

STRATEGIC FLOOD RISK ASSESSMENT

Draft Kildare Town Local Area Plan 2023-2029



16 March 2023

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Contents

1	INTRODUCTION	1
1.1	Background	1
1.2	Report Objectives.....	1
1.3	Disclaimer.....	1
1.4	Report Structure	2
2	STUDY AREA	3
2.1	Introduction.....	3
2.2	Watercourses	3
2.3	Topography	4
2.4	Soils.....	5
3	THE PLANNING SYSTEM AND FLOOD RISK MANAGEMENT GUIDELINES FOR PLANNING AUTHORITIES	6
3.1	Introduction.....	6
3.2	Flood Risk Assessment.....	6
3.2.1	Flood Risk Assessment Approach.....	6
3.2.2	Types of Flooding	7
3.2.3	Flood Risk	7
3.3	Flood Zones	8
3.4	Climate Change	8
3.5	Strategic Flood Risk Assessment	9
3.6	Sequential Approach and Justification Test.....	10
3.7	Development Plan Justification Test.....	11
4	DEVELOPMENT MANAGEMENT AND FLOOD RISK.....	14
4.1	Overview	14
4.2	Surface Water and Drainage.....	14
4.2.1	Overview	14
4.2.2	SuDS Guidance	15
4.3	Residual Risk	17
4.4	Development Proposals in Flood Zones	17
4.4.1	Overview	17
5	STAGE 1 – FLOOD RISK IDENTIFICATION	18
5.1	Overview	18
5.2	Source-Pathway-Receptor Model.....	18
5.3	Flood Risk & Flood Studies Information.....	19
5.4	Historical Flooding.....	19
5.4.1	Floodinfo.ie	19
5.4.2	Kildare Town Surface Water Study.....	20
5.5	Predictive Flood Mapping.....	20
5.5.1	Catchment Flood Risk Assessment and Management (CFRAM)	20
5.5.2	National Indicative Flood Mapping (NIFM)	21
5.6	Conclusion of Stage 1	21
6	STAGE 2 – INITIAL FLOOD RISK ASSESSMENT	22
6.1	Overview	22
6.2	Coastal Flooding	22
6.3	Fluvial Flooding	22
6.4	Groundwater Flooding.....	22
6.5	Pluvial Flooding.....	23
6.5.1	Combined Sewer Network.....	23
6.5.2	M7 Drainage Network	24

6.5.3	Surface Water Networks Draining to Infiltration.....	24
6.5.4	Identified Area of Potential Flood Risk	25
6.6	Conclusion of Stage 2	25
7	DEVELOPMENT PLAN ZONING	26
7.1	Introduction.....	26
8	FLOOD RISK MANAGEMENT POLICIES AND OBJECTIVES	28
8.1	General Development Plans and Strategies.....	28
9	SUMMARY	29
9.1	Overview	29
9.2	Flood Zones and Flood Risk	29
9.3	Flood Management Policies and Objectives.....	29
9.4	SFRA Review and Monitoring	29

Tables

Table 3-1	Flood Event Probabilities.....	8
Table 3-2	Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test	10
Table 3-3	Classification of vulnerability of different types of development.....	11
Table 3-4	Justification Test for Development Plans	13
Table 4-1	Justification Test for Development Management	14
Table 5-1:	Possible Flooding Mechanisms	18
Table 8-1	LAP Flood Risk Management policies	28

Figures

Figure 2-1	Kildare Town Locality and Watercourses.....	3
Figure 2-2	Kildare Town LAP Boundary and Topography.....	4
Figure 2-3	Soils Hydrology in the Study Area.....	5
Figure 3-1	Flood Risk Assessment Source – Pathway – Receptor Model.....	7
Figure 3-2	Sequential approach principles in Flood Risk Management	10
Figure 5-1:	Past Flood Events (floodinfo.ie)	19
Figure 5-2	Areas with Reported Infiltration Capacity Issues	20
Figure 5-3	Predictive Flood Mapping.....	21
Figure 6-1	Groundwater Flooding Data from GSI Data Viewer	22
Figure 6-2	Agglomeration served by the combined sewer network	23
Figure 6-3	M7 Drainage Network and Connected Areas	24
Figure 6-4	Areas Draining to Infiltration.....	24
Figure 6-5	Identified Area of Potential Pluvial Flood Risk	25
Figure 7-1	Development Plan Zoning.....	27

1 INTRODUCTION

1.1 Background

Kildare County Council (KCC) has prepared a Kildare Town Local Area Plan (LAP) 2023 - 2029 in accordance with the requirements and provisions of the Planning and Development Act 2000, (as amended) (the “Act”). The LAP sets out an overall strategy for the proper planning and sustainable development of Kildare Town in the context of the Kildare County Development Plan 2023-2029, the Regional Spatial and Economic Strategy for the Eastern and Midland Region 2019-2031 and the National Planning Framework (2018). It is informed by Ministerial Guidelines issued pursuant to Section 28 of the Act together with EU requirements regarding Strategic Environmental Assessment (SEA), Appropriate Assessment (AA) and Strategic Flood Risk Assessment (SFRA).. The period of the LAP shall be taken as being six years from the date of its adoption or until it is reviewed, or another plan made, unless it is extended under section 19(d) of the Planning and Development Act 2000 (as amended).

KCC commissioned RPS to carry out a Strategic Flood Risk Assessment (SFRA) to support and inform the preparation of the LAP. The SFRA is prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014) referred to hereafter as “The Guidelines”. The SFRA therefore informs policy regarding inappropriate development in areas at risk of flooding and identifies areas where Site Specific Flood Risk Assessments (SSFRA) should be undertaken for development.

1.2 Report Objectives

The objective of this report is to prepare a SFRA for the Kildare Town LAP in accordance with The Guidelines. The SFRA provides an assessment of all types of flood risk within the LAP boundary and enables KCC to make informed strategic land-use planning decisions and to formulate flood risk policies. A review of available flood risk information was undertaken to identify any flooding or surface water management issues related to the town that may warrant further investigation.

The best available data at the time of preparation was acquired from the Office of Public Works (OPW) Eastern Catchment Flood Risk Assessment Management (CFRAM) Studies. The CFRAM Studies have generated flood zone mapping that have enabled KCC to apply The Guidelines’ sequential approach, to appraise sites for suitable land zoning, and identify how flood risk can be managed as part of the development / local area plan.

1.3 Disclaimer

The SFRA has been prepared in compliance with The Guidelines. It should be noted that the SFRA remains a live document and is based on the best available data at the time of preparation. It is subject to change based on more up to date and relevant flood risk information becoming available during the lifetime of the LAP.

All information in relation to flood risk is provided for general policy guidance only. All landowners and developers are instructed that KCC and their consultants can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Furthermore owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.

It should be noted that the CFRAM mapping used to define the flood zones for this SFRA are bound by the disclaimer and other terms and conditions set out on the OPW website www.floodinfo.ie/map/floodplans. The website www.floodinfo.ie provides access to the published Flood Plans along with the Flood Maps developed by the OPW as part of the CFRAM studies and information about flood risk management in Ireland. Further information on the CFRAM studies is available at www.floodinfo.ie. The flood maps are ‘predictive’ flood maps, as they provide predicted flood extent and other information for a flood event that has an estimated probability of occurrence (the 1% Annual Exceedance Probability (AEP) and 0.1% AEP events – refer to **Section 3.2.3**), rather than information on floods that have occurred in the past.

KCC makes no representations, warranties or undertakings about any of the information provided on these maps including, without limitation, their accuracy, their completeness or their quality or fitness for any particular purpose. To the fullest extent permitted by applicable law, KCC nor any of its members, officers, associates, consultants, employees, affiliates, servants, agents or other representatives shall be liable for loss or damage arising out of, or in connection with, the use of, or the inability to use, the information provided on the flood maps including, but not limited to, indirect or consequential loss or damages, loss of data, income, profit, or opportunity, loss of, or damage to, property and claims of third parties, even if KCC has been advised of the possibility of such loss or damages, or such loss or damages were reasonably foreseeable.

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1.4 Report Structure

The Kildare Town LAP area and its primary watercourses are identified in **Section 2**

A summary of the Planning System and Flood Risk Management Guidelines and the procedure for undertaking a SFRA is presented in **Section 3**

Section 4 outlines a broad overview of the requirements of Flood Risk Assessments (FRA) which should accompany planning applications.

The detailed information and data collated as part of the Stage 1 Flood Risk Identification carried out for the study area is discussed in **Section 5**.

Section 6 documents the Stage 2 Initial Flood Assessment to confirm the sources of flooding that affect Kildare Town and presents the information used to prepare the flood zone maps.

Potential zoning areas at risk from flooding are examined and recommendations for Flood Risk Assessments are made in **Section 7**.

Section 8 details the flood risk management policies and objectives being brought forward to the LAP and lastly **Section 9** provides a summary.

2 STUDY AREA

2.1 Introduction

Kildare Town is in County Kildare, approximately 50 km south-west from Dublin City Centre. Kildare Town lies between the towns of Monasterevin and Newbridge, located approximately 10km to the west and east respectively. The population of the town (Legal Town boundary) in the 2011 census was 8,142 with results for the 2016 census showing a slight increase to 8,634. The M7 motorway passes to the south of Kildare Town centre and crosses through area included within the LAP. Kildare Town train station provides access to rail services to Dublin, Cork, Limerick, Galway and Waterford. The extents for the Kildare Town LAP area are shown in **Figure 2-1**.

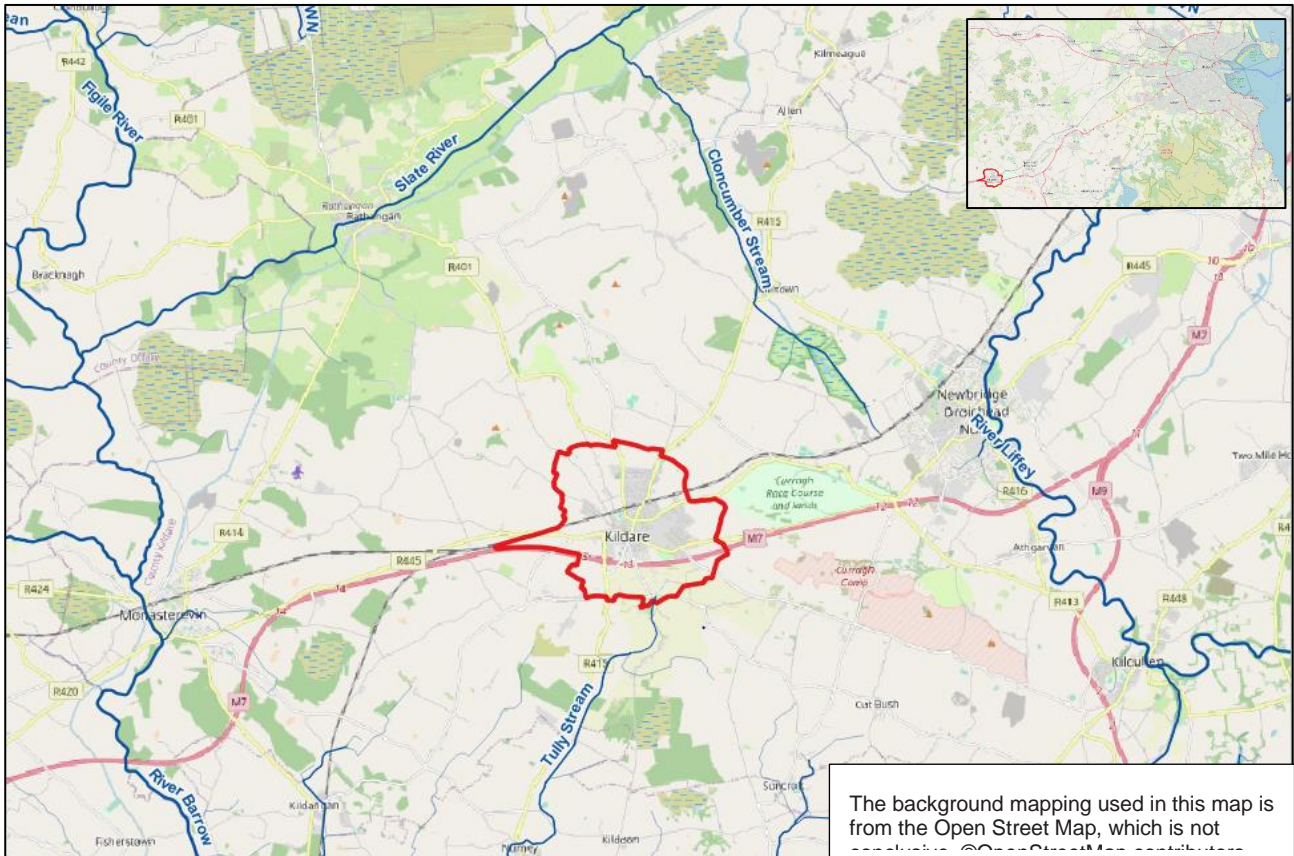


Figure 2-1 Kildare Town Locality and Watercourses

2.2 Watercourses

There are no watercourses within the Kildare Town LAP area, with the closest watercourse to Kildare Town being the Tully Stream, which originates on the southern boundary of the LAP area and flows in a southerly direction away from Kildare Town. Other watercourses around Kildare Town include:

- River Liffey 8.5km to the east, flowing northward;
- Cloncumber Stream 5km to the northeast, flowing northward;
- Slate River 11km to the north, flowing west; and,
- River Barrow 9.5km to the west, flowing south.

2.3 Topography

Kildare Town is situated on a gently sloping plane south of Red Hill (194mOD). The LAP area decreases in elevation from north to south, with a slightly elevated ridge forming down the centre of Kildare Town following the road network along Southgreen Road, Green Road, Fire Castle Lane and the R445 (/Dublin Street/Curragh Road). Lands to the east of the ridge all slope towards Ruanbeg Estate to the east of the town centre. The railway, which is partially in cut within the study area, is likely to have disrupted the natural drainage paths in the catchment.

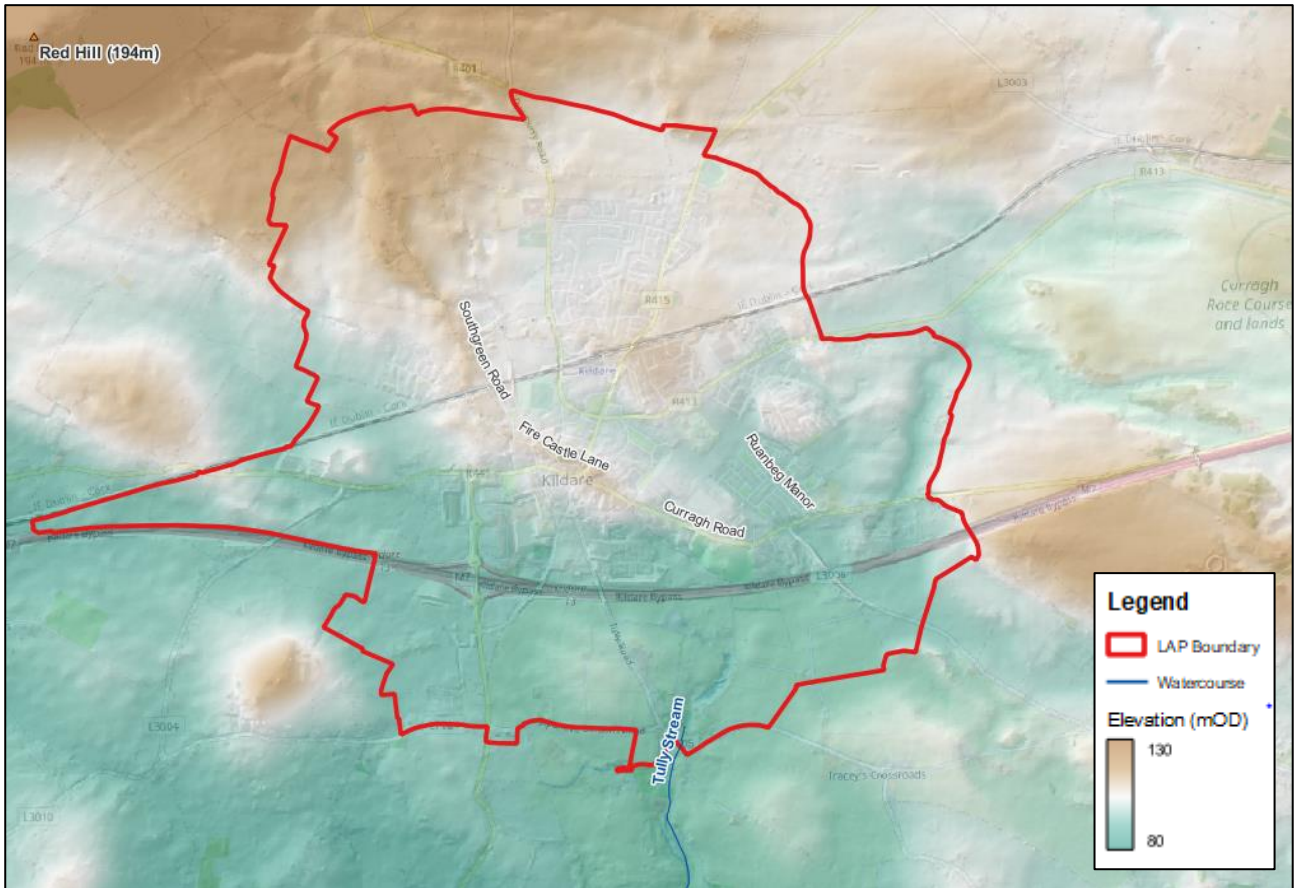


Figure 2-2 Kildare Town LAP Boundary and Topography

2.4 Soils

The study area is largely underlain by shallow well drained soils with pockets of poorly drained material, as shown in Figure 2-3.

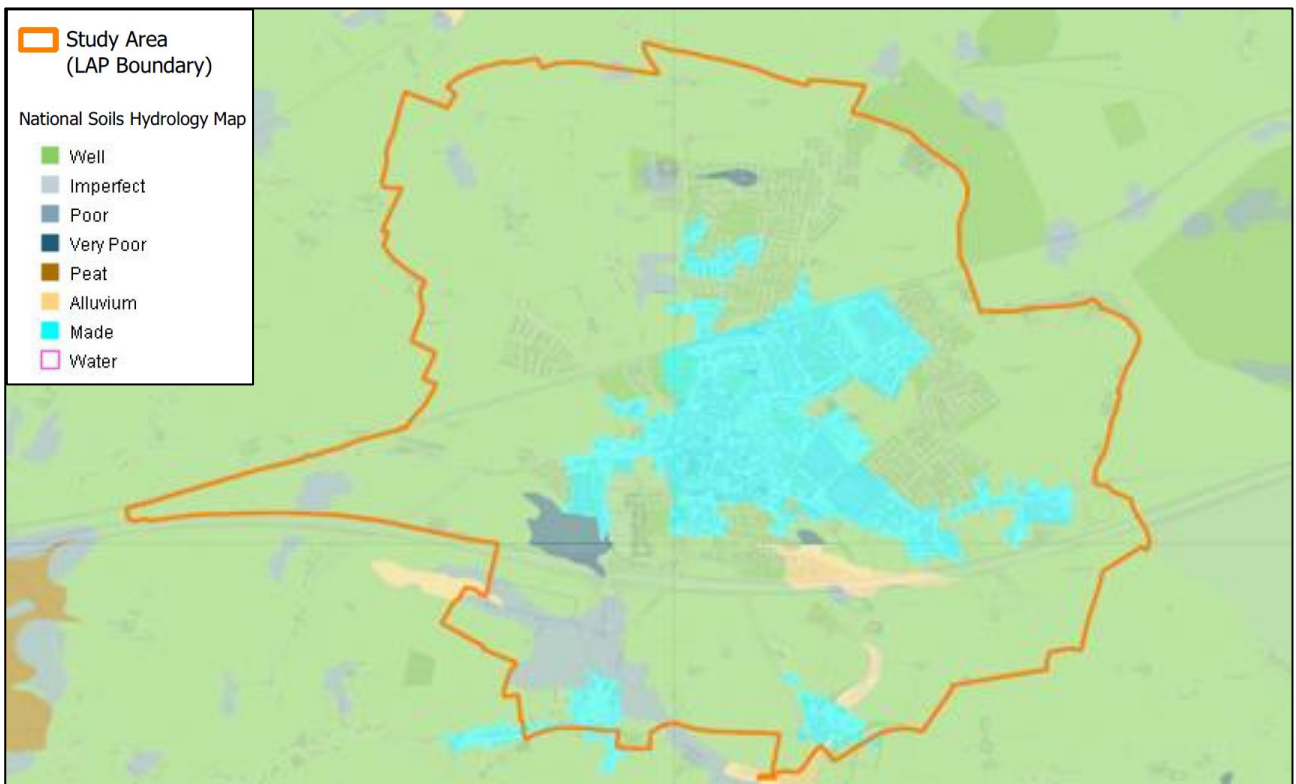


Figure 2-3 Soils Hydrology in the Study Area

3 THE PLANNING SYSTEM AND FLOOD RISK MANAGEMENT GUIDELINES FOR PLANNING AUTHORITIES

3.1 Introduction

In 2009 the Department of Environment, Heritage and Local Government in conjunction with the Office of Public Works published The Planning System and Flood Risk Management: Guidelines for Planning Authorities ('The Guidelines'). The purpose of The Guidelines is to ensure that flood risk is considered by all levels of government when preparing development plans and planning guidelines. They should also be used by developers when addressing flood risk in development proposals. The Guidelines should be implemented in conjunction with the relevant flooding and water quality EU Directives including the Water Framework Directive (River Basin Management Plans (RBMPs)) and the Floods Directive Catchment Flood Risk Assessment Management Studies (CFRAMS).

The core objectives of The 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 that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The Guidelines recommend that Flood Risk Assessments (FRAs) be carried out to identify the risk of flooding to land, property and people. FRAs should be carried out at different scales by government organisations, local authorities and for proposed developments appropriate to the level of information required to implement the core objectives of The Guidelines. The FRA scales are Regional Flood Risk Appraisal (RFRA), SFRA and SSFRA.

This section presents a brief summary of The Guidelines, for more detail refer to The Guidelines and the accompanying Technical Appendices at www.opw.ie.

3.2 Flood Risk Assessment

3.2.1 Flood Risk Assessment Approach

The Guidelines recommend that FRAs be carried out to identify the risk of flooding to land, property and people. FRAs should use the Source-Pathway-Receptor (S-P-R) Model to identify the sources of flooding, the flow paths of the floodwaters and the people and assets impacted by the flooding. **Figure 3-1** shows the SPR model that should be adopted in FRAs.

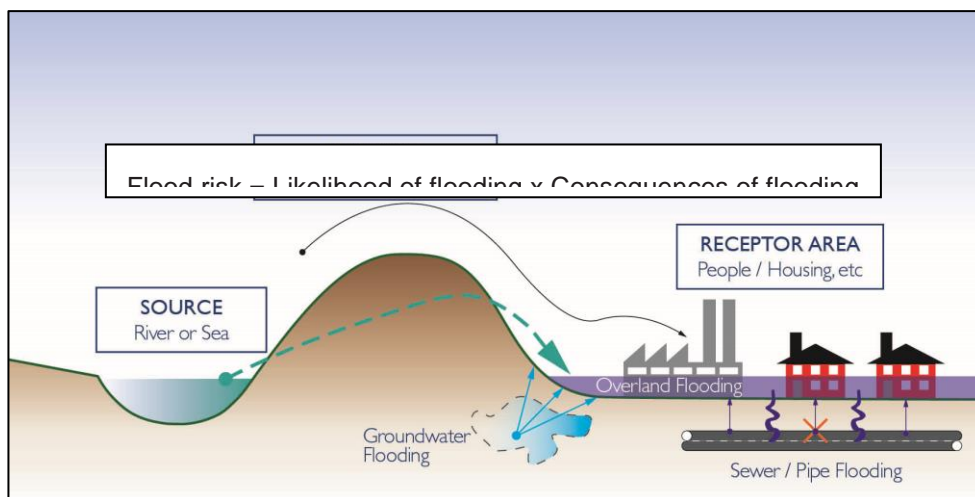


Figure 3-1 Flood Risk Assessment Source – Pathway – Receptor Model

FRAs should be carried out using the following staged approach:

- **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.

3.2.2 Types of Flooding

There are two main sources of flooding: inland and coastal. Inland flooding is caused by prolonged and/or intense rainfall. This results in fluvial, pluvial or ground water flooding acting independently or in combination. Coastal flooding is not a concern for the Kildare Town area as the watercourses within Kildare County do not experience any tidal influence from the Irish Sea.

- Fluvial flooding occurs when a river overtops its banks due to a blockage in the channel or the channel capacity is exceeded.
- Pluvial flooding occurs when overland flow cannot infiltrate into the ground, when drainage systems exceed their capacity or are blocked and when the water cannot discharge due to a high-water level in the receiving watercourse.
- Groundwater flooding occurs when the level of water stored in the ground rises, as a result of prolonged rainfall, to meet the ground surface and flows out over it.
- Coastal flooding occurs when the level of water in the ocean rises, as a result of storm surges, wave action or high tide level, to meet the ground surface and flows out over it.

3.2.3 Flood Risk

The Guidelines state flood risk is a combination of the likelihood of flooding and the potential consequences arising. Flood risk is expressed as:

The Guidelines define the likelihood of flooding as the percentage probability of a flood of a given magnitude as occurring or being exceeded in any given year. A 1% probability indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year. **Table 3-1** shows flood event probabilities used in flood risk management.

Table 3-1 Flood Event Probabilities

Annual Exceedance Probability (%)	Return Period (Years)
50	2
10	10
1	100
0.1	1000

The consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc.).

3.3 Flood Zones

The Guidelines recommend identifying flood zones which show the extent of flooding for a range of flood event probabilities. The Guidelines identify three levels of flood zones:

- 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 year and 0.5% or 1 in 200 for coastal flooding), and
- 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). Flood Zone C covers all areas of the plan which are not in zones A or B.

The flood zones are generated without the inclusion of climate change factors. The flood zones only account for inland and coastal flooding. They should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from pluvial and groundwater flooding. Similarly flood defences should be ignored in determining flood zones as defended areas still carry a residual risk of flooding from overtopping, failure of the defences and deterioration due to lack of maintenance.

3.4 Climate Change

Climate Change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is recommended in The Guidelines:

- Recognise that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopt a cautious approach to zoning land in these potential transitional areas;

- Ensure that the levels of structures designed to protect against flooding, such as flood defences, land-raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect; and
- Ensure that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

3.5 Strategic Flood Risk Assessment

The purpose of this report is to carry out a SFRA at town scale for the Kildare Town LAP. The Guidelines recommend a series of outputs for a SFRA. These outputs in broad terms include:

- Identify principal rivers, sources of flooding and produce flood zone maps for across the local authority area and in key development areas;
- An appraisal of the availability and adequacy of the existing information;
- Assess potential impacts of climate change to demonstrate the sensitivity of an area to increased flows or sea levels. Where mathematical models are not available climate change flood extents can be assessed by using the Flood Zone B outline as a surrogate for Flood Zone A with allowance for the possible impacts of climate change;
- Identify the location of any flood risk management infrastructure and the areas protected by it and the coverage of flood-warning systems;
- Consider, where additional development in Flood Zone A and B is planned within or adjacent to an existing community at risk, the implications of flood risk on critical infrastructure and services across a wider community-based area and how the emergency planning needs of existing and new development will be managed;
- Identify areas of natural floodplain, which could merit protection to maintain their flood risk management function as well as for reasons of amenity and biodiversity;
- Assess the current condition of flood-defence infrastructure and of likely future policy with regard to its maintenance and upgrade;
- Assess the probability and consequences of overtopping or failure of flood risk management infrastructure, including an appropriate allowance for climate change;
- Assess, in broad terms, the potential impact of additional development on flood risk elsewhere and how any loss of floodplain could be compensated for;
- Assess the risks to the proposed development and its occupants using a range of extreme flood or tidal events;
- Identify areas where a SSFRA will be required for new development or redevelopment;
- Identify drainage catchments where surface water or pluvial flooding could be exacerbated by new development and develop strategies for its management in areas of significant change;
- Identify where integrated and area-based provision of SuDS and green infrastructure are appropriate in order to avoid reliance on individual site by site solutions; and
- Provide guidance on appropriate development management criteria for zones and sites.

3.6 Sequential Approach and Justification Test

The Guidelines recommend using a sequential approach to planning to ensure the core objectives (as described in **Section 3.1**) are implemented. Development should be avoided in areas at risk of flooding, where this is not possible, a land use that is less vulnerable to flooding should be considered. **Figure 3-2** shows the sequential approach. If the proposed land use cannot be avoided or substituted a Justification Test must be applied and appropriate sustainable flood risk management proposals should be incorporated into the development proposal. **Table 3-2 and Table 3-3** outline recommendations from the Guidelines for the types of development that would be appropriate to each flood zone and those that would be required to meet the Justification Test.

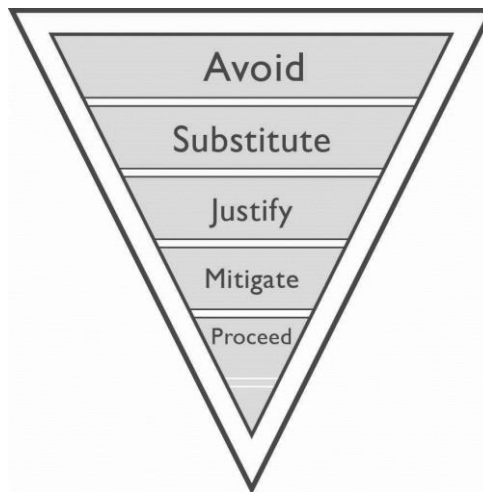


Figure 3-2 Sequential approach principles in Flood Risk Management

Table 3-2 Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water compatible development	Appropriate	Appropriate	Appropriate

The Justification Test is used to assess the appropriateness of developments in flood risk areas. The test is comprised of two processes. The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Table 3-3 Classification of vulnerability of different types of development

Vulnerability Class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	<ul style="list-style-type: none"> • Garda, ambulance and fire stations and command centres required to be operational during flooding, • Hospitals, • Emergency access and egress points, • Schools, • Dwelling houses, student halls of residence and hostels, • Residential institutions such as residential care homes, children’s homes and social services homes, • Caravans and mobile home parks, • Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility, and • Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	<ul style="list-style-type: none"> • 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.
Water-compatible development	<ul style="list-style-type: none"> • Flood control infrastructure, • Docks, marinas and wharves, • Navigation facilities, • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location, • Water-based recreation and tourism (excluding sleeping accommodation), • Lifeguard and coastguard stations, • Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms, and • Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merit

3.7 Development Plan Justification Test

The Development Plan Justification Test (or Plan–making Justification Test) should be carried out as part of the SFRA using mapped flood zones. It applies where land zonings have been reviewed with respect to the need for development of areas at a high or moderate risk of flooding for uses which are vulnerable to flooding and which would generally be inappropriate and where avoidance or substitution is not appropriate. Where land use zoning objectives are being retained, they must satisfy the criteria of the Development Plan Justification Test. The Development Plan Justification Test from the Guidelines is shown in

Table 3-4 (Box 4-1 in the Guidelines), Item 1 has been updated by KCC to reflect the most recent national planning policies and regulations.

Table 3-4 Justification Test for Development Plans

Justification Test for Development Plans	
1.	The Regional Planning Guidelines for the Greater Dublin Area 2010-2022 (now superseded by the Regional Spatial Economic Strategy for the Eastern Midlands Region 2019- 2031) set out the planned direction for growth within the Greater Dublin Area up to 2022 (2031) by giving regional effect to national planning policy under the National Spatial Strategy (NSS) (now superseded by Project Ireland 2040; the National Planning Framework & its Implementation Roadmap) County Development Plan or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
2.	The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular: <ol style="list-style-type: none"> i. Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement, ii. Comprises significant previously developed and/or under-utilised lands, iii. Is within or adjoining the core of an established or designated urban settlement, iv. Will be essential in achieving compact and sustainable urban growth, and v. There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
3.	A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere. N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment

In cases where existing zoned lands are discovered to be within flood zones, the Development Plan Justification Test has been applied, and it is demonstrated that it cannot meet the specified requirements it is recommended that planning authorities reconsider the zoning by implementing one of the following:

- Remove the existing zoning for all types of development on the basis of the unacceptable high level of flood risk;
- Reduce the zoned area and change or add zoning categories to reflect the flood risk; or
- Replace the existing zoning with a zoning or a specific objective for less vulnerable uses.

If the criteria of the Justification Test have been met, the design of structural or non-structural flood risk management measures can be applied as prerequisites to development in specific areas. These measures must ensure that flood hazard and risk to other locations will not be increased or, if practicable, be reduced. The mitigation measures are required prior to development taking place.

4 DEVELOPMENT MANAGEMENT AND FLOOD RISK

4.1 Overview

All development proposals in areas that KCC have applied a Justification Test, where a residual flood risk remains, should be supported by an appropriately detailed Stage 3 FRA. The level of detail within the Stage 3 FRA will depend on the risks identified and the proposed land use. Applications should apply the use of the sequential approach in terms of the site layout and design and, in satisfying the Justification Test (where required), the proposal will demonstrate that appropriate mitigation and management measures are in place. The development should ensure that no encroachment onto, or loss of, the floodplain. Only water compatible development such as Open Space would be permitted for lands which are identified as being at risk of flooding within that site. For any development in flood risk areas that meet the Development Plan Justification Test, a Development Management Justification Test must then be applied. Development must satisfy all the criteria of the Development Management Justification Test. The Development Management Justification Test from the Guidelines is shown in **Table 4-1** (Box 5.1 in the Guidelines). This chapter provides a broad overview of the requirements of FRAs which should accompany planning applications.

Table 4-1 Justification Test for Development Management

Justification Test for Development Management

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
 - i. The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
 - ii. The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
 - iii. The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access, and
 - iv. The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

4.2 Surface Water and Drainage

4.2.1 Overview

KCC are obliged to ensure that permissions granted under the Planning Acts are consistent with the policies and objectives set out in their Development Plans. The Kildare Town LAP outlines specific policies and objectives of the Council relating to the development of Kildare Town. The overarching policies and objectives of the Kildare County Development Plan (CDP) 2023-2029¹ also apply, specifically the Development Management Standards as set out in Chapter 15 of the CDP. Where conflict exists between the LAP and the CDP, the CDP will take precedence. Chapter 15 of the CDP 2023-2029 focuses on the general planning standards and design criteria that will be applied by the council. These standards ensure that future development is in accordance with these policies and objectives.

¹ <https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/Volume1Chapters1-17/Chapter%2015.%20Development%20Management%20Standards.pdf>

Chapter 15 of the CDP 2023-2029 outlines the following considerations for the management of surface water run-off and flood risk when assessing planning applications:

- Detailed proposals for the management of surface water, where Nature Based Surface Water Management solutions are considered and prioritised in the first instance. Groundwater monitoring, if required, should last at least 6 months and include at least one winter season.
- A Surface Water Management Plan shall be submitted which includes details inter alia the location, design and any future maintenance proposals / procedures required to maintain the surface water management system.
- Proposals for surface water management shall be in compliance with the Greater Dublin Drainage Strategy (GDSDS), in particular Volume 2 Chapter 6 Stormwater Drainage Design Criteria, and CIRIA SuDS Manual (C753) and with Nature-Based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas Best Practice Interim Guidance Document (2021, DHLGH).
- In the event that a Nature Based Surface Water Management solution is not feasible, detailed information must be submitted to explain why it was not considered to be a practical solution. Traditional drainage systems will only be permitted where a demonstrable exceptional circumstance has been provided.
- Sustainable Drainage Systems should not form part of the public open space provision, except where they contribute in a significant and positive way to the design and quality of open space. In instances where the Council determines that SuDS make a significant and positive contribution to open space, a maximum 10% of the open space provision shall be taken up by SuDS.
- In the event that underground attenuation storage structures are required, they will not be accepted under areas of public open space, save in exceptional demonstrable situations.
- All existing site watercourses shall be retained and existing site pipework should be “de-culverted” where feasible

All planning permissions must satisfy the Development Management and Flood Risk Management policies and objectives from the KCC CDP 2023-2029.

4.2.2 SuDS Guidance

Applications for developments should incorporate SuDS measures. SuDS use a combination of processes including:

- Nature based SuDS and natural water retention measure SuDS such as constructed wetlands, retention ponds, bioretention areas, green roofs and walls, blue roofs, bioswales, tree pits-trenches, rain gardens and house planters;
- Infiltration – for water absorption into ground;
- Filtration – in order to capture pollutants and provide water quality treatment through;
- Retention – to hold a specific volume of water permanently to control run-off and erosion of downstream areas;
- Detention – to reduce run-off flow rates through flow control devices that may hold water on a temporary basis;

The following SuDS components should be considered for installation:

- Source Control Elements - Green Roofs/Living walls, Rainwater Harvesting and Permeable Surfacing
- Swales & conveyance channels
- Filtration Systems – Filter trenches and bioretention areas

- Infiltration Systems - Soakaways, Rain Gardens and infiltration basins
- Constructed wetlands
- Detention Basins and Retention Ponds
- Wetlands

The following KCC guidance for SuDS and stormwater design also applies:

- The drainage and SuDS strategies shall be in compliance with Greater Dublin Drainage Strategy (GDSDS), in particular Volume 2 Chapter 6 Stormwater Drainage Design Criteria, and CIRIA SuDS Manual (C753) and have regard to the surface water drainage policies and objectives contained in the current applicable LAP and CDP.
- The KCC Roads, Development Control and Parks departments shall be consulted regarding proposed SuDS features, their location, size, number and future maintenance.
- The amount of impermeable surface areas connected to the drainage systems should be reduced. The remaining impermeable surface areas should be connected to SuDS features and not directly to the drainage pipe network.
- In management company controlled areas, permeable paving/pervious surfacing shall be maximised on roads, footpaths and other paved areas. Green-blue roofs and rainwater harvesting shall be provided in management company controlled buildings and rainwater butts provided at houses.
- Nature based solution (NBS) and natural water retention measure (NWRM) e.g. constructed wetlands, retention ponds, bioretention areas should replace the traditional underground attenuation storage structures and bioswales, tree pits-trenches and rain gardens shall also be prioritised in the first instance.
- As well as reducing and treating runoff in accordance with GDSDS, NBS and NWRM also promote biodiversity and provide important amenity value to residents and visitors alike. Therefore KCC require that SuDS features should contribute towards a minimum of 15% of the open space requirement.
- Infiltration systems which discharge runoff directly to groundwater shall be next prioritised where NBS and NWRM SuDS have not been selected or are not deemed to be feasible.
- Infiltration systems e.g., soakaways and infiltration trenches require the BRE Digest 365 soil infiltration tests to be undertaken confirming suitable soil infiltration rates. Groundwater monitoring results confirming favourable groundwater levels at the SuDS locations are also required.
- Groundwater monitoring should last at least 6 months and include at least one winter season. Therefore, it is recommended that the site SuDS strategy is completed as soon as possible and groundwater monitoring commenced to avoid unwarranted delays to the construction programme should planning permission be granted.
- Discharge of runoff from Infiltration system SuDS should be kept a safe distance away from buildings, structures and roads/footpaths to avoid damage to their sub-structures or their foundation layers can be lined/tanked.
- Filtration systems such as filter drains/strips shall be next prioritised after NBS-NWRM and infiltration systems. Narrow, linear filter drains/strips are convenient for road surface runoff.
- Finally, retention and detention systems shall be considered with priority given to detention basins and retention ponds, underground attenuation storage structures should be only used as a last resort.
- All existing site watercourses and open drainage channel/ditches shall be retained and existing site pipework should be 'de-culverted' where feasible subject to a risk assessment especially of the risk of young children drowning in only shallow depths of water. This shall also apply to SuDS which store runoff at ground surface level and access to any the adjoining site watercourses.

- xiv. The environmental implications of discharging surface water runoff to watercourses or to ground on-site shall be addressed and including the impact on groundwater bodies especially water supply groundwater bodies and where water supply wells are located near the subject site.

4.3 Residual Risk

As well as assessing the surface water management risk for a site, all development in Flood Zone C should consider residual risk factors such as blockages in surface water sewers and the effects of climate change which may increase surface water flooding within Flood Zone C. These residual risk factors should influence the potential mitigation measures for a site which could include setting the finished floor levels.

4.4 Development Proposals in Flood Zones

4.4.1 Overview

It is recommended that any planning applications in flood risk areas are accompanied by a supporting appropriately detailed flood risk assessment. This is to ensure a conservative approach and that appropriate consideration is given to development within Flood Zones. The detailed assessment should include at a minimum Stage 1 – Identification of Flood Risk. Where flood risk is identified, a Stage 2 – Initial FRA will be required and depending on the scale and nature of the risk a Stage 3 – Detailed FRA may be required.

Detailed FRAs should be carried out in accordance with the Guidelines and should present in sufficient detail the potential flood risk to a proposed development, the potential increase in flood risk elsewhere, any proposed mitigation measures and proposals for sustainable surface water management. The surface water drainage must be compliant with the GSDSDS and Code of Practice. The FRA should also consider the impacts of climate change, residual risk associated with culvert blockages and freeboard in setting the finished floor levels (FFLs) of any development.

5 STAGE 1 – FLOOD RISK IDENTIFICATION

5.1 Overview

The purpose of this section is to establish the level of flood risk for the town of Kildare and to collate and assess existing current and historical information and data which may indicate the level and/or extent of any flood risk. The following sections detail information and data collated as part of the Stage 1 Flood Risk Identification carried out for the study area.

5.2 Source-Pathway-Receptor Model

In the first instance, an identification and assessment of the probability, magnitude, response of pathways and consequences of a flood event in the proposed development site were appraised. This analysis was aimed at identifying high risk elements as summarised in **Table 5-1** below.

Table 5-1: Possible Flooding Mechanisms

Source	Pathway	Receptor	Likelihood (remote, possible, likely)	Consequences (low, medium, high)	Risk (low, medium, high)	Comment/ Reason
Tidal /Coastal	Increased river levels overtopping existing riverbanks	Town Centre and Suburbs	Remote	Low	Low	The study area is located inland. Approx. 50km from Ireland east coast.
Fluvial	Increased river levels overtopping riverbanks	Town Centre and Suburbs	Remote	Low	Low	The study area is a raised plain not associated with any watercourses or floodplain
Pluvial	Overland Flow from Elevated Lands or Water logging	Town Centre and Suburbs	Possible	Medium	Medium	The surrounding topography slopes gently to the south. Localised pluvial flooding could occur on some sites.
Groundwater	Rising Ground Water Level	Town Centre and Suburbs	Possible	Medium	Low	There are no records of ground water flooding in the area. The subsoil in the area has medium to high permeability so waterlogging potential is unlikely.

The primary source of flood risk to the town may be attributed to pluvial flooding from surface water run-off. Secondary risks may arise from groundwater flooding.

5.3 Flood Risk & Flood Studies Information

Relevant information was reviewed and collated from the following sources:

- [Kildare County Development Plan 2023 – 2029 Strategic Flood Risk Assessment](#)
- Flood Mapping, Hydrology & Hydraulic Reports from CFRAMS and at NIFM²
- [Groundwater Flooding Data](#) from the Geological Survey of Ireland³
- Kildare Town Surface Water Study Phase 1 and Phase 2.

5.4 Historical Flooding

5.4.1 Floodinfo.ie

The OPW Flood Hazard Mapping website (<https://www.floodinfo.ie/>) was consulted to determine whether there was any evidence of previous flooding within the study area.

There was one location in the study area identified as recurring flooding, marking the approximate location of an area that has been affected by more than one flood event. The flood source is attributed to low lying land.

OPW Flood Hazard Mapping – Phase 1: Meeting with Area Engineer for Kildare 30/03/05

40. Kildare Town – Low lying area to the north of the town floods every year. A significant portion of the surface water drainage in Kildare town is piped to this location. Flood Id = 1487

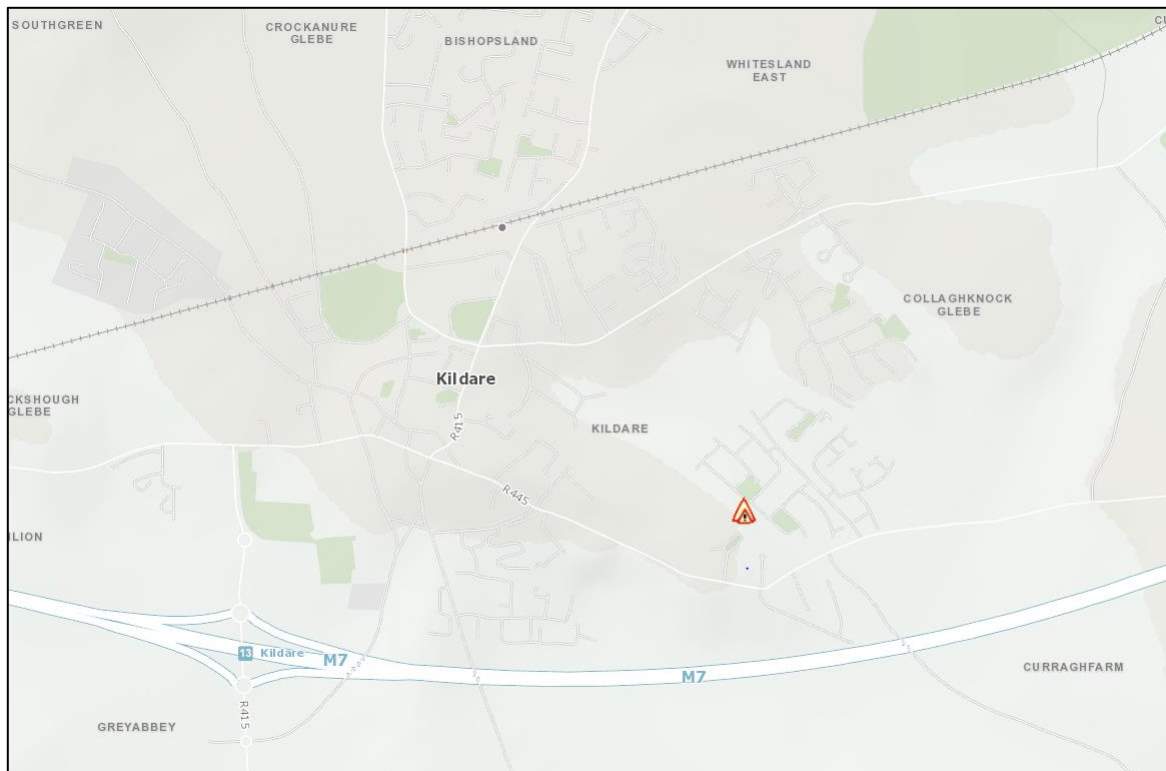


Figure 5-1: Past Flood Events (floodinfo.ie)

² <https://www.floodinfo.ie/map/floodmaps/>

³ <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/groundwater-flooding/Pages/default.aspx>

5.4.2 Kildare Town Surface Water Study

In a meeting with RPS in November 2022, Kildare County Council operational staff described several areas that experience surface water flooding due to lack of capacity in nearby soakaways.

Key findings included:

- Some soakaways lack capacity resulting in overland flow when full. These include:
 - The soakaways and holding tanks servicing the Maryville, Melitta Park, Beechgrove, and Dara Park housing estates. When full, overland flow gravitates to the Magee Barracks area;
 - The holding tanks in the Loughminane housing estate lack capacity and cause ponding in one corner of the estate when full.
- The Magee Barracks area receives surface water flow from the surrounding areas.
- The location of flooding identified by floodinfo.ie could not be confirmed. No photographic records are available.

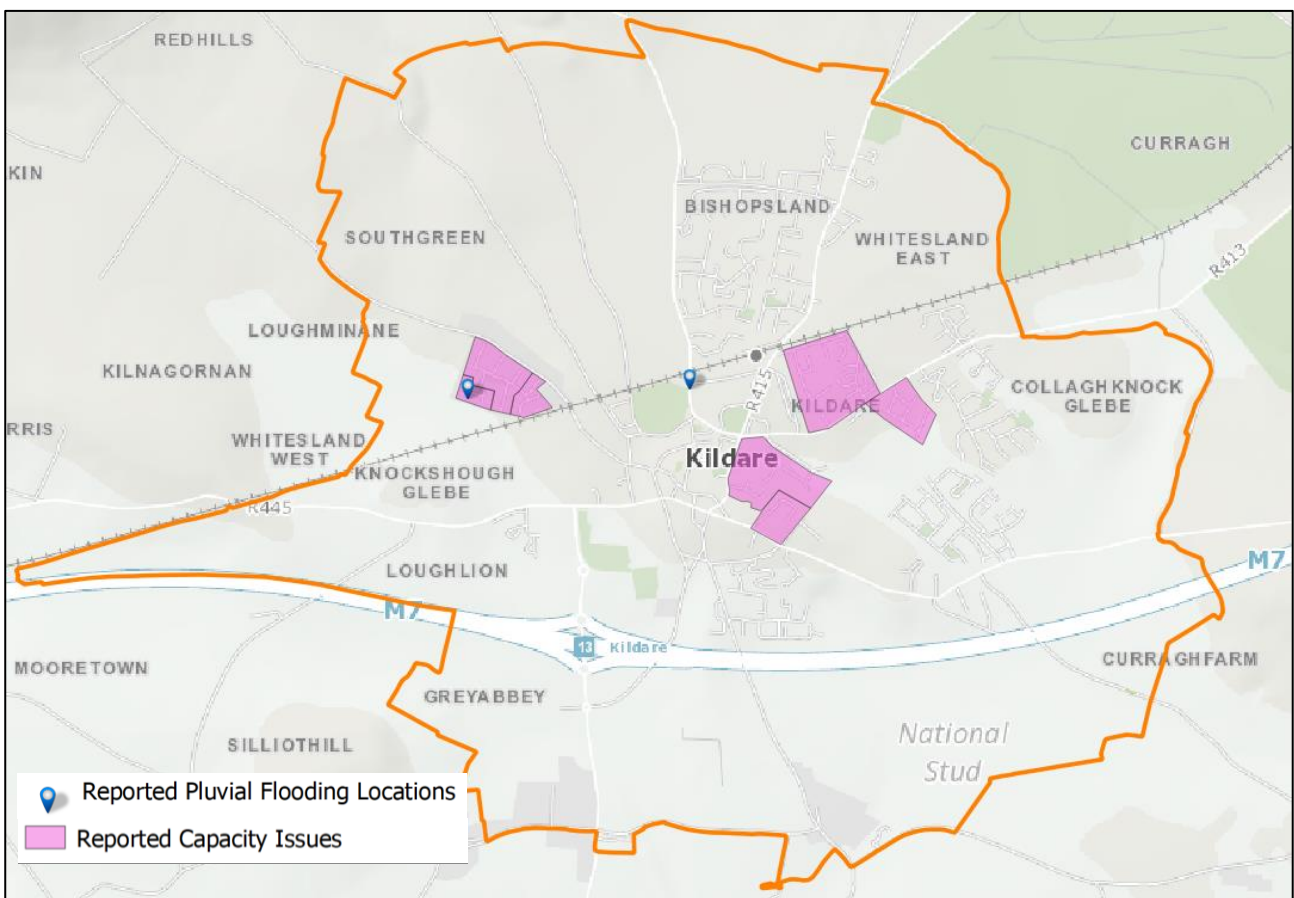


Figure 5-2 Areas with Reported Infiltration Capacity Issues

5.5 Predictive Flood Mapping

5.5.1 Catchment Flood Risk Assessment and Management (CFRAM)

The OPW lead the development of the CFRAM studies. The aim of these studies was to assess fluvial and coastal flood risk, through the identification of flood hazard areas and the associated impacts of flooding. They have considered issues such as climate change, land use practices and future development. These studies have been developed to meet the requirements of the EU Directive on the assessment and management of flood risks (the Floods Directive). The Floods Directive was transposed into Irish law by SI 122 of 2010 “European Communities (Assessment and Management of Flood Risks) Regulations 2010”. The CFRAM Studies have developed FRMPs to manage flood risk within the relevant river catchment. Flood

maps were one of the main outputs of the studies and indicate modelled flood extents for flood events of a range of annual exceedance probability (AEP) for catchments greater than 5km².

As Kildare Town is not located on a watercourse, it was not included as an Area for Further Assessment (AFA) within the CFRAM studies. The River Liffey, River Barrow and their tributaries around Kildare Town were assessed, however as shown in in Figure 5-3, there is no hydraulic connection between these floodplains and the Kildare Town LAP area.

5.5.2 National Indicative Flood Mapping (NIFM)

Subsequent to the completion of CFRAM, the NIFM study was undertaken to assess fluvial flood risk for catchments greater than 1km² not included within CFRAM studies. There is no hydraulic connection between the floodplains mapped within the NIFM study and the Kildare Town LAP area.

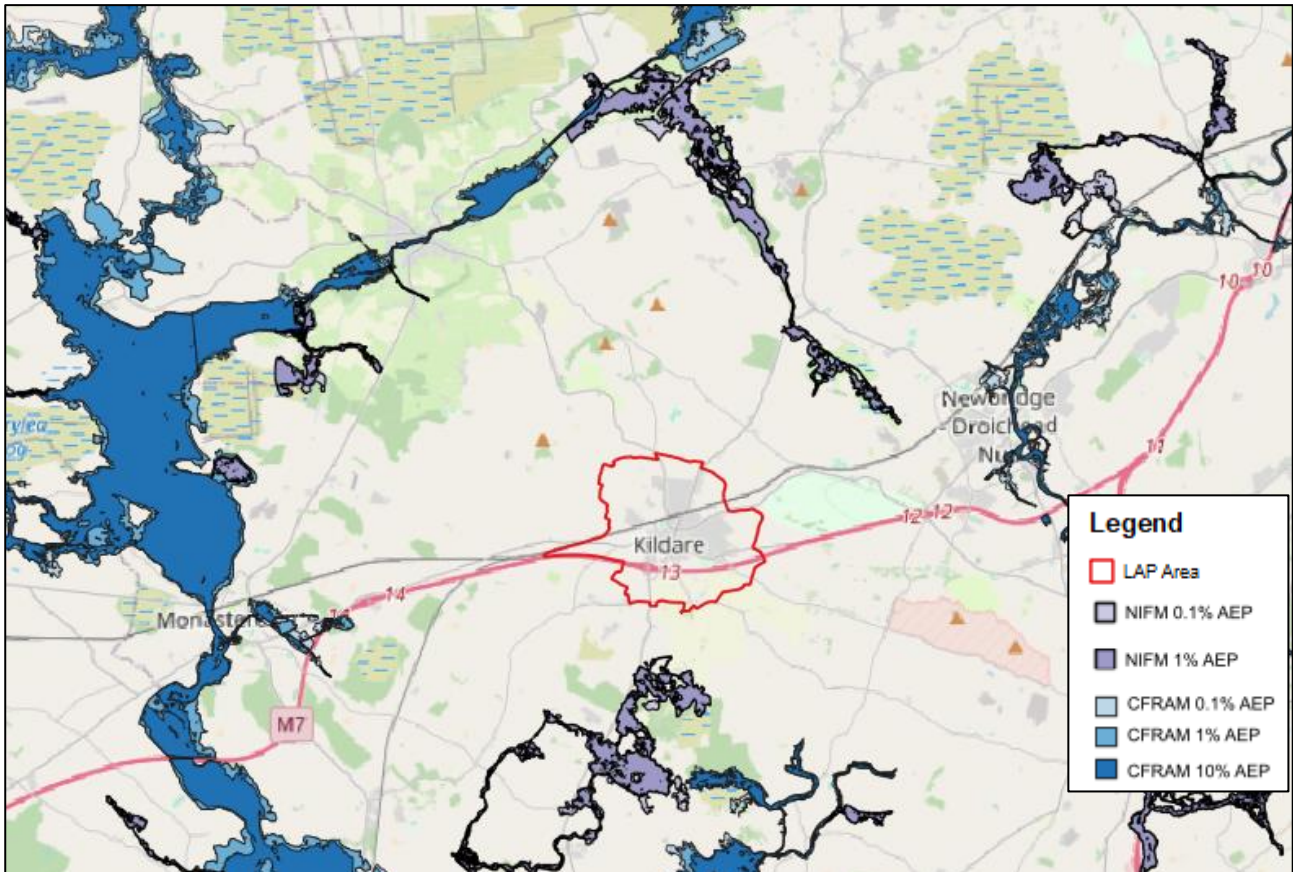


Figure 5-3 Predictive Flood Mapping

5.6 Conclusion of Stage 1

Records of historical flooding and predictive flood mapping outlined in the preceding sections indicated that Kildare Town is not at risk from coastal or fluvial flooding but may be exposed to pluvial flooding and to a lesser extent groundwater flooding. Therefore, the FRA was progressed to Stage 2 – Initial Flood Risk Assessment.

6 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

6.1 Overview

The purpose of the Initial FRA was to appraise the availability and adequacy of the identified flood risk information; to qualitatively appraise the flood risk posed to the site and potential impacts on flood risk elsewhere; and recommend possible mitigation measures to reduce the risk to acceptable level. In consideration of the above assessment, the primary flood risk to the study area was attributed to:

- Coastal – Low Risk
- Fluvial – Low Risk
- Groundwater – Low Risk
- Pluvial (overland flow) – Medium Risk

6.2 Coastal Flooding

There is no active risk of coastal flooding for the Kildare Town LAP area and therefore can be screened out at this stage.

6.3 Fluvial Flooding

There are no identified watercourses within Kildare Town, no recorded incidents of fluvial flooding affecting the study area and no predictive flood mapping studies identifying flood risk to the LAP area. The risk of fluvial flooding for Kildare Town is deemed to be low and therefore can be screened out at this stage.

6.4 Groundwater Flooding

A review of the [GSI Groundwater Flooding Data Viewer⁴](#), as presented in **Figure 6-1**, shows no records of groundwater flooding occurring in the town. There are no recorded karst features, which can indicate potential for groundwater flooding. There are no predicted ground water floods in the region. There are no recorded historical surface water floods. The risk of ground water flooding for the town is deemed to be low.

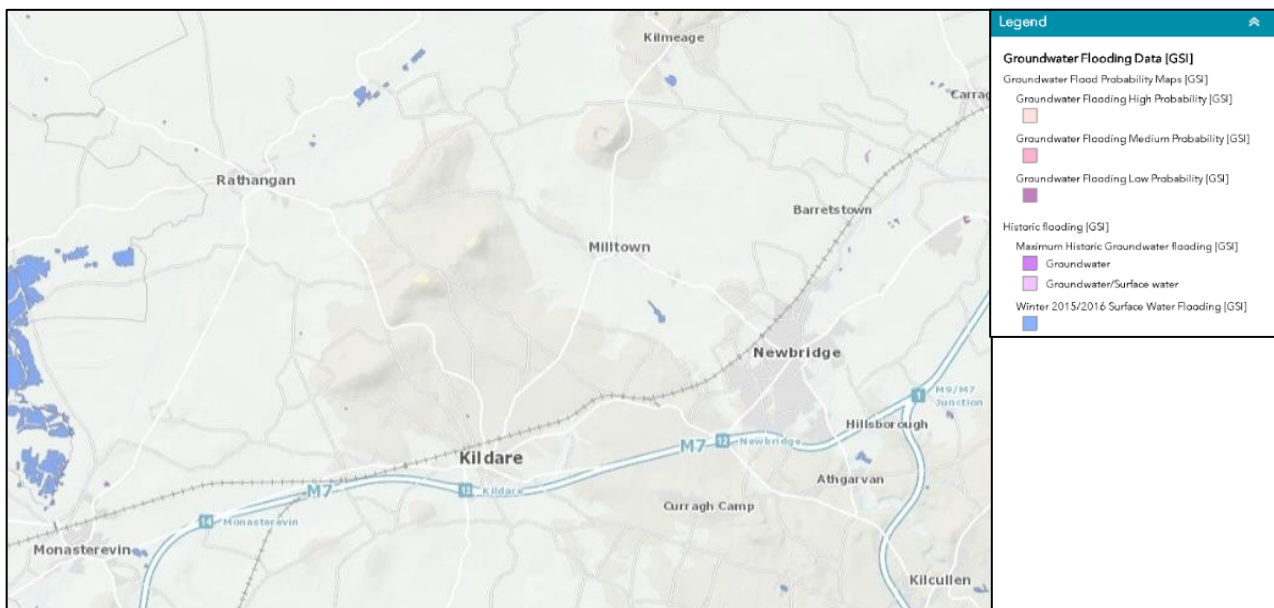


Figure 6-1 Groundwater Flooding Data from GSI Data Viewer

⁴ <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/groundwater-flooding/Pages/default.aspx>

6.5 Pluvial Flooding

Section 5.4 details the historical flooding in the town and the steps taken to analyse and assess the pluvial flood risk to Kildare Town. Consultation with KCC identified sites in the study area with infiltration capacity issues resulting in surface water runoff and two locations with observed pluvial flooding. An additional location of recurring flooding is noted within floodinfo.ie, although this could not be verified.

North of the M7, Kildare Town has three main forms of existing surface water drainage:

1. Discharge into a combined sewer. Sewage is collected and treated in the Kildare Town wastewater treatment plant and discharges to the Tully Stream;
2. Discharge into the M7 motorway surface water drainage network which ultimately discharges into tributaries of the River Barrow;
3. Discharge to groundwater via infiltration; and

6.5.1 Combined Sewer Network

For areas in the centre of the town, the wastewater network collects a combination of foul and surface water. Available records on the wastewater network are shown in Figure 6-2 below. All flows collected are transferred to the Kildare Town wastewater treatment plant south of the M7 for treatment. Treated effluent discharges to the Tully Stream via a 1km long outfall pipeline.

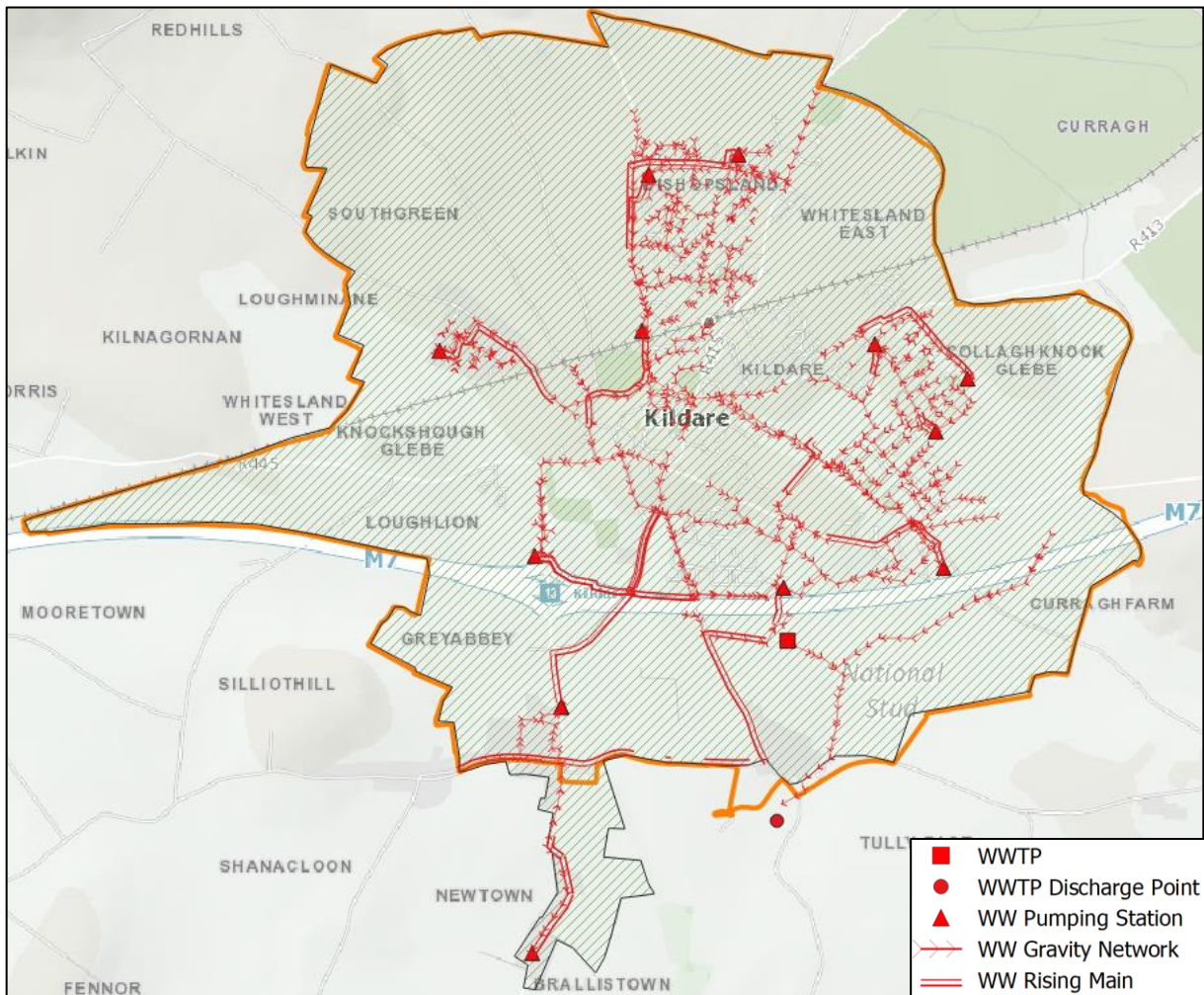


Figure 6-2 Agglomeration served by the combined sewer network

6.5.2 M7 Drainage Network

The M7 road drainage conveys surface water runoff in a westerly direction for discharge to the Barrow Drainage District. The catchment comprises the motorway itself and some areas on the south side of Kildare town that are connected by gravity sewers. The network is shown in Figure 6-3.

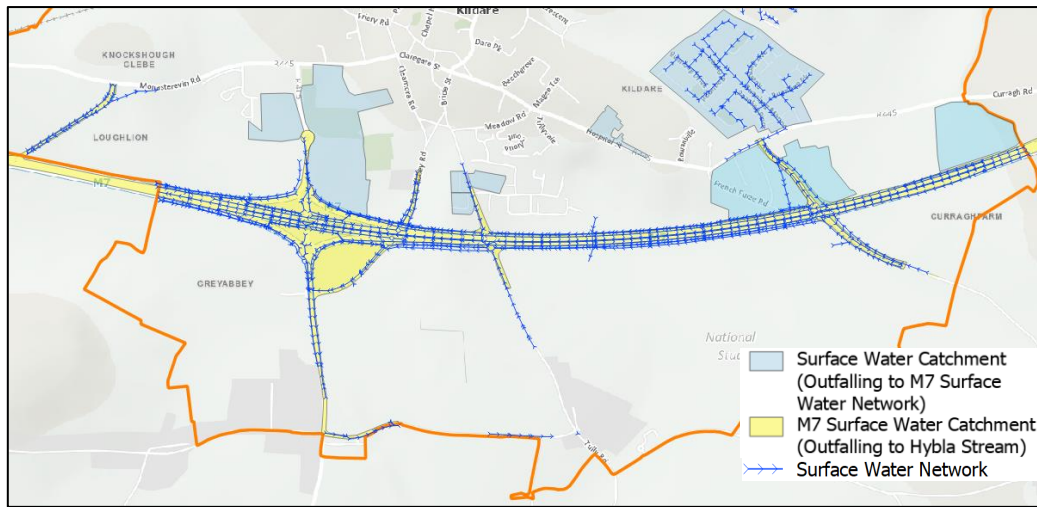


Figure 6-3 M7 Drainage Network and Connected Areas

6.5.3 Surface Water Networks Draining to Infiltration

The study area is largely situated on well drained soils amenable to infiltration. Many existing housing estates have soak pits to cater for surface water runoff. Specific design details of soakaway sizings are unavailable. Figure 6-4 shows the areas within the study area that have surface water catered for by infiltration. Records of surface water network draining to soakaways is also shown. This map includes planned permitted developments either under construction or yet to go to site. Drainage via infiltration has been the predominant approach in granted applications in recent times.

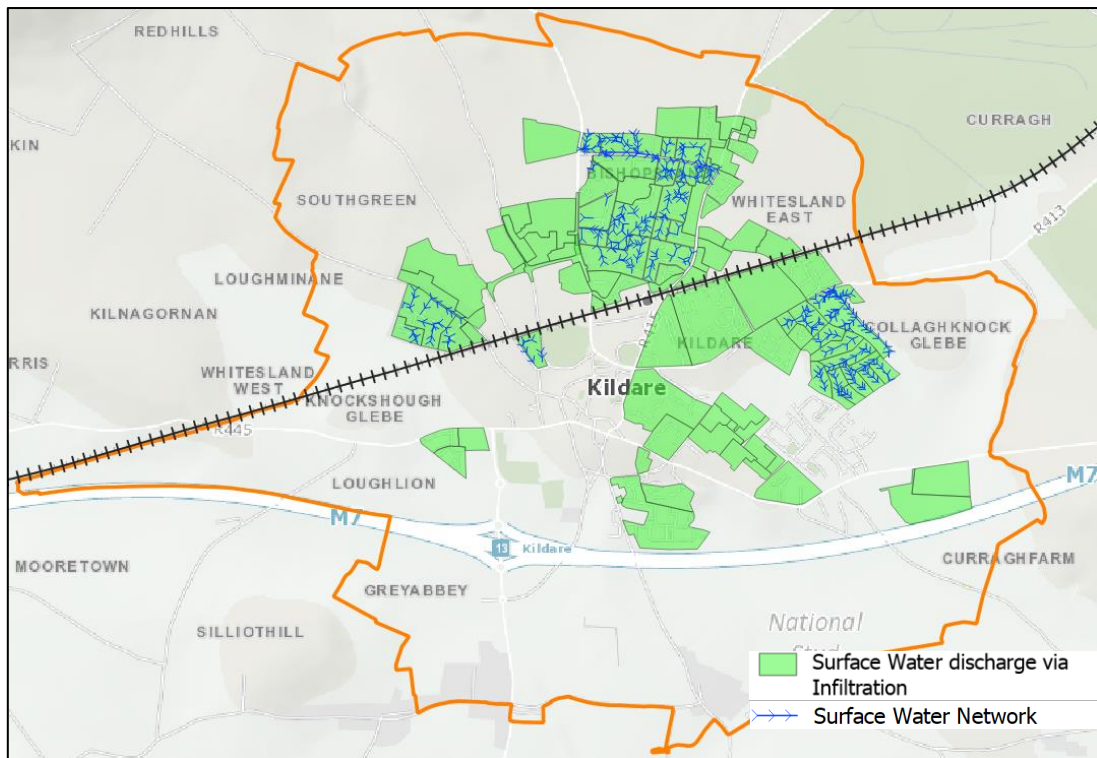


Figure 6-4 Areas Draining to Infiltration

6.5.4 Identified Area of Potential Food Risk

Given the significant areas of surface water drainage reliant on discharge via infiltration and the historic observations of surface water flood risk within the Kildare Town, the area identified as at risk of pluvial flooding it identified in Figure 6-5.

This area has been defined on the basis of:

- Historical Flooding
- Noted Infiltration Capacity Issues
- Site Topography
- Wastewater Sewer Networks coverage
- Stormwater Sewer Network coverage

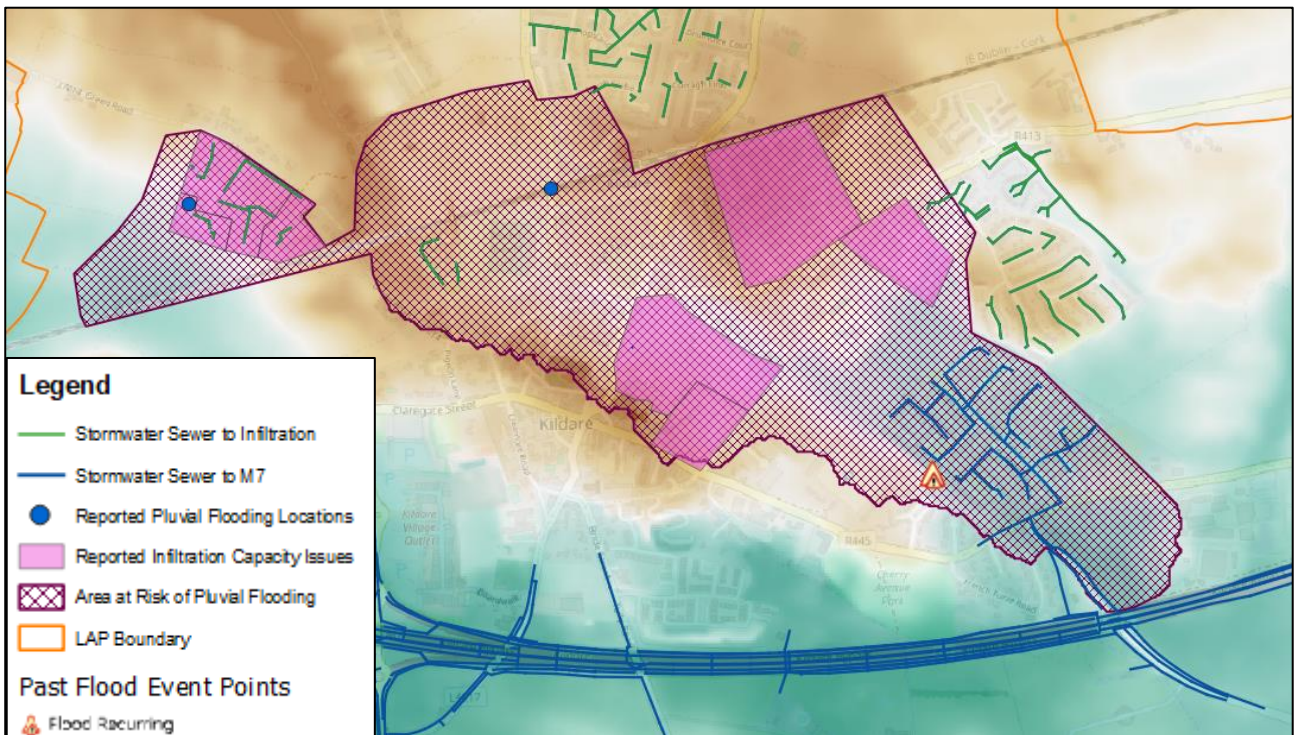


Figure 6-5 Identified Area of Potential Pluvial Flood Risk

6.6 Conclusion of Stage 2

Kildare Town is identified to have a medium pluvial flood risk. Four sites within the Kildare Town were identified as having reported infiltration capacity issues and are at increased risk of surface water runoff. Three locations were identified with historic observations of surface water flooding. The risk of coastal, fluvial and groundwater flooding has been deemed to be low and does not require further assessment for the SFRA, however they should still be assessed for SSFRAs as appropriate.

As there is no identified flood risk to the study area from fluvial or coastal sources, all of the LAP Area is classified within Flood Zone C. Therefore, a detailed Stage 3 FRA is not required at this stage, however developments within the noted area at risk of pluvial flooding should be subject to a site-specific flood risk assessment at development management stage which should be carried out appropriate to the scale and nature of the development and the risks arising in accordance with Section 5.2 of the Guidelines.

7 DEVELOPMENT PLAN ZONING

7.1 Introduction

The land use zonings provided by KCC for Kildare Town have been reviewed in the context of the available flood zone mapping, the indicative pluvial risk, the sensitivity of flood extents to climate change and previous SFRA reports.

The entire LAP area is contained within Flood Zone C. Therefore, all land use zones both pre-existing and proposed are appropriate for development in accordance with the objectives of the LAP.

Due to the identified pluvial flood risk in Stage 2, developments identified in **Figure 7-1** within the noted area at risk of pluvial flooding should be subject to a site-specific flood risk assessment at development management stage which should be carried out appropriate to the scale and nature of the development and the risks arising in accordance with Section 5.2 of the Guidelines.

The SSFRAs should address the site layout with respect to vulnerability of the proposed development type, finished floor levels should be above the 0.1% or 1% AEP level where appropriate, flood resilient construction materials and fittings should be considered and the site should not impede existing flow paths or cause flood risk impacts to the surrounding areas.

Applications for minor development to existing buildings in areas of flood risk such as small extensions and most changes of use must include a flood risk assessment of appropriate detail to demonstrate that they would not have adverse flood risk impacts and employ flood resilient construction materials and fittings.

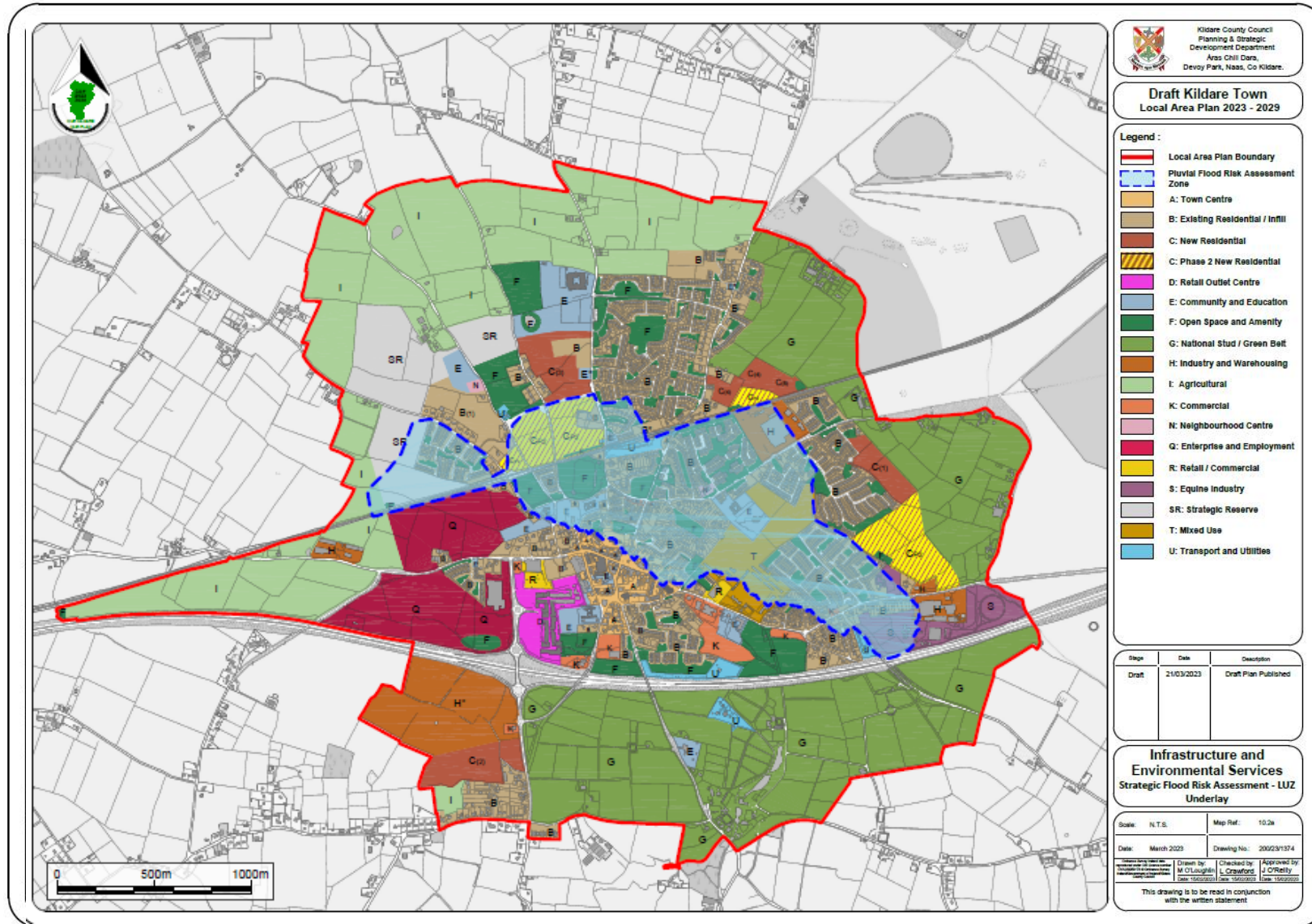


Figure 7-1 Development Plan Zoning

8 FLOOD RISK MANAGEMENT POLICIES AND OBJECTIVES

8.1 General Development Plans and Strategies

The Kildare County Development Plan 2023-2029 outlines surface water and flood risk management policies and objectives for the entire county. The Kildare Town LAP will implement these policies to ensure flood risk and surface water management is considered during the planning process for development within the LAP boundary. The Kildare Town LAP will also implement specific local policies and objectives which have been adopted from the existing development plan and updated based on the information provided in the SFRA process and are shown in **Table 8-1**.

Table 8-1 LAP Flood Risk Management policies

Planning Policy / Objective	Policy Description
<p>IO 2.1</p>	<p>Pursue opportunities to increase surface water drainage capacity in the town as identified in the Surface Water Study, in particular to investigate the feasibility of:</p> <ol style="list-style-type: none"> 1. A new surface water network through the Former Magee Barracks site connecting to the existing surface water siphon under the M7 Motorway with eventual outfall to the Tully Stream. 2. A new surface water pipe crossing under the M7 Motorway and west of the R415 with outfall to the Armour Stream. <p>Investigations shall be subject to capacity assessments, Environmental Impact Assessment (EIA) Screening and Appropriate Assessment (A screening and where applicable Stage 2 AA to minimise the risk of likely significant effects on European Sites, their qualifying interest species and their hydrological connections.</p>
<p>IO 2.2</p>	<p>Prepare a Surface Water Masterplan for Kildare Town, based on the information, recommendations and additional surveys required contained within the Surface Water Study that accompanies this Plan.</p>
<p>IO 2.3</p>	<p>Incorporate nature-based water drainage solutions as part of all plans and projects in Kildare Town. Proposals for new development shall align with the Kildare Town Surface Water Study (that accompanies this Plan), the Surface Water Masterplan (once finalised) and the County Kildare Sustainable Urban Drainage Systems Guidance Document (once finalised).</p>
<p>IO 2.4</p>	<p>Ensure areas indicated as Nature-Based Management Areas (NBMAs) on Map 10.1 are reserved free from development and integrated into design proposals for nature-based surface water drainage purposes; whilst also ensuring a network of Surface Water Corridors (surface water pathway corridors) are provided in accordance with the indicative locations shown on Map 10.1.</p>
<p>IO 2.5</p>	<p>Require the Proposed Wayleave for Future Surface Water Network Extension as indicated on Map 10.1 to be included in development proposals on sites affected by the indicative route.</p>
<p>IO 3.1</p>	<p>Require a site-specific Flood Risk Assessment, appropriate to the scale and nature of the development and the risk arising, to be carried out for developments located within the Pluvial Flood Risk Area as outlined on Map 10.2 Strategic Flood Risk Assessment Map.</p>

All planning permissions must satisfy the Development Management and Flood Risk Management policies and objectives from the KCC CDP 2023-2029.

9 SUMMARY

9.1 Overview

The SFRA Report has been prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). The SFRA has provided an assessment of all types of flood risk within Kildare Town to assist KCC to make informed strategic land-use planning decisions. The flood risk information was used to apply The Guidelines sequential approach to appraise sites for development and identify how flood risk can be reduced as part of the local area plan.

9.2 Flood Zones and Flood Risk

Kildare Town is not susceptible to any coastal, fluvial or groundwater flooding but may be susceptible to pluvial flooding. The flood zones extents were reviewed in accordance the Planning System and Flood Risk Assessment Guidelines, identifying Flood Zone C for the entire LAP area. Flood zones only account for fluvial and coastal flooding and are generated without the inclusion of climate change factors. They should not be used to suggest that any areas are free from flood risk as they do not account for potential flooding from pluvial and groundwater.

All development proposals taking place in areas where pluvial flooding is recognised as a flood risk within Kildare Town, must be supported by an appropriately detailed Flood Risk Assessment. The level of detail within the FRA will depend on the risks identified and the proposed land use. The FRA should in general address the site layout with respect to vulnerability of the proposed development type. Finished floor levels should be above the 0.1% or 1% AEP level with an allowance for climate change. Flood resilient construction materials and fittings may be considered, and the developments should not impede existing flow paths or cause flood risk impacts to the surrounding areas. It also may be necessary to develop emergency evacuation plans and defined access / egress routes for extreme flood events.

9.3 Flood Management Policies and Objectives

The Kildare County Development Plan 2023-2029 outlines surface water and flood risk management policies and objectives for the entire county. The Kildare Town Local Area Plan 2021-2027 will implement these policies to ensure flood risk and surface water management is considered during the planning process for development within the LAP boundary. The Kildare Town LAP will also implement specific local policies and objectives which have been adopted from the existing LAP.

9.4 SFRA Review and Monitoring

The Kildare Town SFRA will be reviewed and updated every six years in line with the Kildare Planning Authority's review process of statutory local area plans, unless a resolution is passed to defer the review process for a further period not exceeding five years. Additionally, outputs from future studies and datasets may trigger a review and update of the SFRA during the lifetime of the LAP and the Kildare County Development Plan. Other sources of information may not lead to an update of the SFRA during the lifetime of the Plan but they should be retained and collected to supplement the future SFRA's.