

MAYNOOTH AND ENVIRONS JOINT LOCAL AREA PLAN 2025-2031

Surface Water Management Strategy

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1 INTRODUCTION

1.1 Background

RPS was commissioned by Kildare County Council (KCC) to complete a Surface Water Management Strategy (SWMS) for the town of Maynooth and the area covered by the Joint Local Area Plan including lands zoned by Meath County Council in the Maynooth Environs (Moygaddy, County Meath).

The overall objective of the study is:

“To prepare a Maynooth Surface Water Drainage Strategy for both existing and new development areas within the town to provide for a municipal-level, multi-site nature-based solution(s) to surface water management in the town over the life of the Joint Local Area Plan and beyond.”

The existing surface water drainage system in Maynooth is as follows:

1. Surface Water collected by surface water drainage network. The area is served by Lower Liffey Valley Regional Sewerage Scheme which discharges into the Rye Water River.
2. Surface water drainage network present on the M4 motorway which discharges to the Lyreen River and its tributary Meadowbrook Stream.

1.2 Objectives of the Surface Water Study

The scope of the Maynooth SWMS will aim to identify a sustainable surface water management strategy with the following key aims:

- To designate areas where surface water can be managed.
- For KCC to be in control of the situation.
- To identify opportunities to build-in extra capacity.
- To take account of the surface water drainage management system being proposed as part of the Maynooth Eastern Relief Road (MERR).
- To prioritise nature-based solutions.
- To consider the amenity potential for any solution of scale (i.e., open space/parkland/linear & riparian access).
- To ensure that development along urban watercourses must comply with the Inland Fisheries Ireland Guidance ‘*Planning for Watercourses in the Urban Environment*’ (2020), including the maintenance of a minimum riparian setback zones.

1.3 Key Constraints and Opportunities

Some key constraints and opportunities that shall be considered during the SWMS are as following:

- The Rye Water Valley/Carton Special Area of Conservation (SAC).
- Existing key infrastructure including the M4 Motorway, Dublin-Sligo Railway Line and Royal Canal
- Proposed Eastern Distributor Road
- Dart+ West Rail Extension
- Outdated Surface Water Drainage Network Records
- Engagement with Irish Water and Surface Water Separation strategy

1.4 Scope of this Report

The scope of this report includes:

1. Identification of surface water assets / GIS layers / combined systems – mapping of existing infrastructure.
2. Identification of permitted developments and their surface water arrangements.
3. Assessment of the capacity of permitted developments and undeveloped zoned land within the town.
4. To inform the preparation of the new Local Area Plan.
5. Identification of areas and modes / types of surface water management.

1.5 Study Area

The study area includes Maynooth Town (Co. Kildare) and lands at Moygaddy (Co. Meath) as shown in **Figure 1-1**. Maynooth is a town in north County Kildare targeted for significant growth in the coming years. It is approximately 25 km west from Dublin City Centre and situated north of the M4 motorway. The Dublin-Sligo railway line and the Grand Canal pass through the centre of Maynooth.

Several watercourses flow through and around the town including the Lyreen River, Meadowbrook Stream and the Rye Water River. Downstream of the town the Rye Water River is classified as a Special Area of Conservation (SAC).

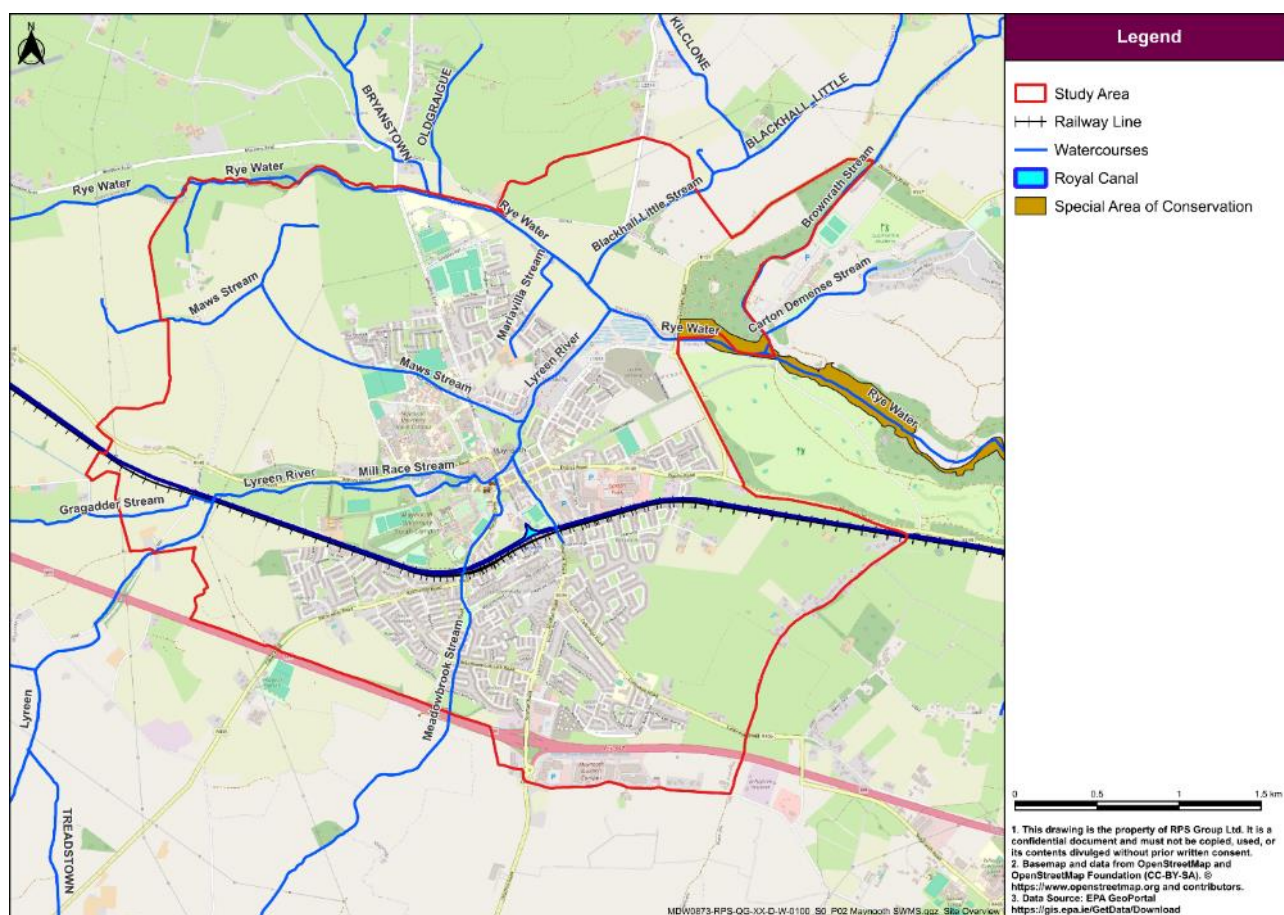


Figure 1-1 Maynooth SWMS study area overview

2 METHODOLOGY

Current surface water drainage records and available datasets exist for approximately 50% of Maynooth. As such, the foundation of the Surface Water Management Strategy was to consolidate existing drainage data sources and produce an updated dataset of surface water infrastructure.

2.1 Data Collection

Data and information were gathered to assist in defining the surface water drainage catchments. Table 2-1 below shows the primary datasets and reports used in the study.

Table 2-1 Datasets and Reports used to help define the surface water drainage catchments.

Dataset	Ownership	Source
Watercourse Network	Environmental Protection Agency (EPA)	EPA Geoportal https://gis.epa.ie/GetData/Download
Historic Flood Data	OPW	Flood Maps Portal Flood Maps - Floodinfo.ie
2m DTM Raster of Study Area	GSI	Open Topographic Data Viewer https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5
Permitted Developments and surface water arrangements	KCC	KCC Planning and Strategic Development Department http://webgeo.kildarecoco.ie/planningenquiry
Permitted Developments and surface water arrangements	ABP	An Bord Pleanála Map Search An Bord Pleanála (pleanala.ie)
Surface Water Drainage Network Shapefile	KCC	Kildare County Council
Irish Water DAP Model, Stage 2 and Stage 3 Reports	Uisce Éireann	Uisce Éireann
Groundwater and Surface Water Flood Data	GSI	GSI Geoportal Geological Survey Ireland Spatial Resources (arcgis.com)
Soil Hydrology Map	EPA	EPA Geoportal https://gis.epa.ie/GetData/Download

2.2 Data Gap Analysis

The SW Drainage Network Shapefile received from KCC covered about 50% of existing developed areas of Maynooth. There was significant overlap with the Irish Water DAP Model SW Drainage Network shapefile, however this also provided coverage for few additional areas. Significant areas of Maynooth were not captured in either dataset, requiring extensive review of surface water arrangements included in planning documentation held on the KCC and An Bord Pleanála online portals.

Where possible, surface water drainage drawings extracted from various planning applications were compiled together with the existing drainage datasets to produce a more complete surface water drainage network record for Maynooth. Figure 2-1 illustrates the spatial coverage of each available dataset.

Despite best efforts, considerable uncertainty remains in some areas where conflicting information existed between datasets or where additional information could not be found and data gaps remain.

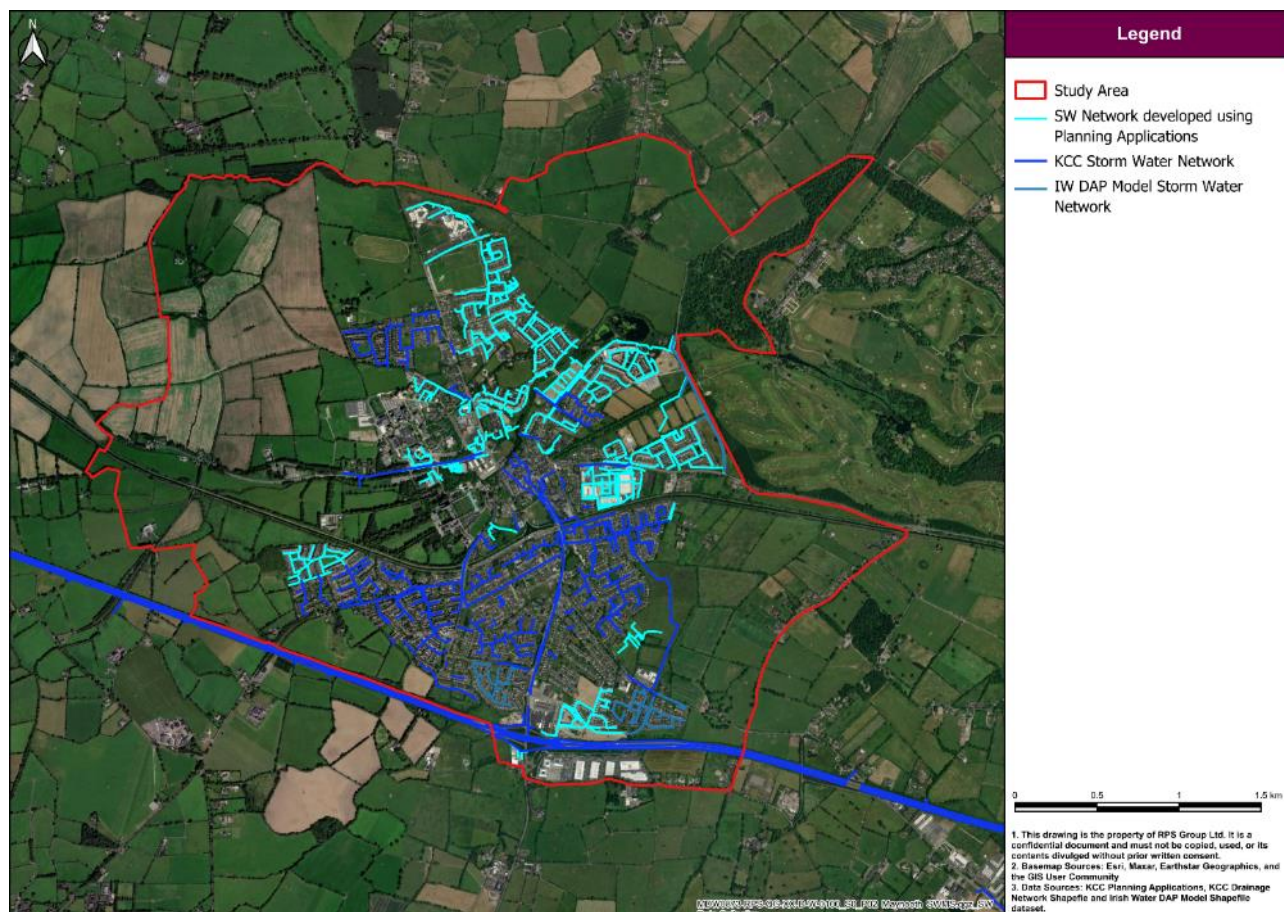


Figure 2-1: Consolidated surface water drainage network dataset

2.3 Conceptual Approach

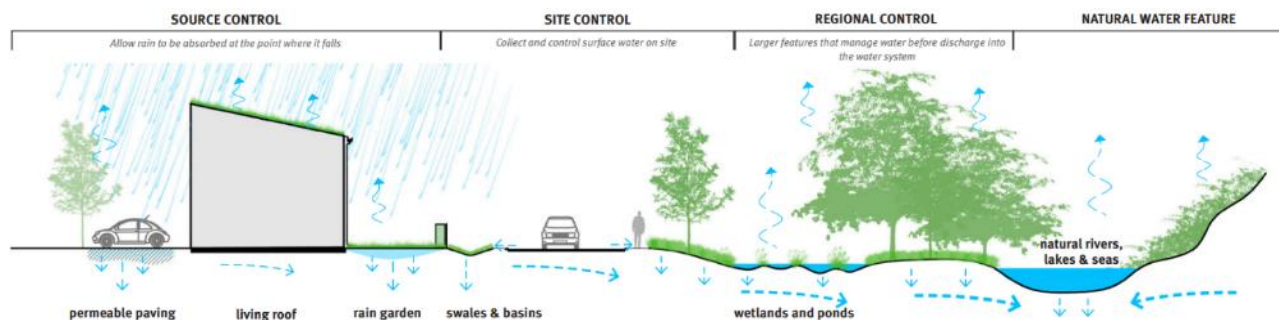
Surface water management in Maynooth should be in accordance with modern sustainable design practice, incorporating SuDS and water-sensitive urban design (WSUD) principles. The use of SuDS and nature-based solutions is required by the County Development Plan.

The following guidance applies:

- Greater Dublin Strategic Drainage Study (DDC, 2005)
- The SuDS Manual C753 (CIRIA, 2015)
- Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas – Best Practice Interim Guidance Document (DoHLGH, 2022)
- Sustainable Drainage Systems Guidance Document (KCC, 2024)

In order to promote a holistic, catchment-wide approach to surface water management between neighbouring development sites, the concept of a SuDS ‘management train’ is used. This means surface water controls are implemented in a hierarchical fashion from the point at which rain lands (source control) up to the extent of a development site (site control) and eventually up to the wider sub catchment level (regional control).

A level of disposal is designed in at each stage of the management train and the surplus is conveyed to the next stage at an attenuated quantity and improved quality. This allows for connectivity of drainage systems between sites and the creation of green corridors providing habitat and amenity value. The concept is illustrated below in Figure 2-2.



Source: [Sustainable Rainwater Management Guidance, CEC 2021](#)

Figure 2-2: SuDS Management Train

Planning for specific areas dedicated to managing surface water at the sub catchment level is a practical and efficient approach. Maynooth has several watercourses running through it which serves as the final discharge points for the surface water.

Surface water from agricultural land should be managed by channelling it through open ditches, directing its flow towards designated watercourses. Similarly, in developed areas of Maynooth like town centre and resident estates, it is essential to employ strategies such as rainwater harvesting to capture surface water at its source. The surface water collected by the surface water drainage network should undergo attenuation processes before being discharged into watercourses. This not only helps in managing water quantity but also contributes to enhancing the quality of surface water intended for release into the river. This approach enhances the preservation of water quality in rivers, particularly important given the presence of the Rye Water River SAC downstream of Maynooth.

Rye Water Valley / Carton Special Area of Conservation (SAC) (site code: 001398) is located to the northeast of the town and is partially within the Maynooth Environs (County Meath). Qualifying interests for the SAC include Petrifying springs with tufa formation (Cratoneurion), a habitat which is listed in Annex 1 of the EU Habitats Directive, in addition to populations of both the narrow-mouthed whorl snail (*Vertigo angustior*) and Desmoulin's whorl snail (*Vertigo moulinsiana*) which are listed under Annex 2 of the Directive.

3 FLOODING

A desktop study was conducted to review existing sources of flooding including fluvial, pluvial and groundwater mechanisms.

3.1 Fluvial Flooding

The main source of flooding in the Maynooth is fluvial. Fluvial flooding within Maynooth occurs primarily from the Rye Water River, Lyreen River and Meadowbrook Stream. **Figure 3-1** presents CFRAM 1% AEP and 0.1% AEP fluvial flood extents in addition to the location of various historic flood events occurred in Maynooth. The most recent flooding event occurred across 21-22 November 2017. Heavy rainfalls occurring on already saturated ground conditions caused substantial flooding on the M4 Motorway. This caused significant disruption to road users, mainly in four areas occurring between Junction 8 Kilcock and Junction 7 Maynooth.

Flooding was attributed to surface water accumulation on floodplain which made its way onto the M4 westbound lanes and continued East towards Maynooth. Due to channel capacity at Maynooth the water was unable to drain off the road causing an accumulation on the road.

Further flooding was caused by surface water accumulation along the M4 motorway eastbound lanes at Junction 7. Due to the river channels on the Meadowbrook River being at full capacity, discharge from the road drainage system proved difficult.

Table 3-1 presents the description of additional previous known flood events.

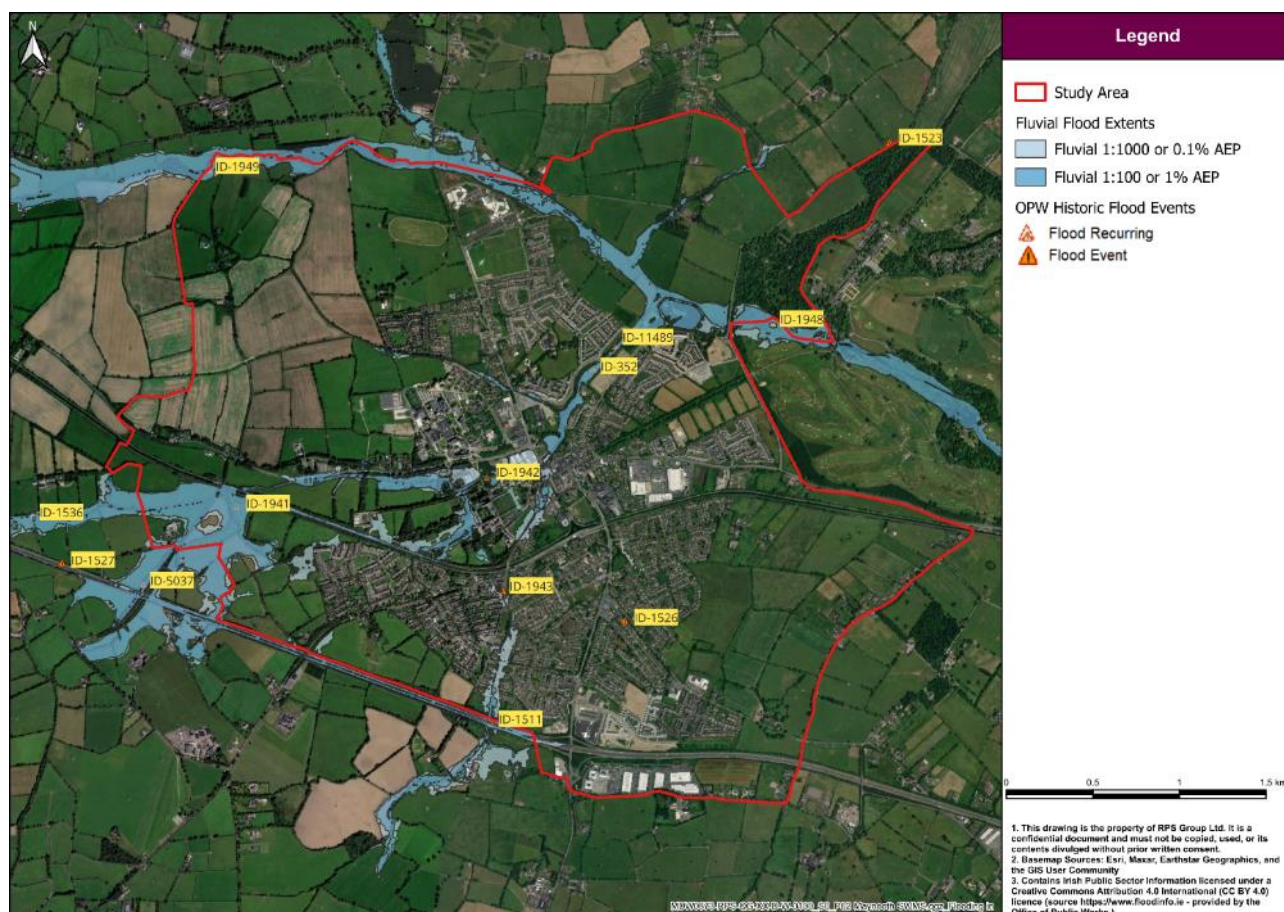


Figure 3-1 Fluvial flood events in Maynooth

Table 3-1 Historical Flooding in Maynooth

Flood ID	Flood Event	Description
ID-476	Lyreen Maynooth Jackson's Bridge Area Jun 1993	Extreme flooding of farmland upstream and downstream of culvert and passageway near River Lyreen & Royal Canal confluence.
ID-1941	Lyreen Maynooth Canal Culvert Nov 2000	Flooding due to River Lyreen forced the closure of a portion of M4 motorway.
ID-3539	Lyreen Maynooth University Jun 1993	River Lyreen: Flooding of Maynooth College Farm, Flooded River channel in the grounds of Maynooth College.
ID-1942	Lyreen Maynooth College Nov 2000	Flooding in the grounds of Maynooth college due to the overflow of Lyreen river.
ID-1943	Meadowbrook Estate Parson St Maynooth Nov 2000	Meadowbrook Stream caused extreme flooding of Meadowbrook housing estate, sections of road and Parson Street.
ID-1948	Rye Water Maynooth Carton Nov 2000	The fields in the surroundings of river Rye Water were flooded.
ID-1949	Rye Water Maynooth Kilcock Area Nov 2000	Flooding of farmland in the vicinity of Rye Water River.
ID-1511	Meadowbrook Greenfield M4 Nov 2000	Meadowbrook Stream caused flooding of M4 Motorway and surrounding area.
ID-1523	Dunboyne Maynooth Road, Meath Nov 2002	Approximately 10 m of road was severely flooded, however no residential property was affected.
ID-352	Lyreen Maynooth Nov 2002	High flow in River Lyreen caused overflow in the weir at Fishponds in Maynooth.
ID-1526	Lawrence Avenue Maynooth Nov 2002	Flooded low lying land and roads. Pipes and drain outfall blocked with tree roots but no house flooded.
ID-11489	Lyreen River Maynooth Oct 2011	River Lyreen: The flood event was not significant as compared to previous events.
ID-5037	Lyreen Maynooth M4 Jun 1993	The event caused flooding of M4 motorway and adjacent farmlands

3.2 Groundwater Flooding

A review of the GSI Groundwater Flooding Data, as presented in **Figure 3-2**, suggests that some instance of surface water flooding with a likely groundwater component has occurred in an isolated area of southern Maynooth. This area has since been developed likely reducing this risk of flooding recurring. GSI Predictive groundwater flood mapping does not identify any groundwater flood risk within the LAP. The risk of ground water flooding for study area is therefore considered low.

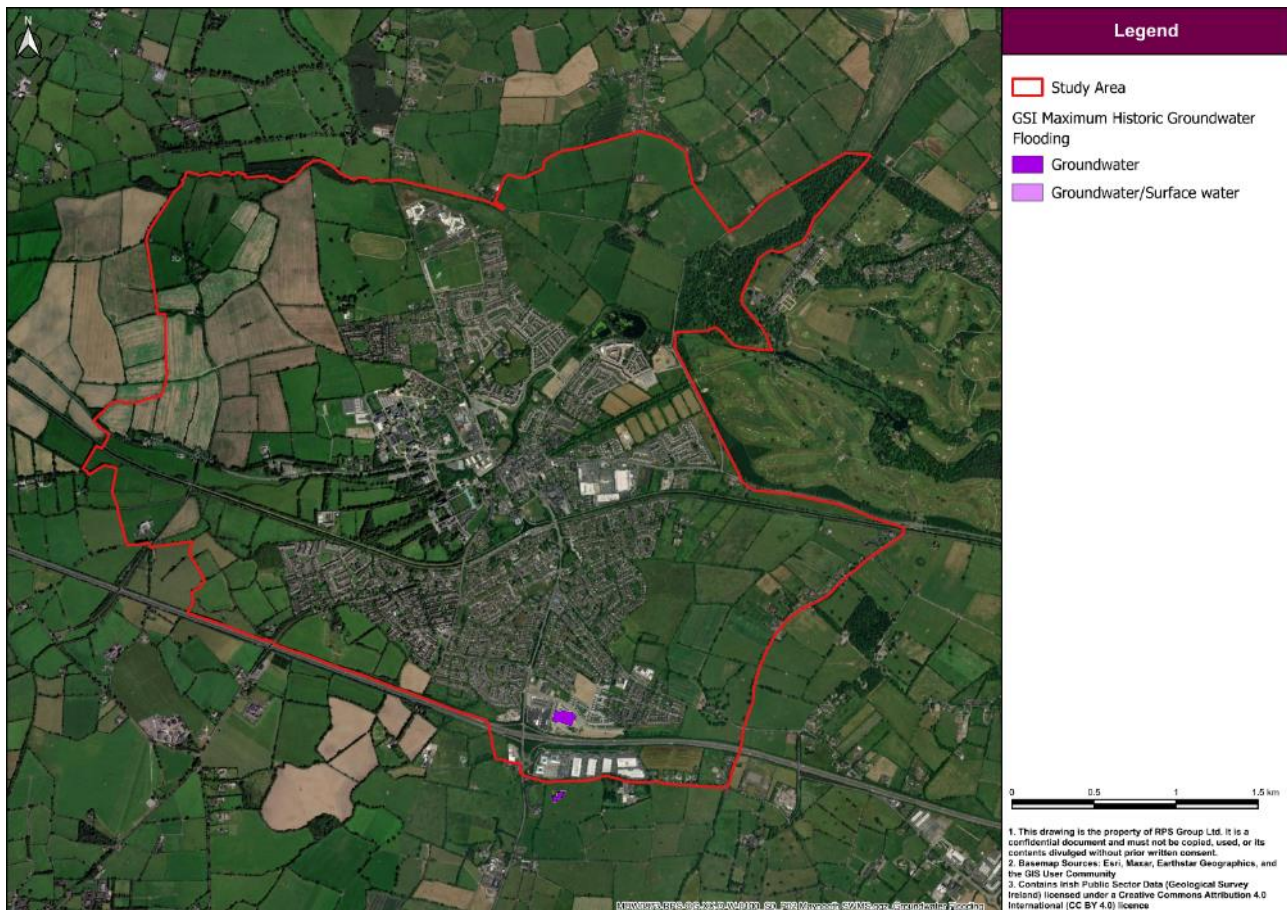


Figure 3-2 Historic Groundwater Flooding in Maynooth

3.3 Pluvial Flooding

The GSI winter 2015/2016 surface water flooding data confirms that there have been historic events of surface water flooding in and around the Maynooth LAP area as shown in the **Figure 3-3**. Further, GSI SAR Seasonal Flood Maps show mapping of surface water extents for Maynooth between Autumn 2015 and Summer 2021. Most areas affected are located in the agricultural fields to the west and south-west of existing developed areas, and along the adjacent floodplain to the Rye Water River.

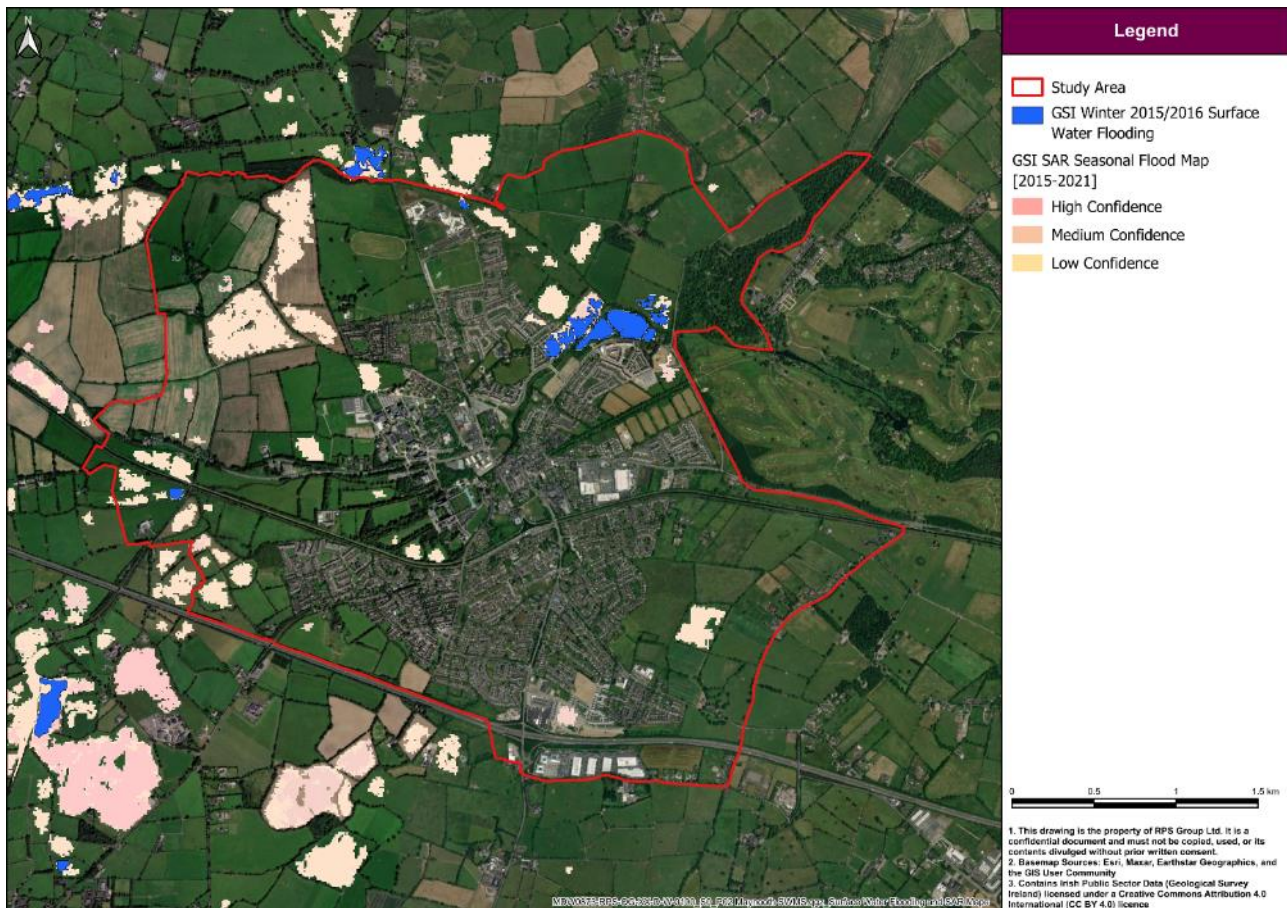


Figure 3-3 GSI Winter 2015/2016 Surface Water Flooding and SAR Seasonal Flood Maps for Maynooth

4 NATURAL DRAINAGE

4.1 Overview

Natural drainage refers to the process by which surface water moves in an area depending on topography and geological features of the area. This section aims to provide information about soils hydrology, topography and receiving water bodies for the study area.

4.2 Receiving Surface Water Bodies

The Rye Water River is the main hydrologic pathway through Maynooth, flowing from west to east across the northern area of the LAP. It also forms the part of Arterial Drainage Scheme as shown in Figure 4-1. Arterial Drainage Schemes were carried out by OPW under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. The purpose of the schemes was to improve land for agriculture, to ensure that the 3 – year flood was retained in bank this was achieved by lowering water levels during the growing season to reduce waterlogging on the land beside watercourses.

The Lyreen River passes through centre of the town and joins Rye Water River to the North-East of Maynooth. Several smaller streams, namely, Meadowbrook Stream (also known as Taghadoe or Joan Slade), Mill Race, Maws (also referred as Crewhill), and Mariavilla flows through Maynooth.

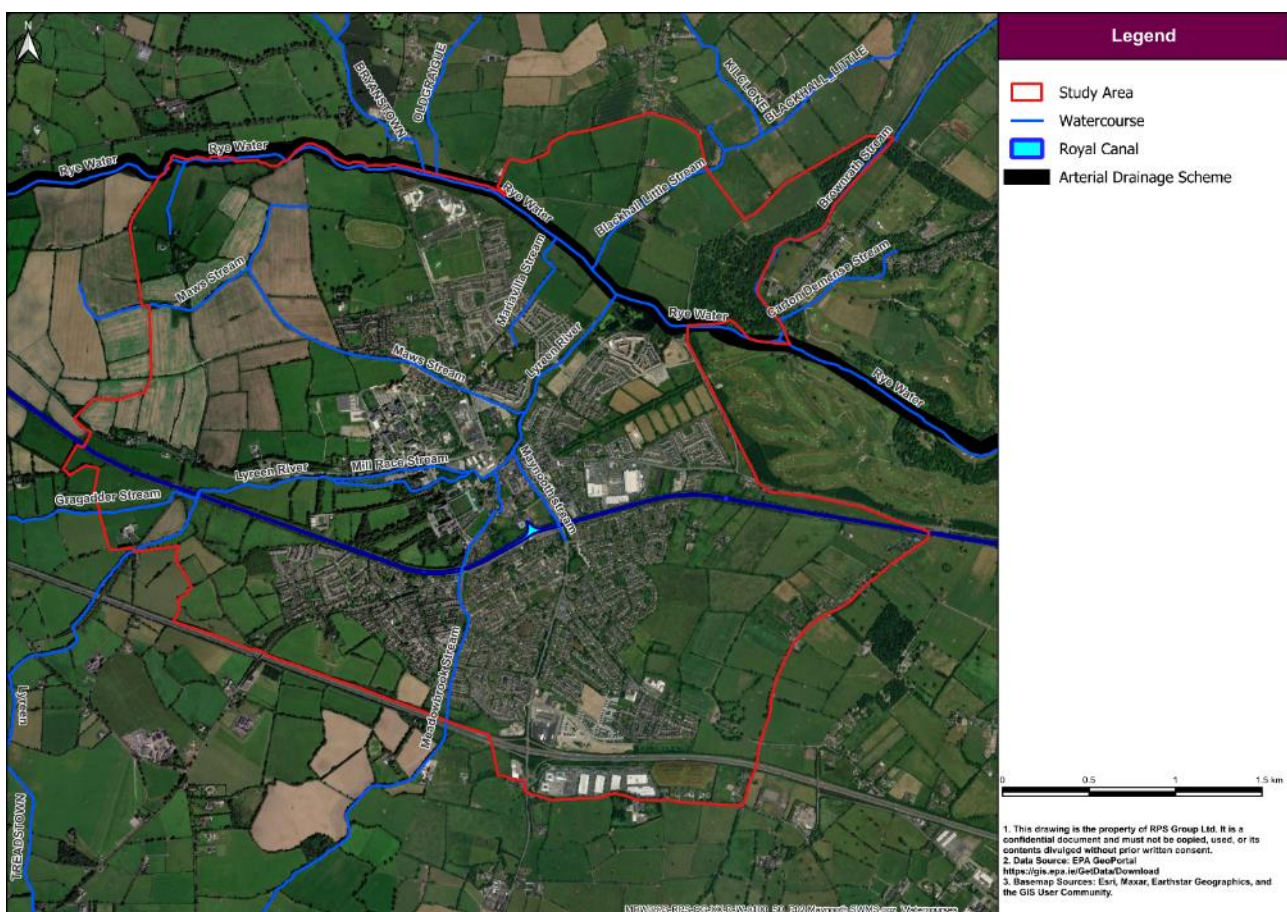


Figure 4-1 Watercourses present in the Study Area

4.3 Topography

The topography of the Study Area is presented in the **Figure 4-2..** The majority of the LAP area therefore slopes downwards towards the Rye Water River. However, the presence of the Royal Canal, Railway and M4 Motorway interfere with overland flow paths and provide hydraulic constraints on surface water movement.

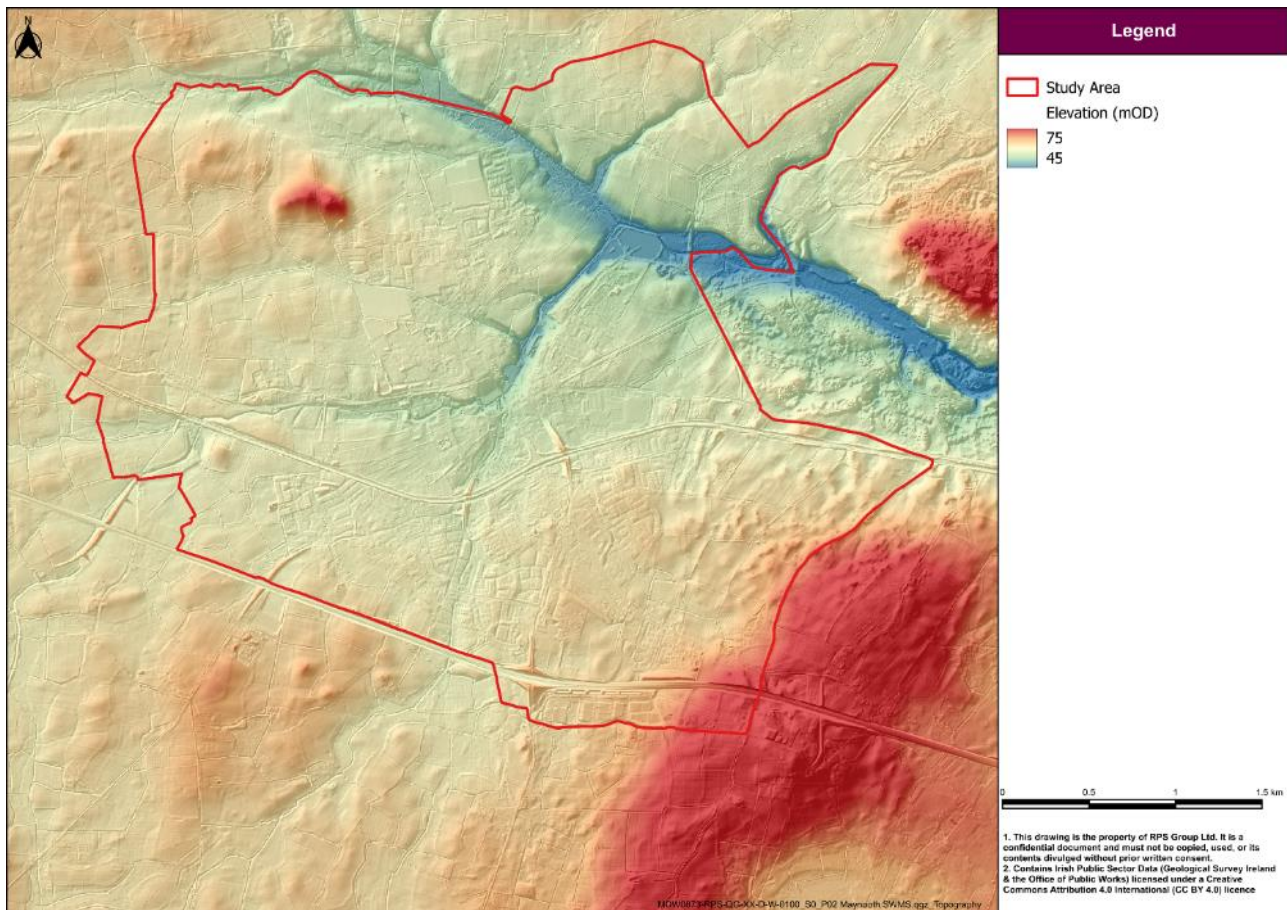


Figure 4-2: Study Area Topography

4.4 Soil Hydrology

The central area of the LAP is largely underlain by made ground material. Outside of the existing developed area, there is a defined separation in soil drainage characteristics between the east and west areas of the LAP. The west is very-poorly drained material with pockets of poorly drained material, while the eastern region of study area possesses well drained material as shown in **Figure 4-3**. The eastern areas of the LAP are typically well draining with some poorly draining soils in the south-east. The mapped soil permeability corresponds well with the observed surface water flooding identified in Section 3.3.

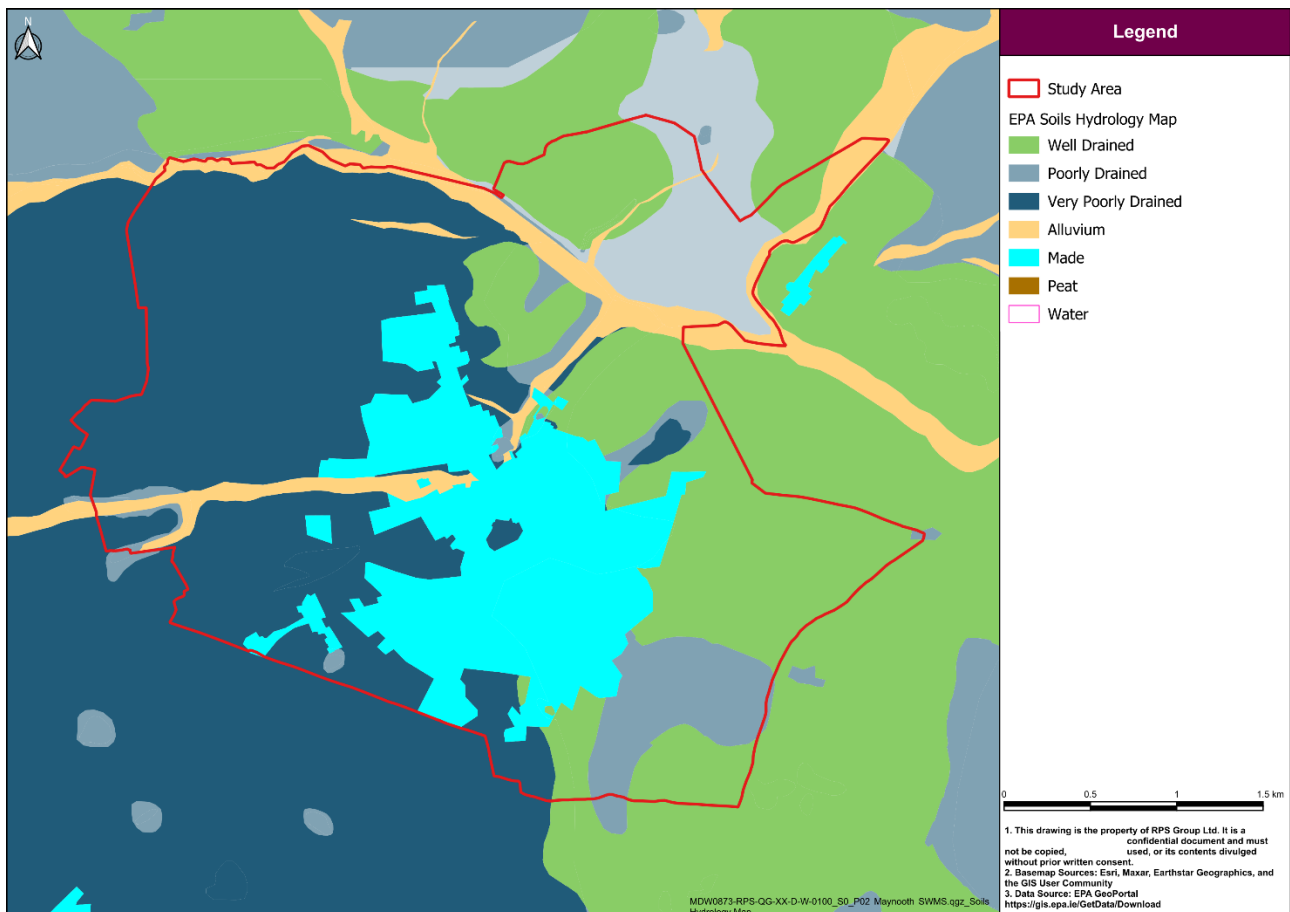


Figure 4-3 Soils Hydrology in the Study Area

5 EXISTING DRAINAGE NETWORK

5.1 Surface Water Network

Surface water in the Maynooth town is collected by a separated surface water drainage network. The surface water drainage network prevailing in Maynooth is represented in **Figure 5-1** below. The drainage network present in the south of the study area discharges into Meadowbrook Stream and Lyreen River, whilst the drainage network in the north mostly discharges into Maws Stream, Lyreen River, Rye Water River and Mariavilla Stream.

Discussion with KCC operations and maintenance staff responsible for drainage in Maynooth communicated concern that higher intensity rainfall associated with climate change combined with future developments place the existing network under stress. It was noted that any recorded issues of flooding from the existing network was attributed to blockage rather than design capacity constraints.

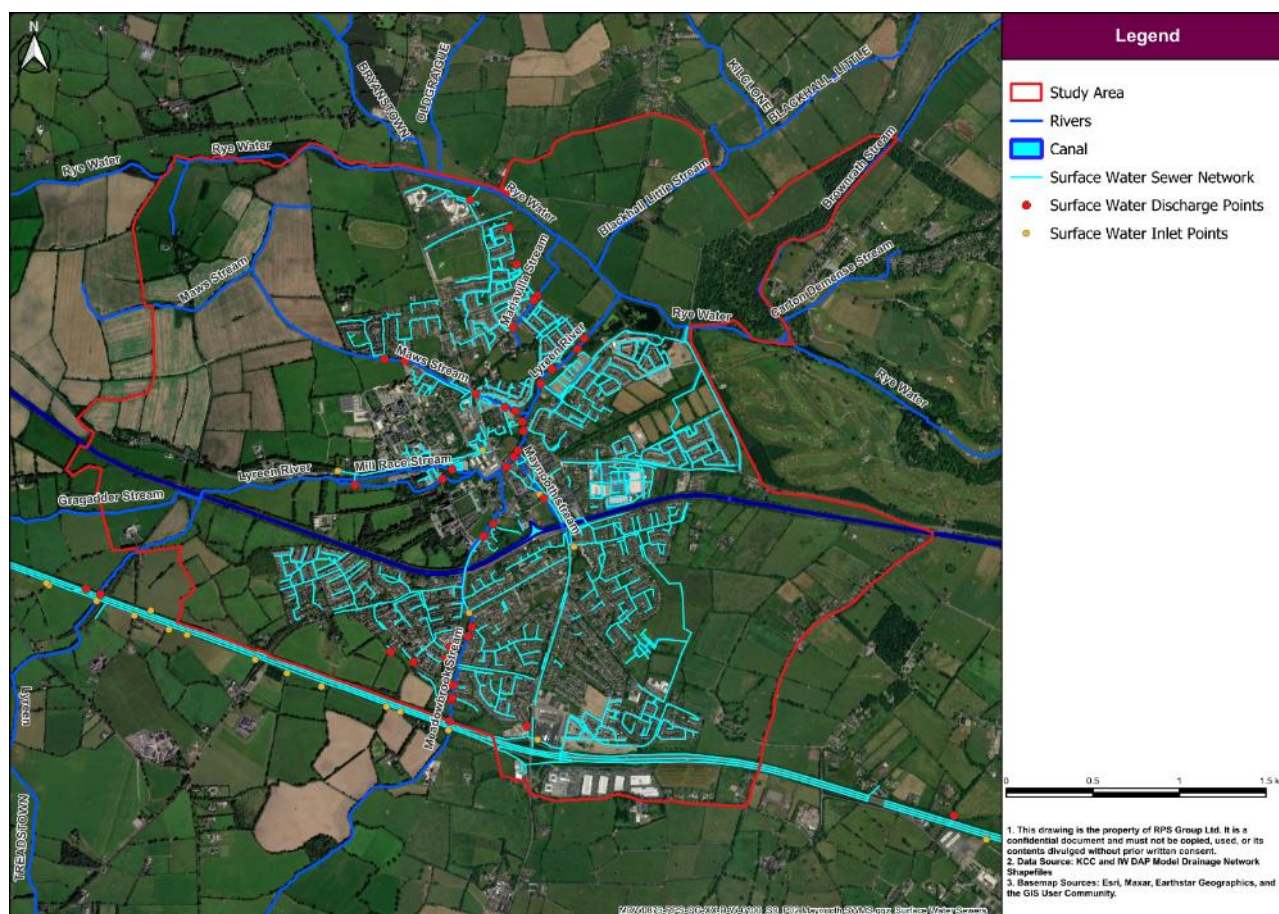


Figure 5-1 Maynooth Surface Water Drainage Network

5.2 Foul Drainage Network

The town of Maynooth has separate foul water drainage network. The foul sewer network runs throughout the town and passes through the R148, R408 and R406. Flow from Maynooth and Kilcock is collected at the Maynooth Transfer Pipeline Station and pumped directly to Leixlip. However, it was identified within the Irish Water Lower Liffey Valley Drainage Area Plan (Atkins 2022) that certain areas within the catchment were likely to have surface water run-off contributing to the foul sewer network. These areas include 'Meadowbrook Road', 'Maynooth University', 'Maynooth Park', 'Leinster Street' and 'Moyglare Road' as shown in Figure 5-2 and listed in Table 5-1.

The Maynooth Surface Water Separation programme by Irish Water proposes storm water removal works from the foul network in the identified sub catchments of Maynooth. By proposing storm water separation,

this project aims to address existing flooding issues, alleviate system surcharge and to allow for additional foul network capacity. The importance of this storm water separation project is highlighted by significant developer pressure in the catchment.

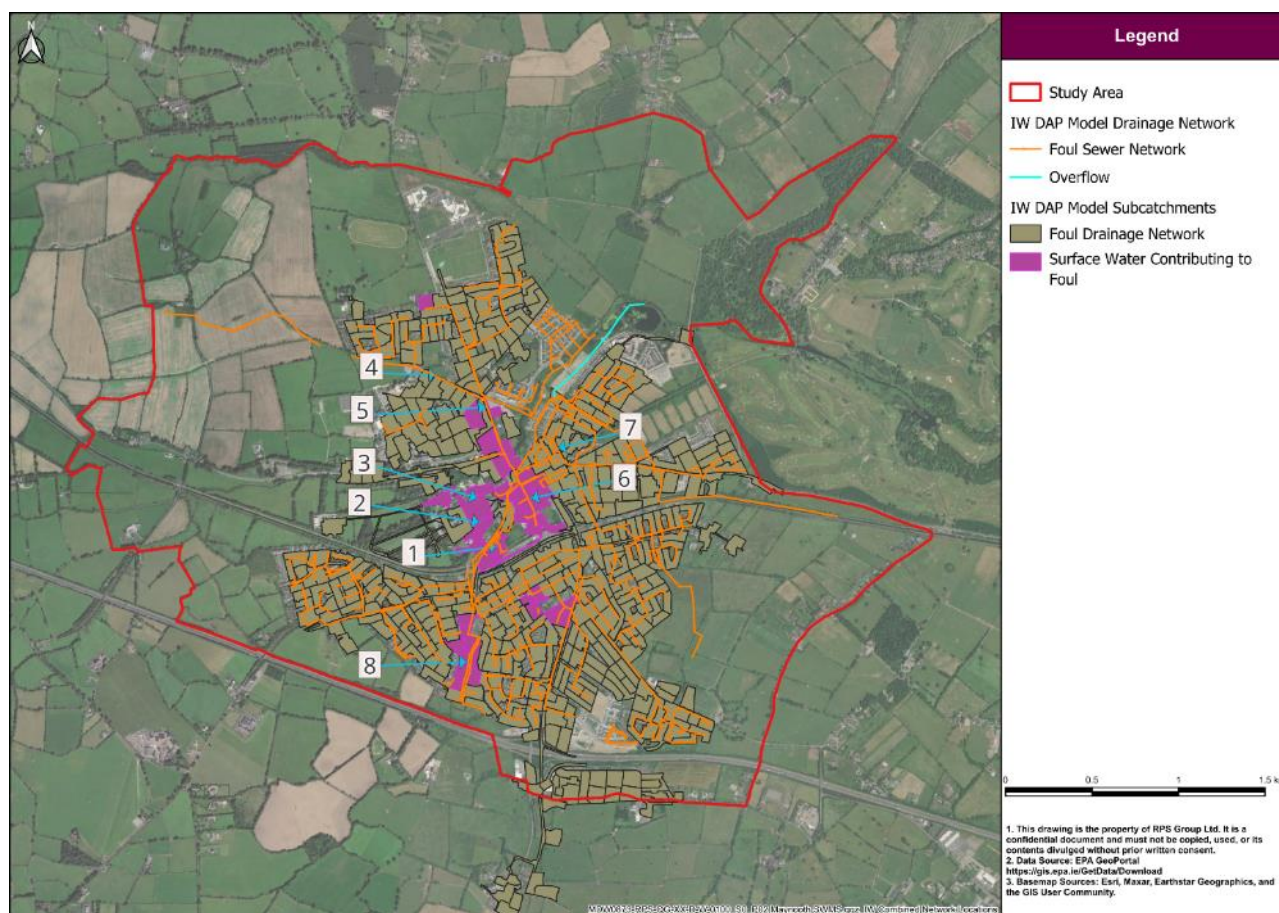


Figure 5-2: Foul Sewer Network

Table 5-1: Suspected Areas of Surface Water contributing to Foul Sewer Network

#	Location	Comments
1	Parson Lodge	Likely Connected Roofs to Foul System.
2	Maynooth University	Likely Connected Roofs to Foul System.
3	Maynooth University	Likely Connected Roofs to Foul System.
4	Maynooth University	Likely Disconnected Roofs to discharge on the road and collected to storm system.
5	Moyglare Road, Maynooth University	Likely Connected Roofs to Foul System.
6	Leinster Street	Disconnected Roofs, no storm system.
7	Buckley's Lane	Not likely Connected Roofs to Foul System.
8	Meadowbrook Drive	Likely Roofs Discharging to Watercourse nearby. No storm system.

5.3 Drainage Summary

Maynooth town has almost completely distinct drainage networks for surface water and foul water drainage. In the southern region of Maynooth, the surface water drainage network, inclusive of the M4 motorway drainage system, discharges surface water into the local watercourses, namely the Lyreen River and Meadowbrook Stream. The northern part of the town discharges into the Rye Water River and its tributaries.

The foul drainage network is largely separate from stormwater, however Irish Water have identified some sub-catchments within central areas of Maynooth where it appears that some stormwater run-off connections, primarily from roofs are partially providing flow into the foul network. Irish Water is commencing a surface water separation programme to remove these surface water inputs from the foul system to improve capacity and resilience for future growth.

It is important to note, that the Rye Water River forms part of the Arterial Drainage Scheme maintained by the Office of Public Works (OPW) and that the Rye Water Valley/Cartron Special Area of Conservation (SAC) is located on the downstream edge of Maynooth, and, as the receiving waterbody for all surface water discharge and foul water overflow, is a key risk receptor potentially sensitive to water quality and treatment of water drainage within Maynooth.

6 SIGNIFICANT INFRASTRUCTURE DEVELOPMENTS

6.1 Dart+ West

On the Maynooth and M3 Parkway Lines, DART+ will introduce electrified high-capacity trains at increased frequency for all stations between Maynooth/ M3 Parkway to Dublin City Centre (40 km corridor). The overall scope of the DART+ Maynooth and City Centre project includes the following key elements of infrastructural work with the Maynooth LAP Area:

- Electrification and re-signalling of the Maynooth & M3 Parkway line from City Centre to Maynooth (40 km approx.).
- Construction of a new DART Depot facility west of Maynooth Station for the maintenance and stabling of trains.

The area surrounding the OBG23 Jackson's bridge is low lying and flow is significantly constrained by the canal culvert. Extreme fluvial events result in considerable flooding in lands south of the canal and subsequent inundation of the rail line. A large portion of the subject area including lands within the footprint of the proposed rail embankment and access road are within Flood Zone A. The post development model shows flood pathways are maintained by the provision of flood conveyance culverts while displaced volumes are accommodated in the compensatory storage areas. The development results in a minor increase in flood levels south of the proposed embankments though these are seen as negligible overall.

The track at this location cannot be raised due to potential conflicts with preserving heritage aspects of Jackson's Bridge. To provide a sufficient level of protection to the Site-Specific Flood Risk Assessment, the development has been moved offline on a raised embankment over the floodplain.

Proposed crossings have been sized as to maintain existing flood levels. Bridges soffits are to maintain a freeboard of >300 mm above the 1% AEP (+ climate change) flood level while the minimum rail level will maintain a freeboard of >500 mm above the 0.1% AEP (+ climate change) events. A schematic showing proposed measures is presented in Figure 6-1.

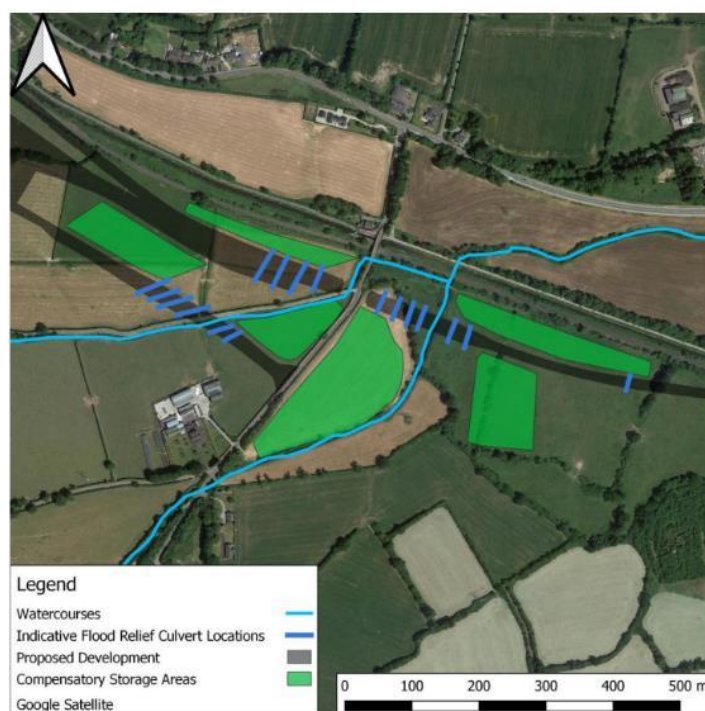


Figure 6-1 Proposed Compensatory Storage Area - Jacksons Bridge¹

¹ Dart+ West Site Specific Flood Risk Assessment (July 2022), <https://www.dartplus.ie/S3mvc/media/DART-West-Railway-Order/7%20Site%20Specific%20Flood%20Risk%20Assessment/Site-Specific-Flood-Risk-Assessment.pdf>

6.2 Maynooth Eastern Ring Road

The future development of the Maynooth Eastern Ring Road is proposed in the Railpark townland to the east of Maynooth area, with an alignment as shown in Figure 6-2. The proposed development will comprise approximately 1.55 km of ring road linking the R148 Leixlip Road and the R405 Celbridge Road in a north-south direction, and a new bridge crossing of the Royal Canal and Dublin/Sligo railway line. Additional aspects of the proposed development include pedestrian and cycle facilities and the provision of property accesses.

The road alignment is located within Flood Zone C with a low risk of flooding. The drainage network for the proposed development will incorporate Sustainable Drainage Systems (SuDS) for the purpose of managing surface water in terms of both flow and quality.

The proposed development has received Part 8 Planning Approval including the necessary land acquisition (CPO). The Part 8 Planning Application Planning Report states, *'Surface water from the project will be directed to the existing drainage network and will pass through attenuation tanks and a hydrocarbon interceptor prior to reaching the existing surface water drainage network and eventually the Rye Water. This will prevent impacts on water quality, both in terms of sedimentation, pollutants and the sudden increase inflows following a rainfall event, as a result of the project.'* *'Once the road construction is complete, it is proposed to collect road drainage and discharge it to existing surface water sewers in the vicinity of Maynooth town; infiltration to groundwater is not proposed. There will therefore be no effect on soils, geology or groundwater quality during the operational phase of the proposed development.'*

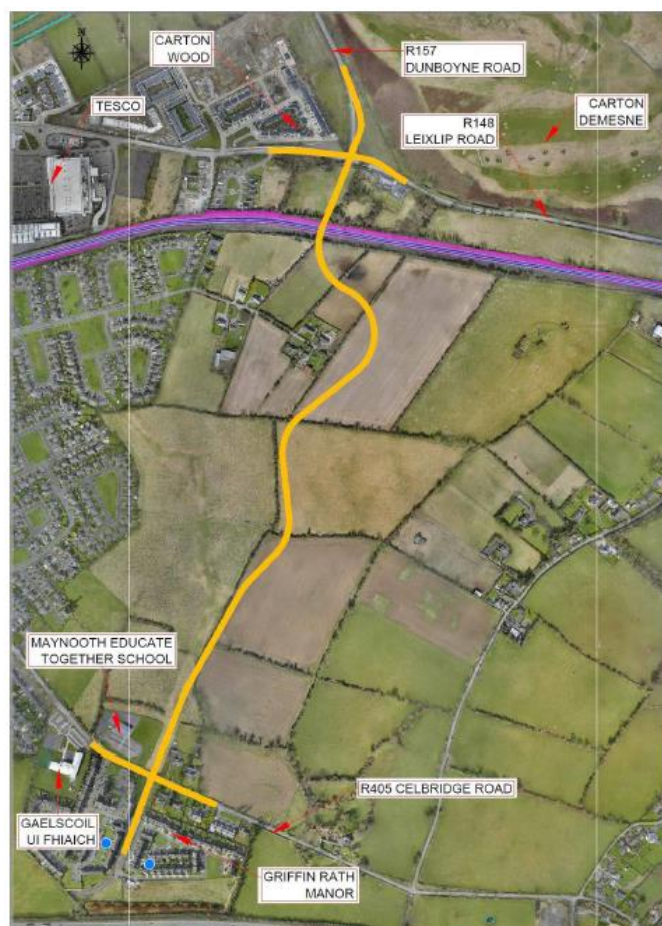


Figure 6-2 Eastern Ring Road Alignment²

² Figure 3.1 Appendix F – Flood Risk Assessment, Maynooth Eastern Ring Road – Part VIII Planning Report, KCC 2019.

7 SURFACE WATER MANAGEMENT PROPOSALS

7.1 Catchment Delineation Review

The steps outlined below were followed to review and update the catchments:

1. The best available digital terrain model (DTM) of the Study Area was procured.
2. The catchment delineation was performed in the GIS software package QGIS manually using the DTM, terrain profile and aerial photography.
3. These catchments were reviewed against the prevailing surface water drainage network and constraints affecting the natural drainage of the study area such as Royal Canal, M4 motorway and Dublin Sligo railway line traversing the study area.
4. Following the review, corrections were made to the developed catchment.

Maps were produced for all developed catchments for the Maynooth SWMS (refer to Figure 7-1 for the overview of developed catchments) and measures suggested for the delineated catchments are described in further sections of this report.

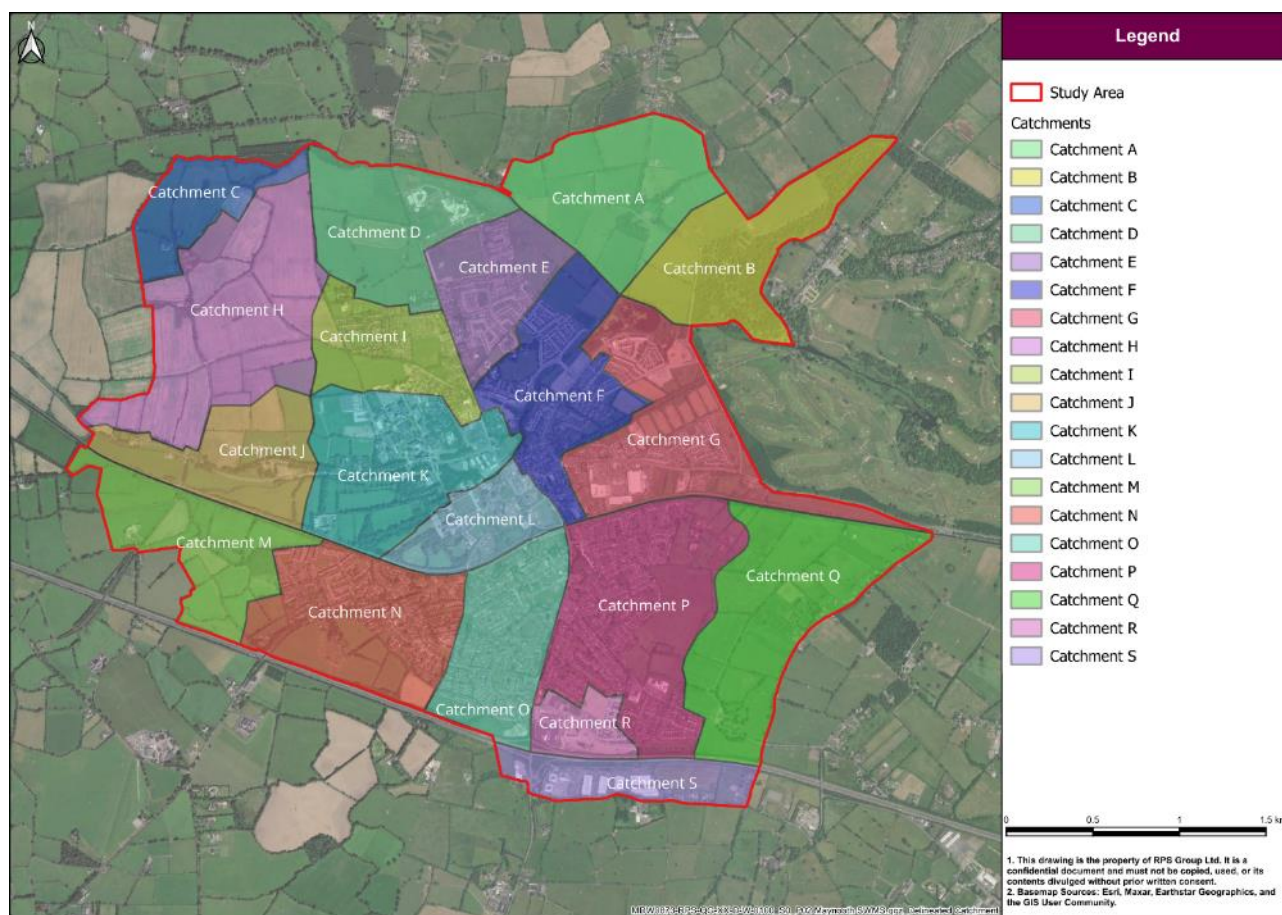


Figure 7-1 Overview of Delineated Catchment for Maynooth SWMS

7.2 Catchment A and B

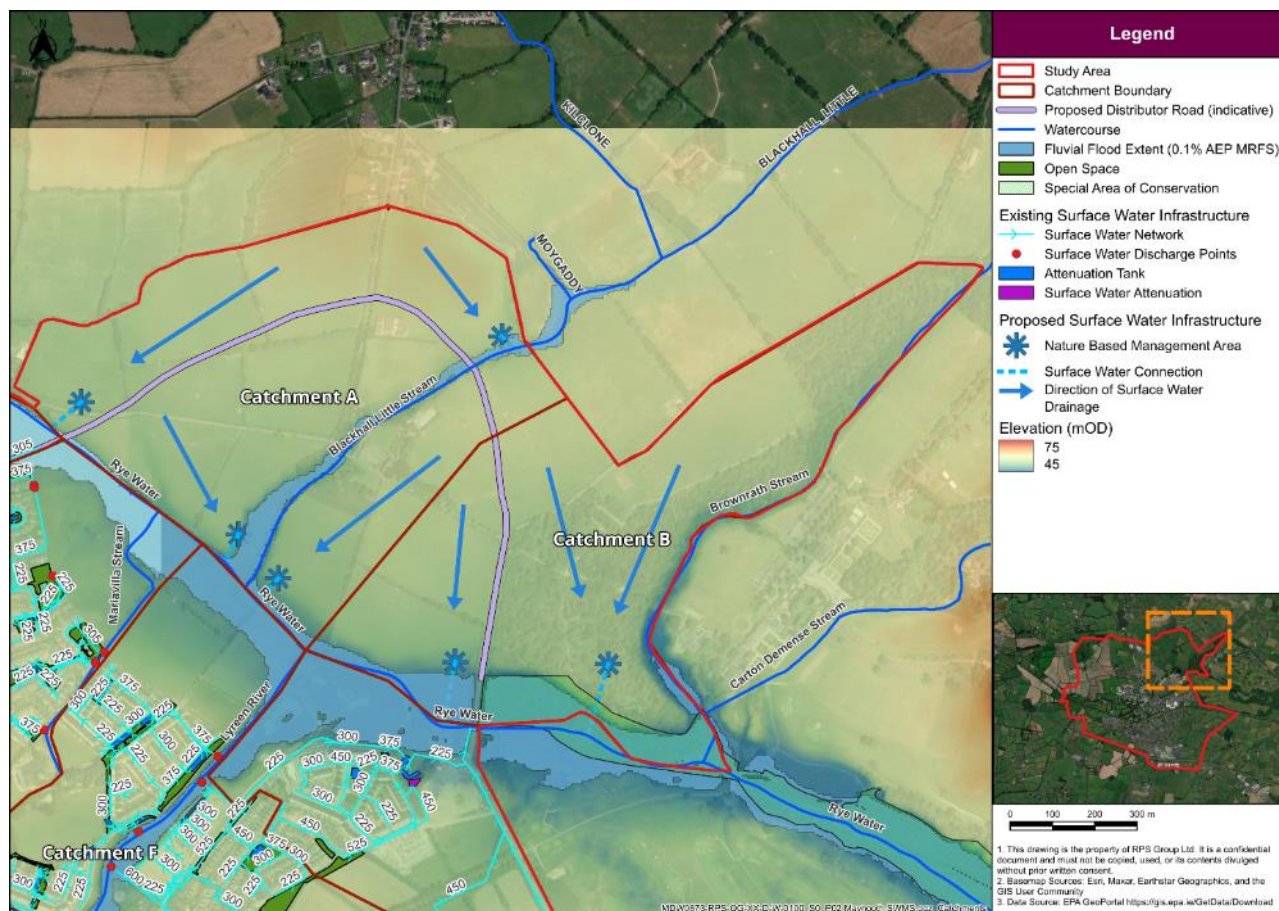


Figure 7-2: Catchment A and B Assessment

7.2.1 Development Zoning

North of the Rye Water River the lands within the Maynooth LAP are located within Meath County Council Maynooth Environs and are subject to the Meath County Council County Development Plan 2021-2027. These lands are zoned for a mixture of New Residential, Tourism, Strategic Employment, Community Infrastructure and High Amenity land uses.

Rye Water River on the boundary of catchment B is the part of Rye Water/Carlton SAC.

7.2.2 Proposed Drainage Strategy

- Blackhall Little Stream passes through the catchment A and divides the catchment into two parts, while the eastern boundary of catchment B is roughly defined by the Brownrath Stream that joins Rye Water River.
- A housing estate development project has been proposed in the south of the catchment A. A sub catchment was established with an approx. area of 40 ha to collect surface water to potential NBS identified in the south-east corner of catchment A to attenuate the surface water before it gets discharged into the river with controlled rate. Since the soil in the catchment is well drained, NBS could be a bioretention pond.
- Catchment B is noted for significant development area of Strategic Employment. Therefore, an NBS is proposed in the catchment to attenuate the surface water as any development in the catchment will be subject to environmental constraints of the SAC.

7.3 Catchment C

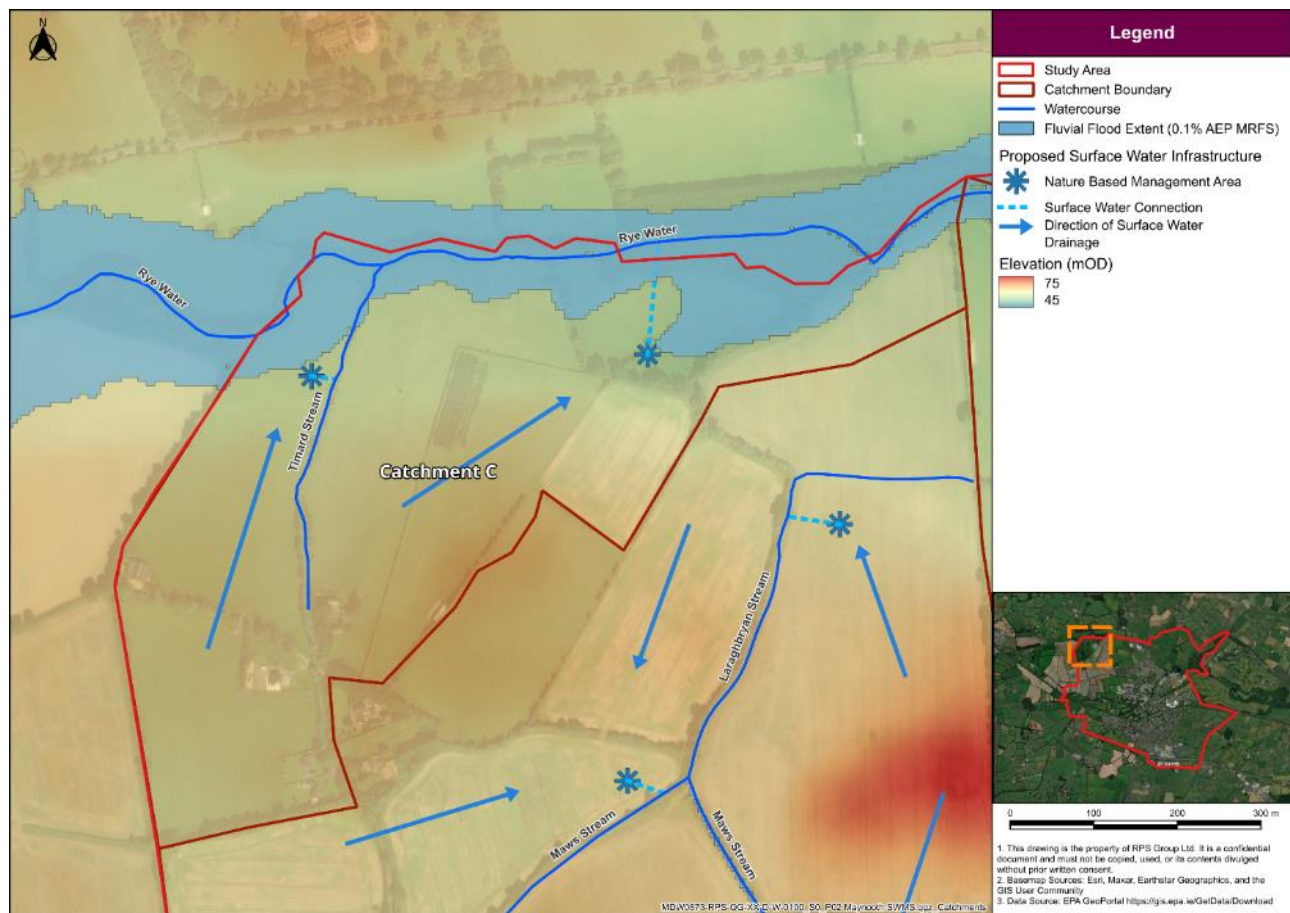


Figure 7-3: Catchment C Assessment

7.3.1 Development Zoning

Catchment C is situated in the north-west extent of the Maynooth LAP area. The area is currently agricultural fields and is not zoned within the Maynooth Local Area Plan 2013-2019.

7.3.2 Proposed Drainage Strategy

The soil in the catchment is poorly drained hence infiltration is unlikely to be a viable option.

A Surface-based attenuation NBS should be included in development plans prior to discharge of any future surface drainage network into the Rye Water River.

7.4 Catchment D and E

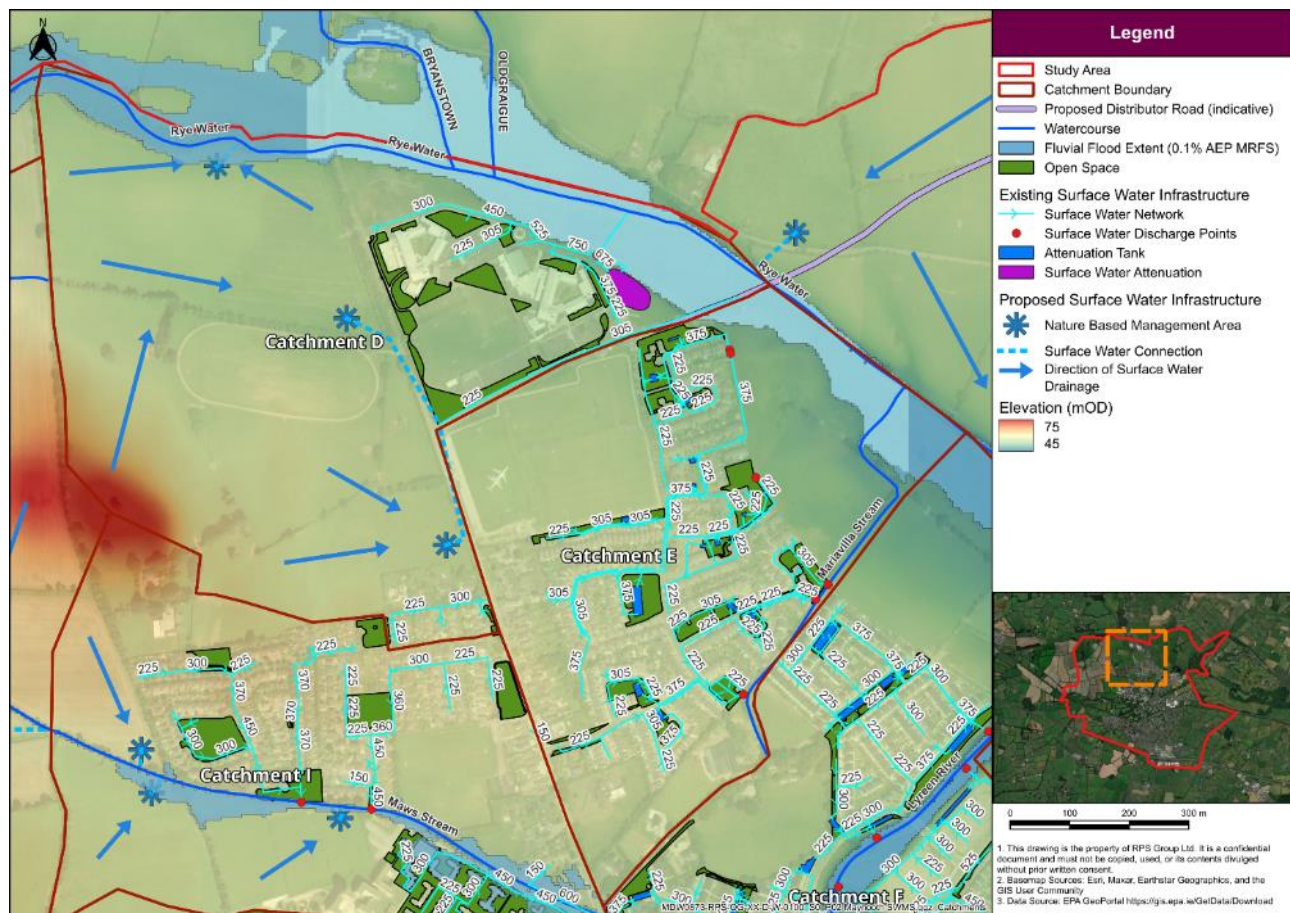


Figure 7-4: Catchment D and E Assessment

7.4.1 Development Zoning

Catchment D and Catchment E consists of mixed land use zone as per LAP 2013-2019 located in the northern region of Maynooth LAP area. Both catchments discharge into the Rye Water River

Catchment D is currently zoned:

- I - Farmland and Maynooth GAA Club training ground
- E - Maynooth Post Primary School and Maynooth Community College
- F - Land on the bank of Rye Water River

The zoned sites for Catchment E are:

- F – Maynooth GAA Training ground
- B – Mycete Homes Ltd
- I - Farmland beside existing residences
- F - Land between farmlands and Rye Water River
- C – New Residential Properties

7.4.2 Proposed Drainage Strategy

- A potential NBS is identified in the north sub catchment (see Figure 7-4) of catchment D to attenuate the surface water for approximately 10.4 ha of land before it gets discharged into the river with controlled rate. Another Sub catchment with area of around 10.2 ha is proposed with NBS in the centre of the catchment just beside GAA pitch which then drains the collected surface water to the existing surface water drainage network in front of the Maynooth Community College on Moyglare Hall Estate Road through a proposed SW network extension.
- The Maynooth Post Secondary school and Maynooth Community College is well connected to SW Network which drains into surface water attenuation pond before ultimately draining to the Rye Water River through an open drain.
- Catchment E is mostly residential area which is connected to SW Network. The residential estate has underground attenuation storage distributed throughout the developed area, likely constructed to GDSDS requirements.
- Any future development within Catchment E should ensure inclusion of SuDS measures in accordance with the requirements of the LAP.
- Surface water discharge by infiltration is potentially viable within Catchment E with most of the region containing well-drained soils.

7.5 Catchment F and G

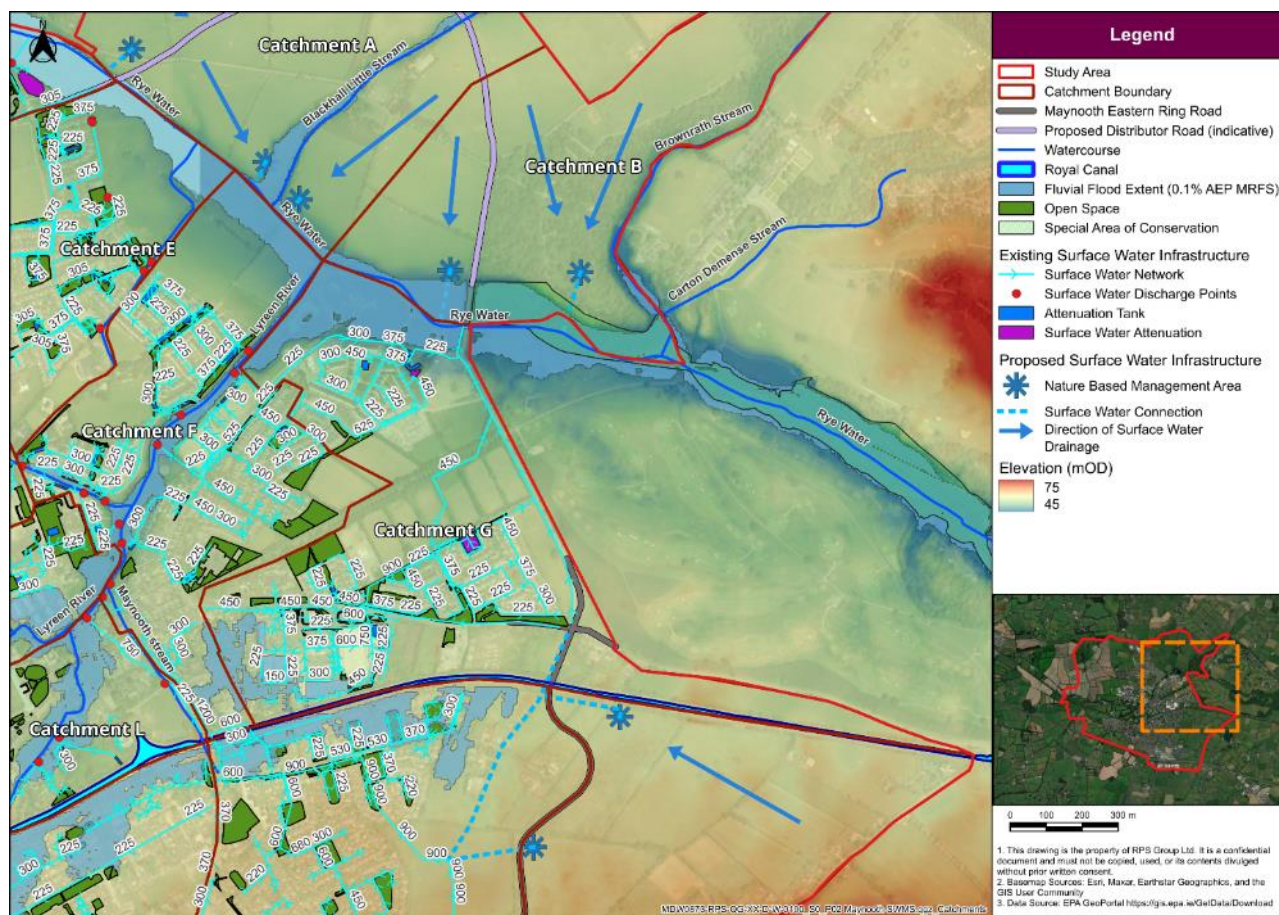


Figure 7-5: Catchment F and G Assessment

7.5.1 Development Zoning

Catchment F in the Maynooth LAP consists of following zones:

- C – Mariavilla, Lyreen Park and Lyreen Lodge Residential Houses
- A1 – Commercial Places
- F - Land on the bank of Rye Water River and Lyreen River
- I - Agricultural Land either side of Mariavilla Residential Area
- S – Carton Avenue/ The Lime Walk

The zoned sites for Catchment G are:

- A1 – Commercial places such as Tesco, McDonald's etc
- B – Housing estate on Leinster Park Road and Dublin Road
- E – Commercial and Educational places
- H2 – Car Park and Warehouses on Dublin Road
- F – Open Space between Carton Wood Residential Area and R157 Regional Road
- I – Agricultural Land Between Maynooth SWMS Boundary and
- C – New Residential area on Dublin Road
- S – Carton Avenue/ The Lime Walk

7.5.2 Proposed Drainage Strategy

- In Catchment F, recently developed housing estates incorporate a well-structured surface water drainage network discharging into the Lyreen River. Residential properties in this catchment are outfitted with attenuation storage.
- Preservation of agricultural land and open spaces on both sides of the Mariavilla residential estate in Catchment F is recommended. These areas should be safeguarded against future urban development projects and maintained as multi-purpose spaces to fulfil the requirements of surface water drainage. The soil in this area is well drained hence provide opportunities to discharge water through infiltration.
- Within Catchment G, housing estates feature a comprehensive surface water drainage network that discharges runoff into the Rye Water River. Residential properties within this catchment are equipped with attenuation storage.
- It is recommended to monitor the quality of discharged surface water from the catchment because the outfall point of SW drainage network is close to the Rye Water River SAC.
- Consideration should be given to utilise public open green space as multi-purpose spaces to include surface water attenuation to help improve the resilience of the system and maintain capacity under likely climate change scenarios.

7.6 Catchment H and I

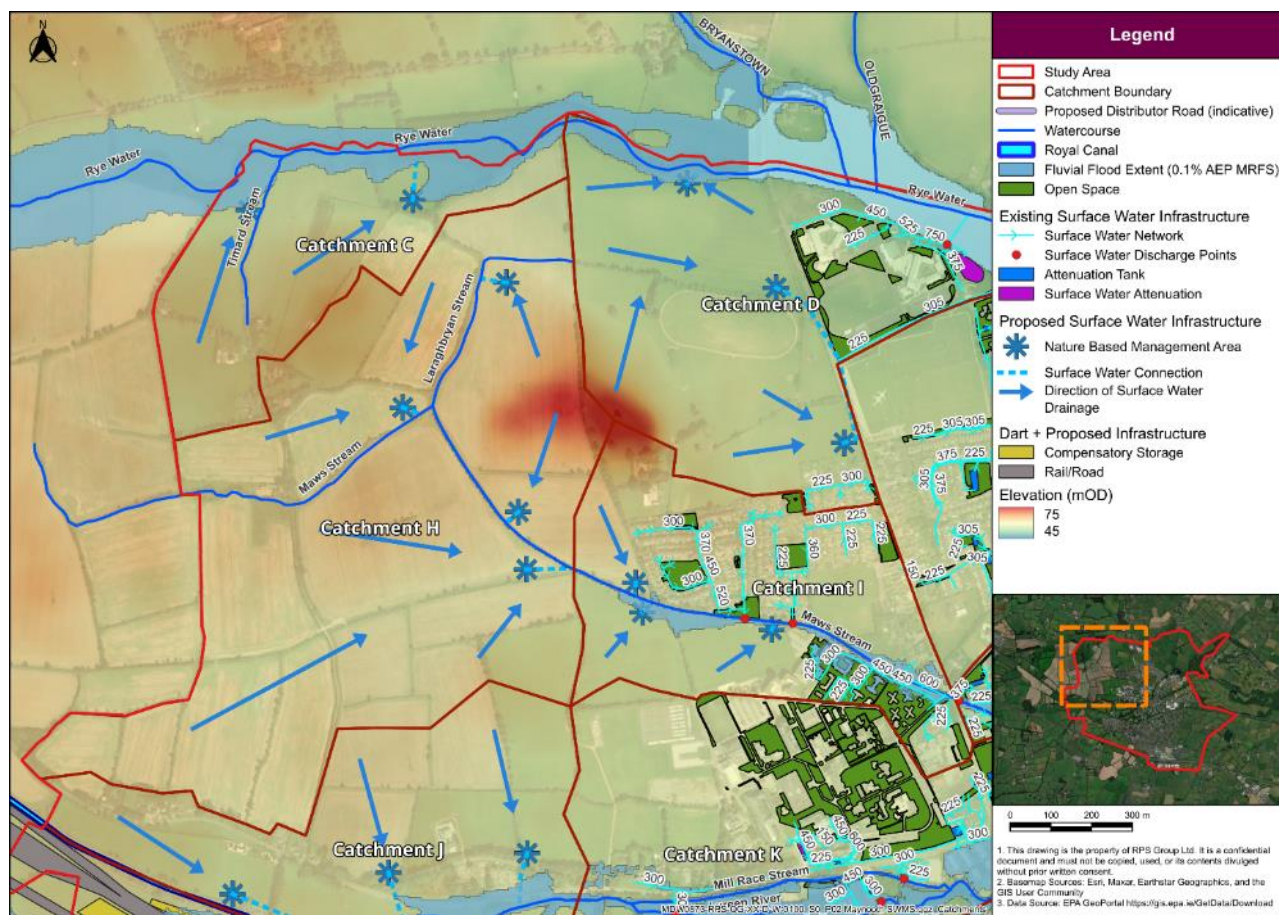


Figure 7-6: Catchment H and I Assessment

7.6.1 Development Zoning

Catchment H is situated in the west of the Maynooth LAP area while Catchment I is nearly in the centre of the LAP area. Both the catchments drain their surface water into Maws Stream

Catchment H in the Maynooth LAP consist of following zones according to LAP 2013-2019 with approximate area under zoning:

- I - Agricultural Land part of GAA Club Training Ground
- P – Research and Technology Area

The majority of Catchment H is currently agricultural fields

The zoned sites for Catchment I are:

- B – Housing estate on Moyglare and Moyglare Abbey Road
- E – Student Accommodations part of North Campus Maynooth University
- F – Open Space in residential area
- P – Research and Technology Area beside Carton School of Motoring
- I – Agricultural Land north of existing housing estate on Moyglare Abbey Road

7.6.2 Proposed Drainage Strategy

- Catchment H is mostly consisting of agricultural land, but the northwest part of the catchment is zoned for research and educational facility. Hence a sub catchment (29.8 ha of area) is established to provide potential NBS based on the natural drainage slope of the surface water and is then connected to Maws Stream. The surface part from the North of the Maws Stream is sloped towards the stream present within the catchment hence it would be aimed to drain the attenuated surface water into the stream.
- In Catchment I, one catchment with area 4.48 ha and other with area 3.4 ha are proposed with potential locations for the NBS in the grounds of North Campus, Maynooth University to attenuate the surface water which then discharges into the Maws Stream. The locations of NBS were tested for the low probability MRFS Fluvial Flood Extent and are out of the flood plain. It is recommended that open spaces in the existing residential area should be preserved and provided with surface water storage functionality.

7.7 Catchment J and M

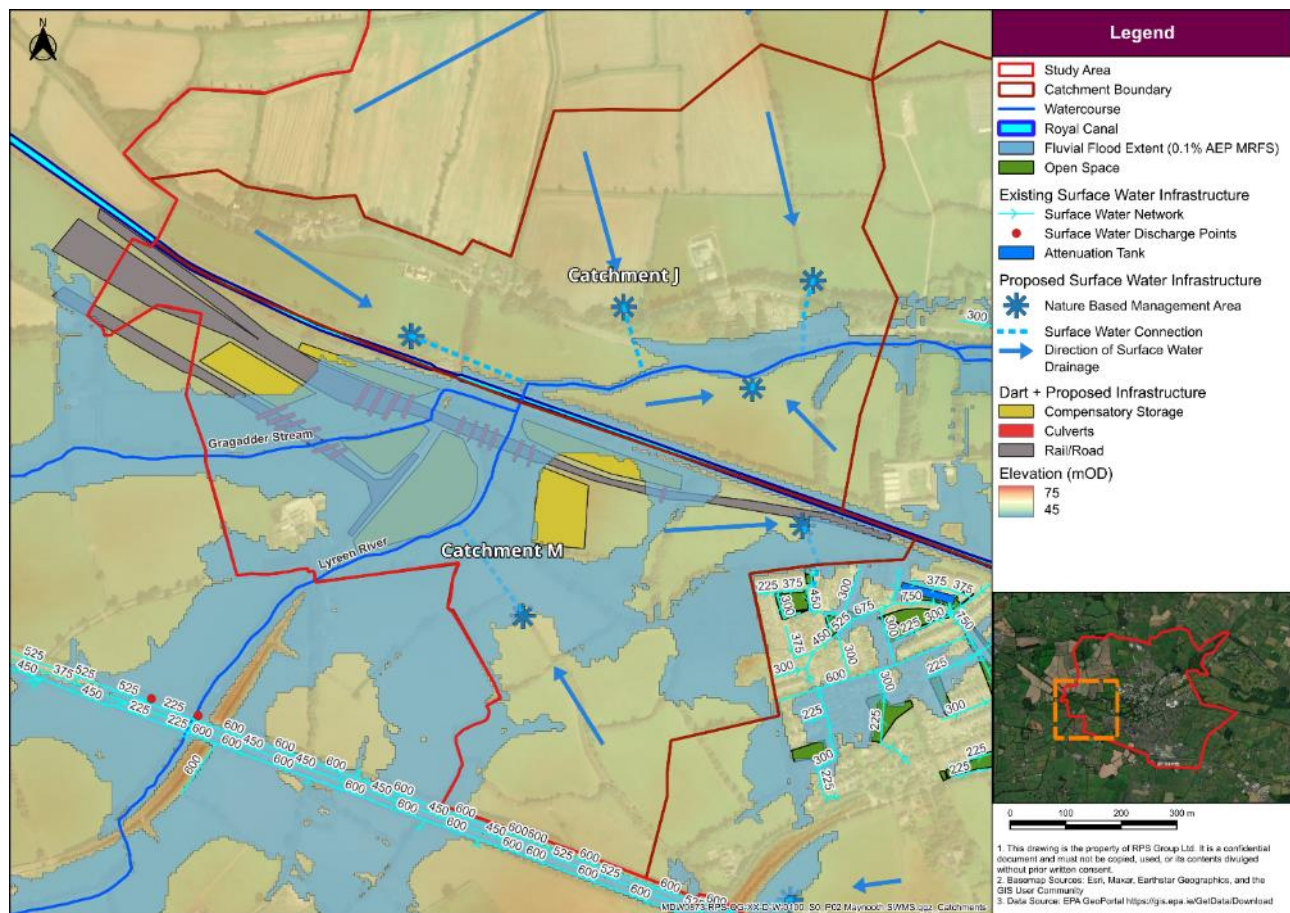


Figure 7-7: Catchment J and M Assessment

7.7.1 Development Zoning

The catchment J in the Maynooth SWMS consist of following zones according to LAP 2013-2019:

- I – Agricultural Land between Kilcock Road and Royal Canal
- E – Laraghbryan Cemetery and Grounds of North Campus, Maynooth University
- P – Research and Technology Area North of Laraghbryan Cemetery

The zoned sites for Catchment M are:

- I – Agricultural Land beside existing housing estate in Newtown

The west part of the Catchment M is not zoned as per LAP 2013-2019 but is the location of the proposed Dart+ West infrastructure. Much of Catchment M is prone to flood risk with restricted development opportunity.

7.7.2 Proposed Drainage Strategy

- Catchment J maintains mixed land use zone as per LAP 2013-2019 located in the western region of Maynooth LAP area. The surface water from the catchment is discharged into the Lyreen River. Potential locations of NBS are suggested based on the natural slope of the area.
- Catchment M includes some potential for further development. Two locations may be possible to include Nature Based attenuation. The first potential NBS will intend to attenuate the surface water from the sub catchment (17 ha in area) and discharge it into the Lyreen River. The second NBS is situated in the North-East corner forming an 8 ha sub catchment to attenuate the surface water from the north part of the catchment which is then connected to SW drainage network prevailing in the nearby housing estate.
- Infiltration is unlikely to be a viable option in either catchment due to the soils identified to be poorly draining.

7.8.2 Proposed Drainage Strategy

- Catchment K and L are in central Maynooth discharging their surface water into the watercourses running through the catchment. Catchment K mainly discharges its SW drainage into the Lyreen River while Catchment L discharges into Meadowbrook Stream.
- Both catchments mostly consist of grounds of Educational Institutes in central of Maynooth. Catchment K has the history of historic flood events in the grounds of St. Patrick's College.
- Both catchments are considered to be significantly affected by fluvial flooding.
- Consideration should be given to utilise public open green space as multi-purpose spaces to include surface water attenuation to help improve the resilience of the system and maintain capacity under likely climate change scenarios.

7.9 Catchment N, O and R

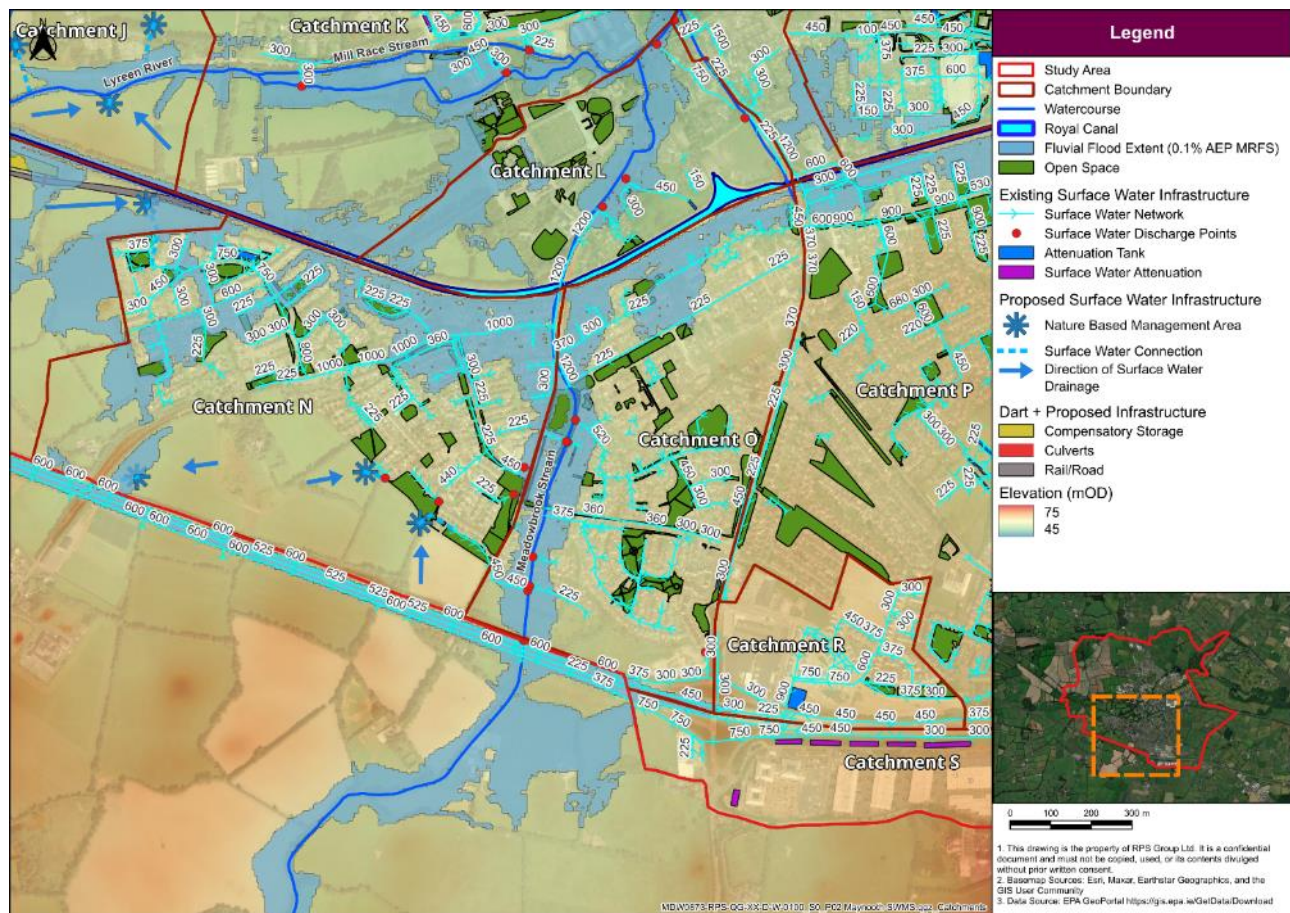


Figure 7-9: Catchment N, O and R Assessment

7.9.1 Development Zoning

Catchment N in the Maynooth LAP consists of following zones according to LAP 2013-2019:

- C – New Housing estates in Newtown
- B – Existing Housing estates
- F – Open spaces prevailing in the residential estates
- I – Agricultural Land just north of the M4 motorway

The zoned sites for Catchment O are:

- B – Existing Housing estates
- F – Open spaces prevailing in the residential estates
- I – Agricultural Land just north of the M4 motorway

The zoned sites for Catchment R are:

- T – Barton's Transport Service and Lidl
- C – New Housing estates on Mullen Park Road
- F – Open space around the new residential state

7.9.2 Proposed Drainage Strategy

- Catchment N, O and R mostly comprising of residential area with connected surface water drainage network. The SW drainage network discharges either into the Meadowbrook Stream or runs to the North of the catchment crossing Railway Line and Royal Canal to discharge into the Lyreen River.
- Southern part of Catchment N is zoned as agricultural land as per LAP 2013-2019. Three potential NBS locations in three subcatchment were identified - one at a low point on the Southwest corner side of the catchment N (subcatchment area 7.14 ha), and other two at a low point at the bottom edge of the residential area (subcatchment area of 7.3 ha and 5.6 ha). The NBS proposed in the Southwest corner is then connected to drainage network on M4 motorway to discharge attenuated surface water while the other two NBS could be connected to nearby SW drainage network to discharge collected surface water.
- Consideration should be given to utilise public open green space as multi-purpose spaces to include surface water attenuation to help improve the resilience of the system and maintain capacity under likely climate change scenarios.

7.10 Catchment P and Q

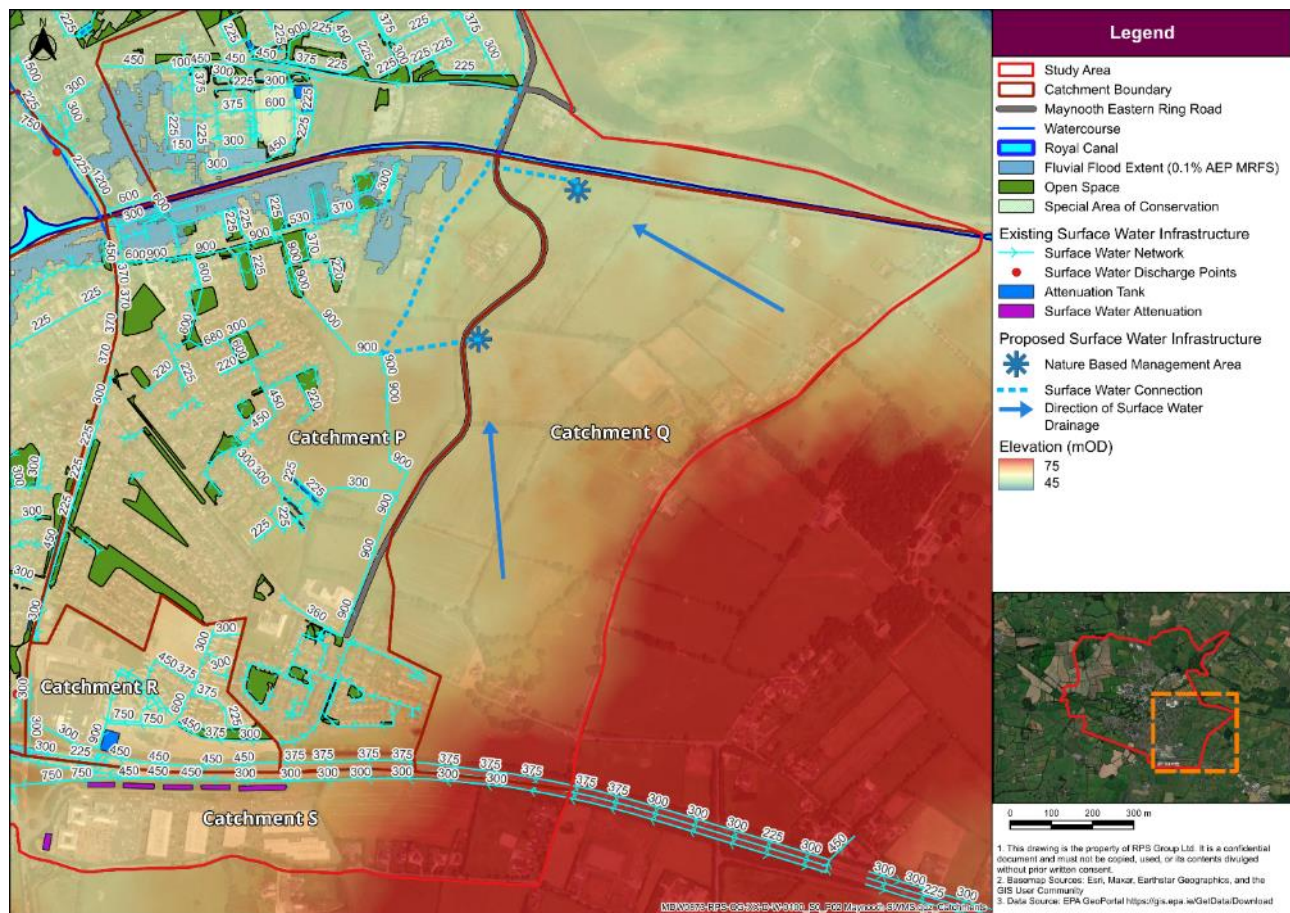


Figure 7-10: Catchment P and Q Assessment

7.10.1 Development Zoning

Catchment P in the Maynooth LAP consists of following zones according to LAP 2013-2019:

- B – Existing housing estates in Greenfield, Old Railpark and Griffin Rath
- E - Maynooth Educate Together National School campus, Camp Hollywood etc
- F – Open Spaces prevailing in existing housing estates
- C – New Residential Properties in Railpark, Parkland area and Griffin Rath
- N – Maynooth Neighbourhood Centre

The zoned sites for Catchment Q are:

- I - Farmland beside Railpark area
- C – New Residential Properties in Parkland

7.10.2 Proposed Drainage Strategy

- Catchment P and Q are located south of the Royal Canal, comprising mixed land use zones. The Eastern Ring Road is planned in catchment P and mostly serves as the boundary between catchment P and Q.
- Catchment P consist mostly of residential area. The available agricultural land that could be seen in Figure 7-10 in the catchment is zoned for residential area. The surface water from the catchment is collected by SW drainage network. A proposed extension of the SW pipe in the Railpark area aims to divert surface water discharge away from central Maynooth by directing it towards the Rye Water River situated to the north of the study area. This would help improve capacity of the existing urban drainage network whilst increasing resilience in the system for future climate conditions.
- It is recommended that the new development in the should have proposed NBS plan based on landscape design than connect into the proposed surface water extension pipe.
- Potential NBS location is identified in Catchment Q in two sub catchments (refer Figure 7-10). The outlet for these proposed NBS is connected to proposed sewer extension pipe in Catchment P. The soil in Catchment Q is well drained, hence it is suggested that these proposed NBS can potentially drain attenuated water through infiltration by developing them as bioretention area or infiltration basin or similar.

7.11 Catchment S

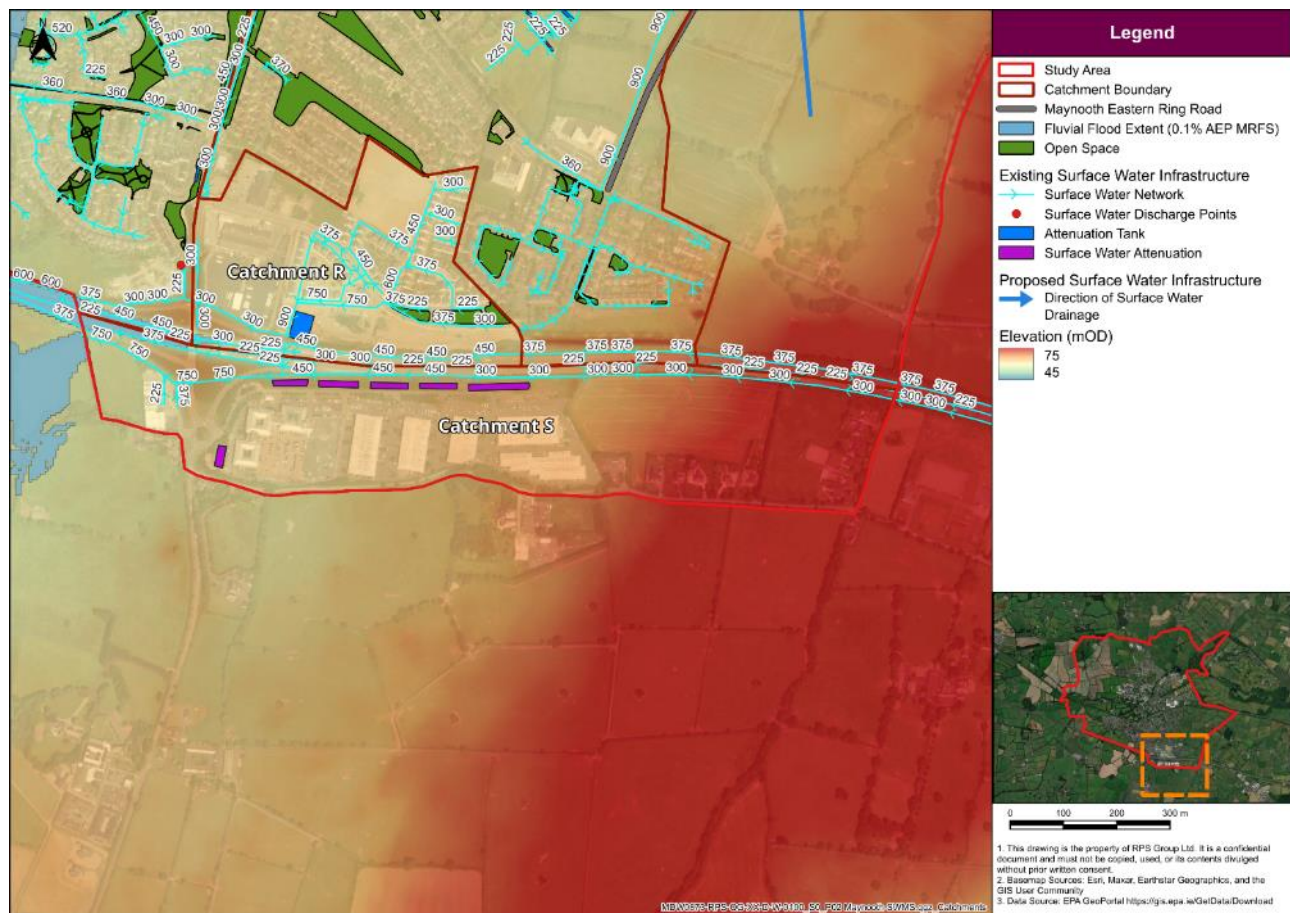


Figure 7-11: Catchment S Assessment

7.11.1 Development Zoning

Catchment S in the Maynooth LAP consists of following zones according to LAP 2013-2019:

- H2 – Maynooth Industrial Area

7.11.2 Proposed Drainage Strategy

- Catchment S is catchment considered to the south of the M4. It features mainly industry and warehouses. The SW drainage network collects the surface water from the industrial area and attenuates run-off through a collection of surface water network ponds. Controlled discharges are released into the drainage network which then finally discharges into Meadowbrook Stream.
- Future development within the catchment could consider continuing the use of surface water attenuation ponds and nature based solutions as appropriate.

8 CONCLUSIONS

8.1 Conclusions

- Data was collected by desktop assessment and provide by KCC. Information was collected on surface water management for various permitted developments which are now either completed or under construction.
- The data gathered includes information on the surface water drainage infrastructure within the study area. Some data gaps remain due to unavailable records at the time of writing.
- A separate sewer system serves the agglomeration within the study area conveying the surface water of the town to various watercourses.
- The natural catchment drainage paths have been altered by urbanisation, construction of the railway line, M4 motorway and Royal Canal.
- Fluvial flooding has been a concern within the study area from Lyreen River and Meadowbrook Stream.
- This report explores options for sustainably managing surface water in future developments within the Study Area. A hierarchical approach to managing surface water in discrete sub-catchments is proposed with areas reserved for the implementation of nature-based solutions.
- The development of NBS in delineated catchment is encouraged, with surface-based conveyances such as swales, rain gardens and open low flow channels utilised to mimic natural drainage processes as closely as possible. The exact locations and discharge routes of proposed NBS are flexible and will be subject to the design and landscaping proposals for each development. Similarly, the routes of the proposed extensions to the surface water network is flexible and will depend on local design considerations.

8.2 Recommendations

- Reserve areas for the proposed NBMA and open spaces within the study area, including overland flow paths.
- Pursue opportunities within the Railpark area (Catchment Q) to divert the surface water drainage away from the town centre by developing a SW drainage network which discharges into the Rye Water River downstream of Maynooth.
- Identify opportunities to integrate surface water management objectives with other KCC-led development projects in the area. For example,
 - Planned Eastern distributor road should have integrated plan for implementation of SuDS for surface water drainage.
 - The Green Infrastructure Strategy, Biodiversity Action Plan and other relevant strategic assessments should take account of the nature-based solutions proposed for managing surface water.
- Require developers to provide an audited SuDS Strategy with their planning applications which takes account of any future surface water masterplan for the town and any recommendations from this report adopted into the Maynooth LAP.
- Make provision for maintenance of nature-based surface water management solutions by KCC operations staff.
- Complete a capacity assessment if increasing discharges to existing surface water infrastructure.
- Conduct an integrated surface water modelling study to represent all potential surface water flooding and connections with the surface water and foul water drainage networks to support the aims of this strategy through quantification of pipe network capacities and to demonstrate practical implementation of the strategy. Inter-agency collaboration with Uisce Eireann is recommended to incorporate the aims and objectives of the Surface Water Separation Project.