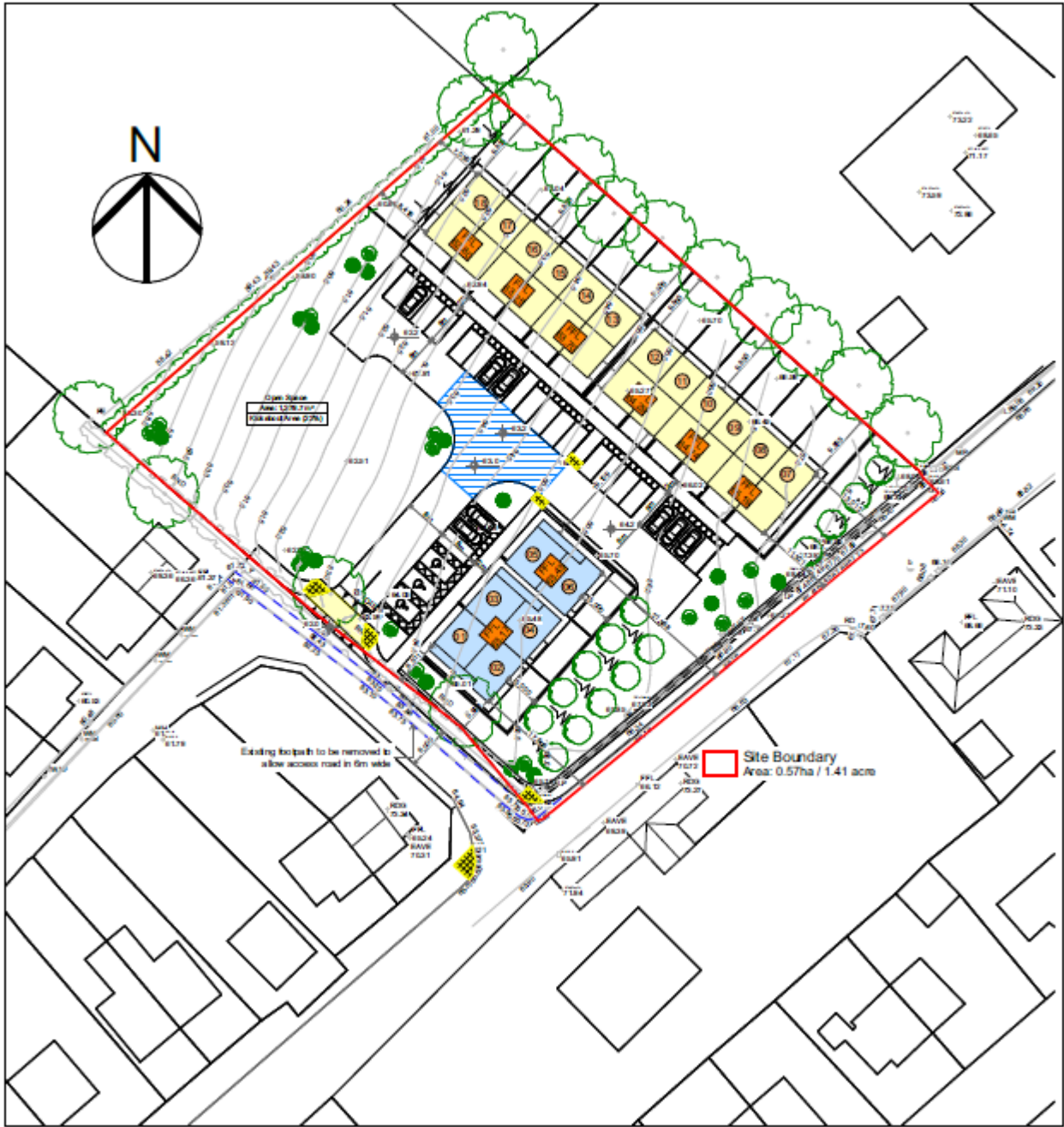
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For Traynor Environmental Ltd

## APPENDIX A – TOPOGRAPHICAL SURVEY





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FLOOD RISK ASSESSMENT

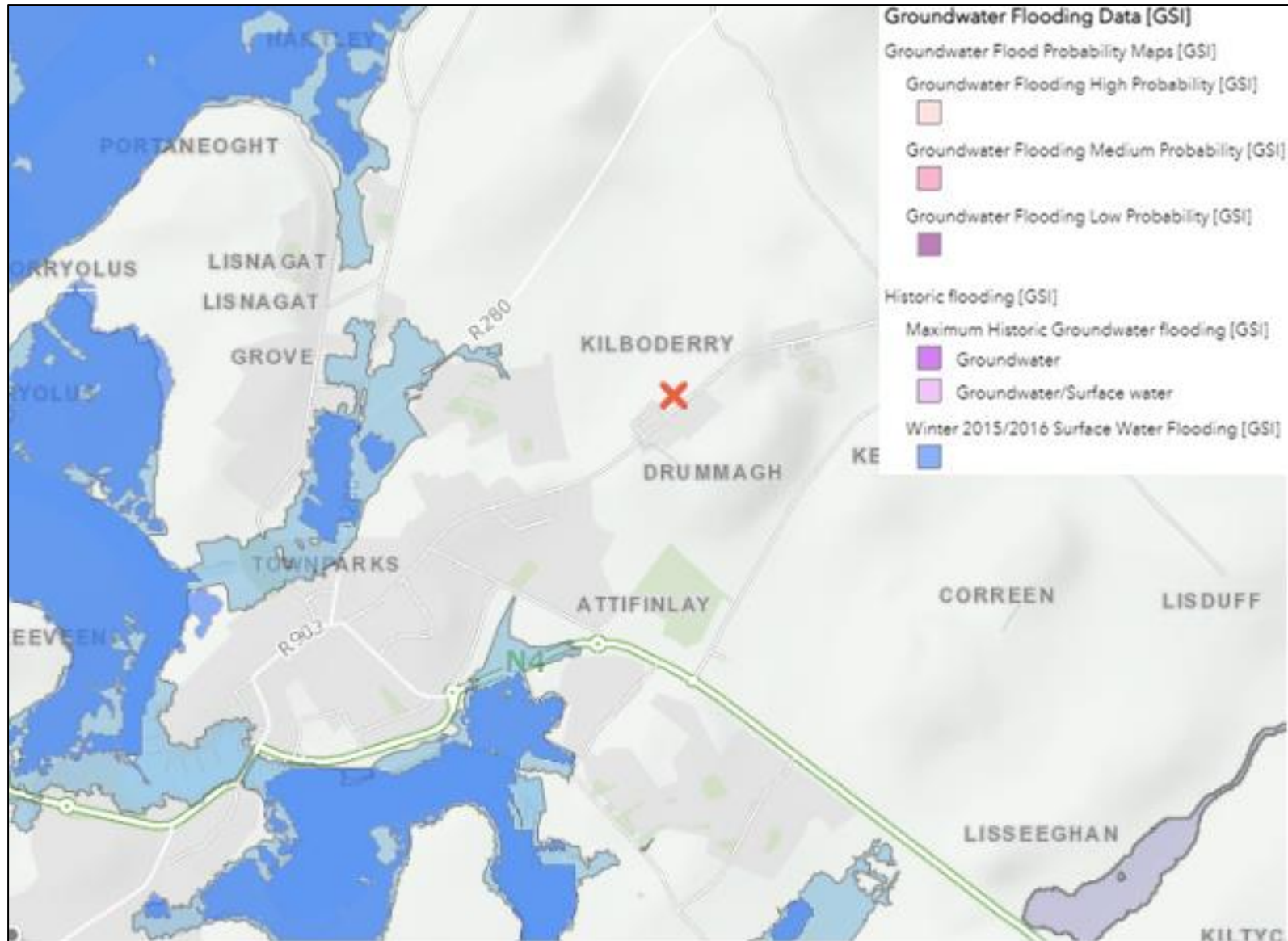
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## APPENDIX B – GROUNDWATER FLOOD MAP







**FLOOD RISK ASSESSMENT**

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**APPENDIX C– CFRAM RIVER FLOOD EXTENTS – PRESENT DAY**



