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Northwest Quadrant (Naas) Framework Masterplan

Surface Water Management Plan

Kildare County Council

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	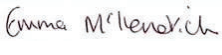		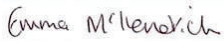
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1. Introduction

This Surface Water Management Plan (SWMP) was commissioned by Kildare County Council to accompany the proposed Framework Masterplan for the Northwest Quadrant in Naas, Co. Kildare. It sets out how surface water will be managed across the site in a safe, sustainable manner that supports placemaking, biodiversity and climate resilience. Surface water is more than just a drainage issue, it shapes the quality of places, influences where and how people move through the landscape, and provides opportunities to enhance nature and wellbeing. By weaving surface water management into the design of streets, open spaces, and ecological corridors, this SWMP helps create a Framework Masterplan that is resilient to flooding while also attractive, green, and enjoyable to live and work in.

This SWMP demonstrates that the objectives set out in the Kildare County Development Plan 2023–2029 and relevant SuDS policy. It acts as a framework for design, to be supplemented by more detailed drainage and flood risk strategies as different parts of the Framework Masterplan come forward.

In addition to technical design principles, this SWMP considers key constraints and opportunities including riparian corridors, flood extent mapping prepared as part of the Naas Flood Relief Scheme, and the integration of green and blue corridors across the site. These elements guide how surface water features are integrated within the landscape.

This SWMP also looks ahead to the future, recognising the importance of climate resilience, long-term maintenance, and the need to monitor performance as the site develops. It is closely integrated with other aspects of the Framework Masterplan including open space, biodiversity, movement, and community infrastructure, ensuring that surface water contributes positively to a coherent and connected place.

1.1 Policy and Guidance References

This document has been prepared with reference to the following key policy and guidance documents:

- Kildare County Development Plan, 2023 – 2029,
    - Chapter 6 – Infrastructure and Environmental Services,
    - Chapter 12 – Biodiversity and Green Infrastructure,
    - Chapter 15 – Development Management Standards. Flood Risk Management.
- Naas Local Area Plan, 2021 – 2027,
    - Section 7.5 Green Infrastructure – Surface Water Management,
    - Section 7.7 Green Infrastructure – New Developments,
    - Section 9.3 Surface Water & Ground Water,
    - Section 9.4 Flood Risk Management.
- Flood risk mapping prepared as part of the Naas Flood Relief Scheme Project,
- CIRIA SuDS Manual,
- Kildare County Council Sustainable Drainage Systems Guidance Document (2024),
- Greater Dublin Strategic Drainage Study, 2005,
- Greater Dublin Regional Code of Practice for Drainage Works (2012),
- The Planning System and Flood Risk Management Guidelines, OPW/ DoEHLG, 2009.
- Rainwater Management Plans, Guidance for Local Authorities, Dept of Housing, Local Government & Heritage, 2024.
- Nature Based Management of Urban Rainwater and Urban Surface Water Discharges A National Strategy 2024.

1.2 Objectives

This Surface Water Management Plan (SWMP) has been developed in line national, regional, and local planning policy, which sets the framework for managing rainfall and flood risk in new development. The Plan also recognises the role of surface water in supporting community life, biodiversity and climate resilience.

The key objectives of this SWMP are to:

- Meet planning policy requirements for surface water management and flood risk reduction.
- Apply the Sustainable Urban Drainage Systems (SuDS) approach, managing rainfall close to source promoting infiltration wherever feasible.
- Limit runoff so that post-development flows are no greater than, and where possible lower than, greenfield conditions.
- Protect and improve water quality through treatment of runoff before discharge.
- Pollution control through filtration, sedimentation, biological degradation, volatilization and plant uptake.
- Integrate visible and attractive drainage features within streets, open spaces, and ecological corridors, delivering amenity, biodiversity, and wellbeing benefits.
- Coordinate with the Naas Flood Relief Scheme to ensure alignment with wider flood protection measures.
- Ensure long-term resilience through climate-responsive design and maintainable drainage solutions.

1.3 Integration with Other Plans and Projects

The SWMP has been developed in coordination with wider initiatives, ensuring that surface water management supports both site-specific and catchment-scale objectives:

- Naas Flood Relief Scheme (NFRS): Aligning with the NFRS flood risk/ extent mapping and town-wide flood protection measures to avoid conflicts.
- Regional and Local Planning Policy: Supporting the Kildare County Development Plan, Naas Local Area Plan, and guidance for SuDS and riparian zone protection.
- Ecological Networks and Blue-Green Infrastructure: Complementing existing and planned corridors to maintain habitat connectivity and support biodiversity.
- Site-Specific Constraints: Informing the location of SuDS in response to existing watercourses, drainage systems, and sensitive ecological areas.
- Multifunctional Spaces: Using open space corridors, SuDS features, and riparian zones to deliver amenity, education, and ecological benefits alongside surface water management objectives.

Through careful alignment with these initiatives, this SWMP ensures that surface water is managed sustainably while providing wider benefits for the environment, public amenity, and resilience to future climate conditions.

1.4 Summary

By setting clear objectives and drawing on established policy and best practice, this SWMP provides a robust and adaptable framework. It recognises that water is not only a technical consideration but also a valuable asset in shaping the quality of place. As the Framework Masterplan progresses, the principles set out here will guide more detailed design, ensuring that surface water management is fully integrated with the site's green infrastructure, movement networks, and public spaces. In doing so, this SWMP supports the delivery of a resilient, attractive, and sustainable new quarter for Naas.

2. Northwest Quadrant (Naas) Lands

This section provides an overview of the existing physical, environmental, and hydrological characteristics of the Northwest Quadrant lands. Understanding these baseline conditions is essential for shaping a SWMP that responds not only to technical requirements but also to the wider landscape character and opportunities of the site. The information presented here provides the foundation for a strategy that safeguards surrounding environments, protects downstream receptors, and integrates surface water management into the vision for a resilient and attractive new quarter for Naas.

2.1 Location

The Northwest Quadrant lands cover an area of approx. 280 ha to the north west of Naas town, including Ploopluck & Oldtown. It is generally located between the Naas Branch of the Grand Canal and the M7. Figure 2-1 shows the location of the Northwest Quadrant lands relative to Naas town.

The site is currently a mix of undeveloped land and existing development. Along the M7, there are several commercial premises, including the Kerry Group Innovation Centre, Irish Commercials, and Applegreen Service Station, as well as Naas Community College. The R445 Millennium Park Road provides access to these facilities and connects the site with the wider town and regional road network including the Monread Road, R407 Sallins Road and the R409 to the west.

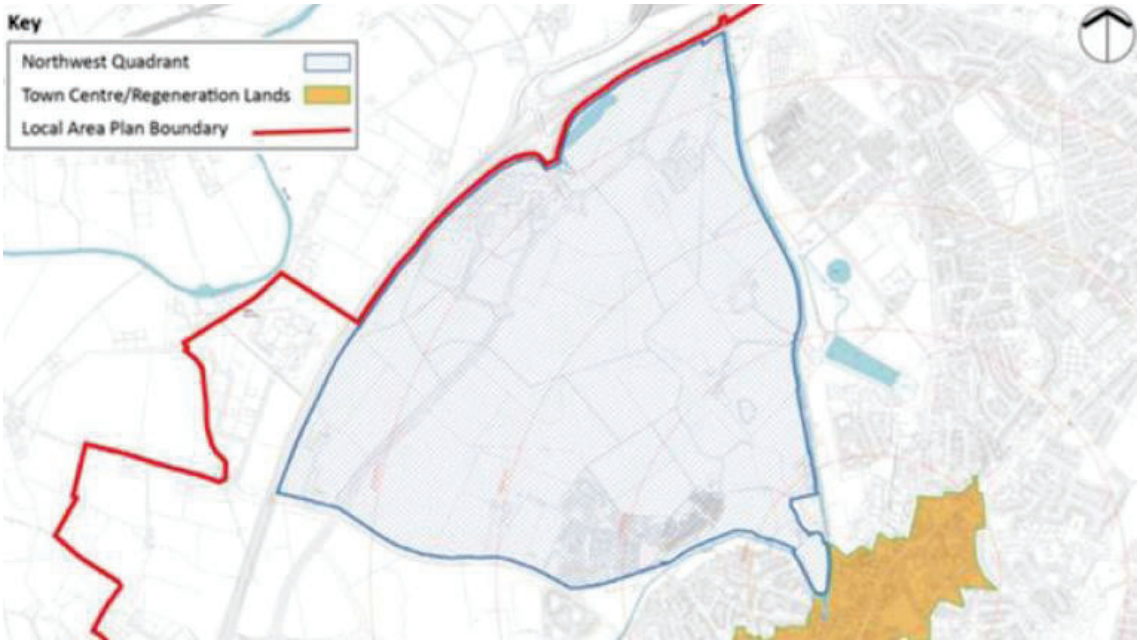


Figure 2-1 - Northwest Quadrant (Naas) Lands (source: Naas LAP)

2.2 Existing Site Conditions

2.2.1 Topography

The lands generally fall from the south to north of the overall site, with localised variations in height across the site. These subtle changes in topography influence how water moves through the landscape, creating flow paths that will be important in shaping future green and blue infrastructure. There is a slightly lower area in the centre of the overall site. This is generally in line with the extent of the existing land drains within the site.

2.2.2 Hydrology & Drainage

The site benefits from a number of existing water features that together form an interconnected drainage system. The Grand Canal defines the southern edge, while a network of natural watercourses and field drains cross the lands and flow northwards towards the River Liffey. These include:

- The Ploopluck Watercourse, which flows northeast along Millennium Park Road and then north under the M7 before joining the River Liffey downstream of Osberstown Wastewater Treatment Plant.
- The Oldtown Watercourse, which flows through the northern part of the site and connects with the Ploopluck Watercourse. This watercourse is believed to be the former Rathasker Stream before channelisation following construction of the Grand Canal.
- The Castlesize Stream, which flows along the eastern boundary, through Naas, and northwards towards the Liffey.

Historical mapping indicates that parts of the Northwest Quadrant lands previously contained areas of marsh and poorly drained ground, with local springs and wetland features evident across the central portion of the site. Over time, a network of drainage ditches, land drains, and modified watercourses have been introduced to improve drainage and likely agricultural productivity of the area. These historic drainage patterns continue to influence the hydrology of the site and form part of the existing surface water management regime (included in Figure 2-2).

In addition, these drains collect a number of existing piped systems serving the site and surrounding residential areas. More recent infrastructure, such as the attenuation basins near Millennium Business Park, already demonstrates how SuDS components can be integrated into the landscape. It is important that these drains are considered as part of the Framework Masterplan to ensure that the existing drainage networks discharging to them are appropriately accounted for, and that future drainage proposals recognise their role within the wider surface water management and blue-green infrastructure network.

Along with the Corbally Branch of the Grand Canal which runs along the southern side of the Northwest Quadrant lands, there are a number of existing watercourses and drainage ditches located throughout the Northwest Quadrant. These generally flow in a north-westerly direction through the site and discharge to the River Liffey to the north of the M7. Along with conveying run-off from the site itself, these watercourses convey run-off from areas outside of the Northwest Quadrant boundary.

The Ploopluck Watercourse flows in a north easterly direction along Millenium Park Road and then in a northerly direction under the M7 discharging to the River Liffey downstream of Osberstown Wastewater Treatment Plant. The Oldtown watercourse flows through the northern part of the study area under the M7 and discharges into the Ploopluck watercourse. There is a network of land drains within the study area which flow into the Oldtown and Ploopluck watercourses. The Castlesize Stream flows in a northerly direction along the eastern boundary of the Northwest Quadrant lands. This stream flows through Naas, alongside the subject site, under the M7 and rail line before discharging to the River Liffey.

There are existing surface water drainage networks within the existing Caragh Court & Finlay Park residential developments to the south of the Northwest Quadrant lands which discharge to these drains/ watercourses. These networks flow in a northerly direction through the residential developments and discharge via four outfalls into the existing watercourses with cross the Northwest Quadrant lands. A fifth connection in this area discharges flows from the Jigginstown Park area to the south of the Northwest Quadrant lands.

Records indicate that there is an existing piped surface water drainage network running within the R409 it the south west of the Northwest Quadrant lands. This runs in a north westerly direction along the R409 before turning north-east to run within the R445 Millennium Park Road and serves the road itself, Millennium Business Park and Naas Community College.

These networks have been developed more recently and include an attenuation basin (a TII asset associated with the M7) and may also include other SuDS features.

Taken together, these features create areas that require careful management to control flood risk, while also providing locations where sustainable drainage measures and natural watercourses can be integrated into the Framework Masterplan.

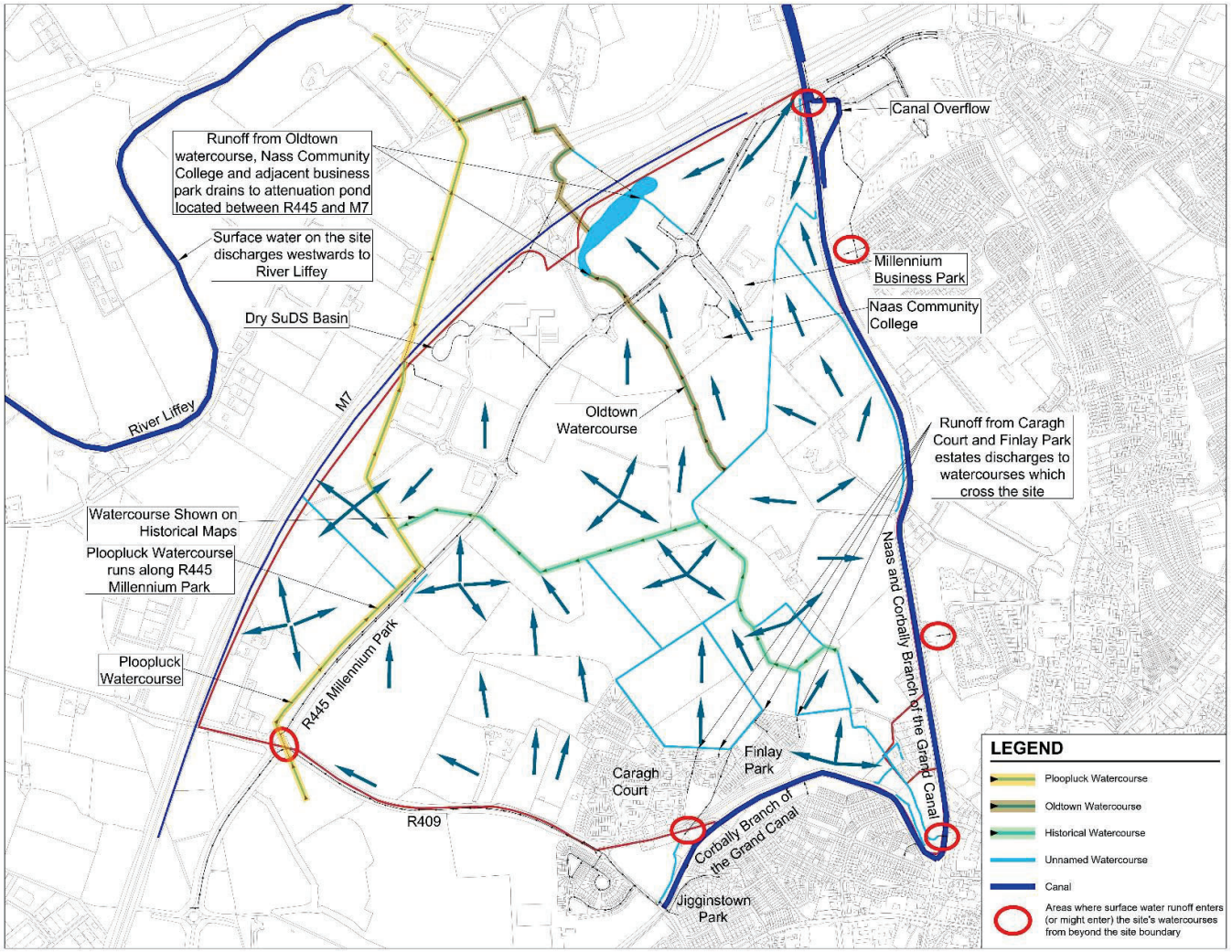


Figure 2-2 - Existing watercourses and drainage channels

2.2.3 Geology & Hydrogeology

The Geological Survey Ireland (GSI) mapping indicates that the site is underlain by a combination of two bedrock types:

- Cherty often dolomitised limestone of the Rickardstown Formation, and
- Dark muddy limestone, shale of the Ballysteen Formation

The bedrock across the site is generally split between a “Regionally Important Aquifer - Karstified (diffuse)” along the north western & eastern parts of the site and “Locally Important Aquifer” within the southern part of the site.

The subsoils within the lands vary from west to east and consist of the following:

- Limestone till (Carboniferous) within the majority of the lands,
- Limestone sands and gravels (Carboniferous) along the eastern boundary of the site,
- Lacustrine Sediments to the north of the existing Caragh Court residential area.

The ground water vulnerability is made up of mainly ‘Moderate Vulnerability’ with an area of ‘High Vulnerability’ along the eastern boundary.

Ground permeability will require further ground investigation will be required at detailed design stage to confirm opportunities for infiltration-based SuDS.

2.2.4 Flood Risk

Initial review of existing flood risk mapping, including work undertaken as part of the Naas Flood Relief Scheme, highlights that certain parts of the site are influenced by fluvial flooding along the watercourses. More detailed assessment of flood risk is provided in Section 3.0.

The baseline review shows that the Northwest Quadrant lands are influenced by a number of existing surface water features, drainage systems, and areas of flood risk. These conditions create important design constraints but also set the framework for integrating sustainable water management into the Masterplan. Recognising riparian zones, existing drainage networks, and natural flow paths at this stage will ensure that the SWMP builds on the site’s characteristics and provides a practical basis for managing water in a safe, resilient, and environmentally responsible way.

3. Baseline Flood Risk Assessment

This section summarises the existing flood risk within and around the Northwest Quadrant lands, based on available flood risk mapping, historic records and climate guidance. This assessment has been undertaken in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities, DoEHLG/OPW, 2009. Understanding baseline flood risk is essential to guide the Framework Masterplan layout, identify areas suitable for development and define locations where flood risk management measures, green infrastructure, and open space can be incorporated.

In addition to the OPW Catchment Flood Risk Assessment and Management (CFRAM) mapping, reference has been made to the Naas Flood Risk Study (NFRS), which provides updated hydraulic modelling and flood extent mapping for the Naas area. The NFRS model outputs, including the revised flood extents, have been developed and reviewed as part of the flood relief scheme assessment and were accepted by the project Steering Group in March 2026 as an accurate representation of flood risk in Naas.

Accordingly, the flood extents represented within the NFRS represent the most up-to-date and reliable information available and have been adopted as the baseline for this SWMP.

3.1 Sources of Flooding

A review of the following potential sources of flooding has been undertaken to inform the baseline assessment.

3.1.1 Fluvial Flood Risk

The assessment of fluvial flood risk for the Northwest Quadrant Lands is based on the Naas Flood Relief Scheme (FRS), which provides updated hydrological and hydraulic modelling for the Naas area. The FRS model has been developed using an integrated 1D–2D approach within the InfoWorks ICM platform and incorporates a detailed representation of the river network, including the Oldtown River and Ploopluck stream, as well as their interaction with the Canal and elements of the urban surface water drainage network.

The FRS modelling represents a significant advancement over the earlier CFRAM study. The CFRAM assessment was constrained by limited calibration data and simplified representations of the hydraulic system, including incomplete coverage of watercourses, limited treatment of hydraulic structures, and a coarse representation of overland flow processes. In addition, interactions between watercourses and flow transfers between catchments were not fully captured.

The FRS modelling represents a significant improvement over the earlier CFRAM study, incorporating updated hydrometric records, refined hydrological methods, and additional survey data, including new cross-sections for the Oldtown and Ploopluck watercourses within the Northwest Quadrant. The model captures key hydraulic features such as culverts, storage areas, and watercourse interactions, providing a more realistic representation of flood behaviour.

Model confidence has been enhanced through a flow and rainfall monitoring programme across the Naas catchment, informing calibration and improving representation of flow dynamics. The results indicate that fluvial flood risk is relatively limited and is primarily influenced by interactions between the fluvial system and the urban drainage network, rather than widespread overtopping of watercourses.

Accordingly, the FRS model outputs provide a robust and site-specific assessment of fluvial flood risk, and the associated flood extent mapping has been adopted as the baseline for this Surface Water Management Plan.

Maps No. 2, 3, 5 and 6 published as part of the Naas FRS illustrate the predicted flood extents in the Northwest Quadrant for 1 in 100 year (Flood Zone A) and 1 in 1000 year (Flood Zone B) return period events.

The FRS mapping indicates that fluvial flood risk within the Northwest Quadrant is generally limited, with areas of risk primarily associated with land adjacent to existing watercourses and attenuation features, as well as localised areas along the southern boundary near the M7 corridor.

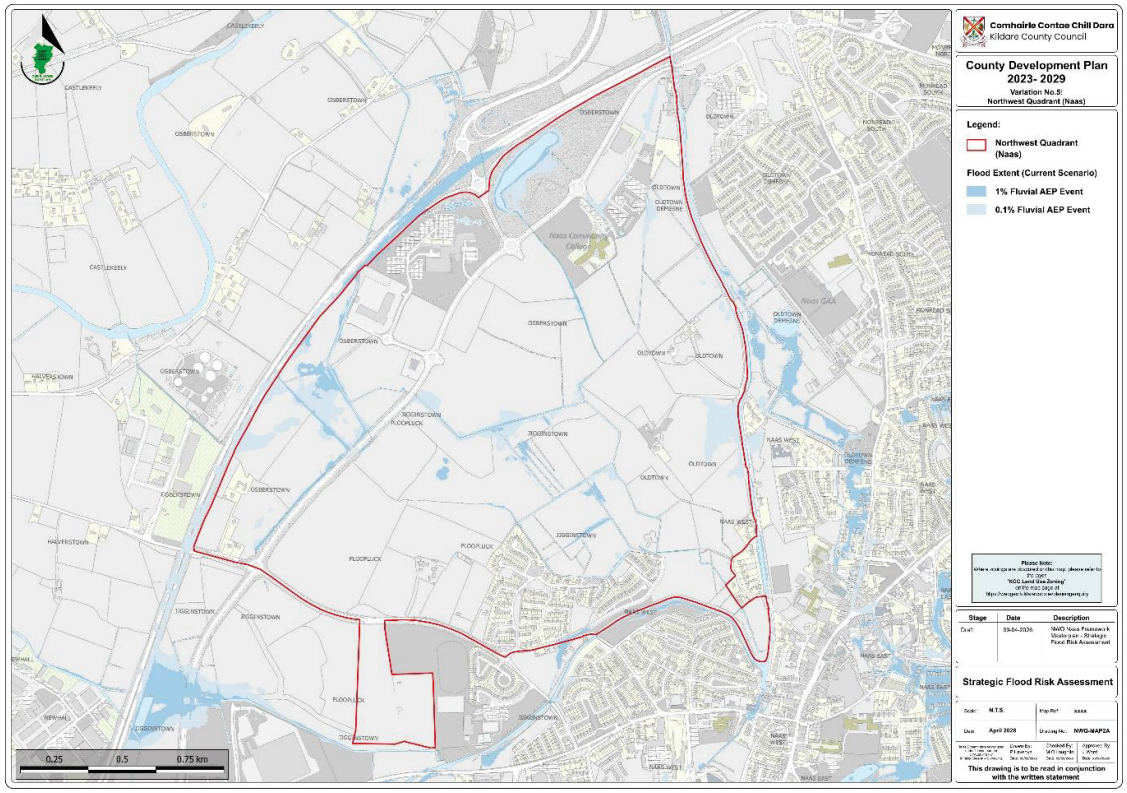


Figure 3-1 - 1 in 100-year (1% AEP) Return Period Event & 1 in 1000 year (0.1% AEP) Return Period Event

3.1.2 Pluvial Flood Risk

Surface water (pluvial) flooding from heavy rainfall has been considered. While detailed flood extents mapping is not available, the topography and drainage network described in Section 2 indicate natural flow paths that will need to be accommodated in the design of streets, open spaces, and SuDS features.

3.1.3 Groundwater Flood Risk

An area within the masterplan, as shown in Figure 3-2, is noted as being affected by the Winter 2015/2016 Surface Water Flooding event, which was a considerable and prolonged event across Ireland. There are no records of ground water flooding within the remainder of the masterplan lands and the risk of groundwater flooding is therefore considered low. This further highlights the importance of considering the existing land drainage network within the Framework Masterplan. Further ground investigation, including infiltration testing, will be required during detailed design to confirm suitability for infiltration-based SuDS.

Figure 3-2 – Extract from Past Flood events available on floodinfo.ie showing extent of Geological Survey Ireland (GSI) Winter 2015/2016 Surface Water Flooding

3.1.4 Tidal/ Coastal Flood Risk

The site is inland and at elevation above sea level. OPW coastal flood hazard mapping confirms that tidal flooding is not a risk now or under projected future sea level scenarios.

3.2 Review of Historic Flood Records

Records from OPW's floodinfo.ie indicate no historical flood events within the Northwest Quadrant lands.

3.3 Flood Zone classification

The majority of the Northwest Quadrant lands are classified as Flood Zone C (low risk). Areas along the watercourses fall within Flood Zones A and B, highlighting where development may be limited or where open space, riparian buffers, or SuDS features may be most appropriate.

3.4 Climate Change Allowances for Design

To account for potential future impacts of climate change, the following allowances will be applied in the design of drainage and flood mitigation measures:

- Rainfall intensity: increase of 20%–30% for Mid-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS).
- Fluvial flows: up to 20% increase for the MRFS, and 30% for the HEFS.

These allowances will inform the sizing of attenuation, conveyance, and flow control measures to ensure long term resilience.

3.5 Implications for Development Layout

Flood risk mapping and climate allowances inform the placement of buildings, streets, and open space. Areas within Flood Zones A and B are most suitable for open space, green/blue corridors, and multifunctional SuDS, while low-risk areas can accommodate development.

This approach ensures that flood management is integrated into the Framework Masterplan rather than treated as a constraint separate from design.

In summary, the baseline flood risk assessment shows that the majority of the Northwest Quadrant lands are at low risk of flooding, with higher-risk areas largely confined to land adjacent to watercourses. By understanding these patterns and accounting for climate change allowances, the Framework Masterplan can direct development to safer areas while reserving flood-prone zones for open space, riparian buffers, and sustainable drainage measures. This approach ensures that flood risk is managed proactively, supporting both the safety and resilience of the site and the integration of water-sensitive design into the overall Framework Masterplan.

4. Surface Water Management Strategy

This Surface Water Management Strategy provides a framework to manage rainfall and runoff within the Northwest Quadrant lands while supporting flood risk mitigation, water quality protection, and integration with the Framework Masterplan's open space, streets and ecological networks. The strategy follows the Sustainable Drainage Systems (SuDS) hierarchy, in line with national policy, GDSDS guidance and the Kildare County Development Plan objectives.

4.1 Strategy Objectives

The strategic objectives are to:

- Manage surface water at or close to source using existing drains, natural slopes, ponds & wetland areas before considering the installation of hard engineering systems.
- Manage surface water runoff close to source through SuDS measures.
- Limit post-development runoff to greenfield rates or better.
- Provide treatment and attenuation prior to discharge to protect downstream watercourses.
- Protect downstream catchments from increased flood risk or water quality deterioration.
- Incorporate climate change allowances to ensure long term resilience.
- Support multifunctional benefits, including amenity, biodiversity, and educational opportunities.

4.2 Policy Alignment

This SWMP aligns with the relevant policy objects from the following:

- Kildare County Development Plan, including riparian zone protection, SuDS requirements, and surface water management.
- Naas Local Area Plan, including surface water, groundwater, SuDS, and flood risk management policies.

Future development proposals within the Northwest Quadrant lands must continue to comply with these policies.

4.2.1 Kildare County Development Plan

Table 4-1 sets out the relevant Policies & Objectives in the Kildare County Development Plan relating to riparian zones/ strips.

Table 4-1. Riparian Zone Policies & Objectives

Column heading	Riparian Zones
BI P7	Recognise and promote inland waters, natural environmental assets and to protect rivers, streams and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitats for fauna and flora while discouraging culverting or realignment.
BI O41	Maintain riparian buffer zones and potential uses as identified in Table 12.4 when considering potential development and proposed development layouts within or adjacent to waterways.
BI O45	Ensure that any runoff from developed areas does not result in any deterioration of downstream watercourses or habitats and require that pollution generated by a development is treated within the development area prior to discharge to local watercourses.
BI O46	Generally, prohibit infilling of land adjacent to rivers, including natural floodplains, prior to or during any development. This will only be permitted, where, in the opinion of the planning authority, there is an overriding public interest in order to provide a key public infrastructure or to provide a more coherent design approach (in line with an approved urban design strategy) but, it will be subject to ensuring that adequate compensatory flood storage (if necessary) is provided elsewhere.

Column heading	Riparian Zones
BI O47	Ensure the protection, improvement or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations including nature-based solutions, in order to protect ground and surface water quality and build resilience to climate change.

Table 4-2 sets out the relevant Policies & Objectives in the Kildare County Development Plan relating to SuDS & surface water management.

Table 4-2. SuDS Policies & Objectives

Column heading	Sustainable Urban Drainage Systems
BI P15	Promote and support the development of Sustainable Urban Drainage Systems (SuDS) to ensure surface water is drained in an environmentally friendly way by replicating natural systems.
BI O76	Promote and support the development of Sustainable Urban Drainage Systems (SuDS) such as integrated constructed wetlands, permeable surfaces, filter strips, ponds, swales and basins at a site, district and county level and to maximise the amenity and bio-diversity value of these systems.
BI O77	Integrate nature-based solutions and climate change considerations into the design, planning, and implementation of infrastructure provision/ works and development proposals at the earliest possible stage of the design process.
BI O78	Actively promote and encourage nature-based approaches and green infrastructure solutions as viable mitigation and adaptation measures to surface water management.
BI O79	Promote the provision of Green Roofs and/ or Living Walls in developments where expansive roofs are proposed.
BI A32	It is an action of the Council to showcase good examples of SuDS which maximise amenity and biodiversity through the use of systems such as (but not limited to) swales, rain gardens as part of local authority developments.

Chapter 12 (Biodiversity Green Infrastructure) of the Kildare County Development Plan also notes in BI A32 that it is an action of the council to “Showcase good examples of Sustainable Urban Drainage Systems (SuDS) which maximise amenity and biodiversity through the use of systems such as (but not limited to) swales, rain gardens as part of local authority developments.”

The KCC SuDS Guidance Document published in April 2024 sets out design guidance for the design of developments within County Kildare. This guide will support the planning process, where SuDS schemes which form part of planning applications are assessed by KCC against the Policies and Objectives set out in the Kildare County Development Plan along with the requirements outlined by the KCC Strategic Flood Risk Assessment and the Greater Dublin Strategic Drainage Study.

As set out in the SuDS Guidance Document, “Where SuDS are designed as an integral part of the urban fabric, they will help mitigate the contribution to flooding and the impact that development has on the natural landscape. They are also able to rehabilitate the hydrology of the urban environment through sustainable re-development and SuDS retrofit.”

There are four critical objectives that SuDS seek to meet:

- Amenity,
- Quantity,
- Quality, and
- Biodiversity.

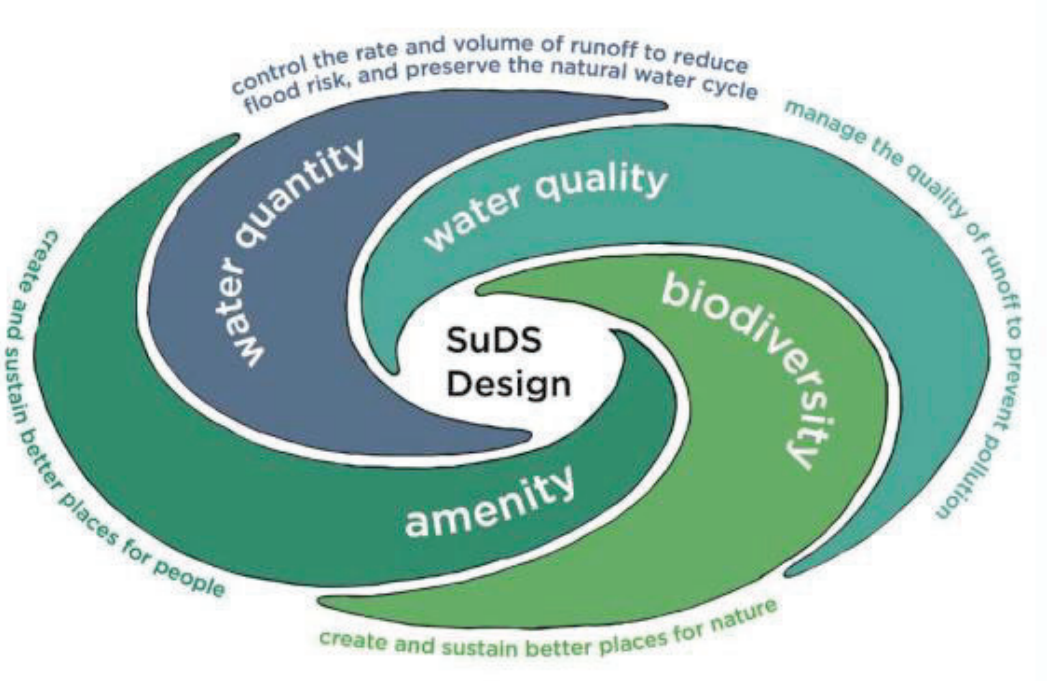


Figure 4-1 SuDS Design Objectives (Extract from KCC SuDS Guidance Document, 2024)

4.2.2 Naas Local Area Plan

Table 4-3 sets out the Naas Local Area Plan policies & objectives relating to the provision of SuDS and Table 4-4 sets out the policies & objectives relating to surface water and groundwater.

Table 4-3. Naas LAP Surface Water Management Policies & Objectives

No.	Green Infrastructure – Surface Water Management
NE 3.1	Encourage the use of SuDS within public and private developments and within the public realm to minimise and limit the extent of hard surfacing and paving, in order to reduce the potential impact of existing and predicted flooding risks.
NE 3.2	Enhance and promote biodiversity and amenity and to ensure the protection of environmentally sensitive sites and habitats, including where flood risk management measures are planned.

Table 4-4. Naas LAP Surface & Ground Water Policies & Objectives

No.	Surface Water and Groundwater
IO 2.1	Carry out an audit of an existing surface water infrastructure to identify improvement works as required.
IO 2.2	Ensure that all new development maintain surface water discharge at greenfield run-off rate, including an allowance for climate change.
IO 2.3	Incorporate Sustainable Urban Drainage Systems (SuDS) and other nature-based surface water drainage solutions as part of all plans and development proposals in Naas. Priority shall be given to SuDS that incorporate green infrastructure and promote biodiversity including green roofs, walls and rain gardens. Proposals for development in the Key Development Areas, Core Regeneration Areas and Masterplan areas must consider the potential for SuDS to control surface water outfall and protect water quality, with underground retention solutions only being considered when all other options have been exhausted.
IO 2.4	Maintain, improve and enhance the environmental and ecological quality of surface waters and groundwater in Naas in conjunction with the Environmental Protection Agency and in accordance with the River Basin Management Plan for Ireland 2018-2021.

IO 2.5	Require applicants, where necessary, to demonstrate that proposals will not negatively impact on any groundwater or surface water body and be compliant with the requirements of the Water Framework Directive and measures to protect and improve our water bodies set down in the River Basin Management Plan for Ireland 2018 – 2021 and future cycles of this Plan.
IO 2.6	Ensure that development along urban watercourses comply with, Planning for Watercourses in the Urban Environment (IFI, 2020), including the maintenance of a minimum riparian zone of 35 metres for river channels greater that 10 metres in width, and 20 metres for rivers channels less than 10 metres in width. Development within this zone will only be considered for water compatible developments.

Table 4-5 sets out the Naas Local Area Plan policies & objectives relating to Flood Risk Management.

Table 4-5. Naas LAP Flood Risk Management

Policy I3	Flood Risk Management
IO 3.1	(a) Ensure all development proposals within the areas identified as 'Flood Risk Assessment' on LUZ SFRA Map 9.1, where Justification Tests have been carried out as part of the Strategic Flood Risk Assessment and where residual flood risk remains are the subject of site-specific flood risk assessment appropriate to the nature and scale of the development being proposed. (b) Flood Risk Assessments for such developments must assess climate change scenarios in accordance with the allowance outlined in the OPW Flood Risk Management Climate Change Sectoral Adaptation Plan 2019.
IO 3.2	Progress and co-operate with the OPW in delivering the Flood Relief Scheme for Naas.
IO 3.3	Maintain all existing overland flow routes.
IO 3.4	All development proposals should apply the use of the sequential approach in terms of the site layout and design. If there is a proportion of the site at risk of flooding, the sequential approach must be applied to ensure that there is no encroachment onto, or loss of, the flood plain. Only water compatible development such as Open Space should be permitted for the lands which are identified as being at risk of flooding within that site. This shall ensure that flood risk on sites can be managed through the sequential approach only, without the requirement for further mitigation measures. If this cannot be achieved the applicant must clearly show that the sequential approach cannot be followed, they must satisfy all the criteria of the Justification Test and demonstrate that appropriate flood mitigation and management measures are put in place.
IO 3.5	Following the completion of the flood mapping stage of the River Liffey and Dublin Flood Risk Management Plan a review of the flood extents will be undertaken and if required Kildare County Council will carry out an update to the SFRA and an amendment of the Plan. The updated SFRA would be prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009). The SFRA would enable Kildare County Council to carry out a review of strategic land-use planning decisions with respect to flood risk and to update flood risk policies if required.

4.3 Design Principles

The following standards will be applied as the design of the Framework Masterplan & individual development parcels progress:

- Runoff control: Post-development peak runoff rates will be restricted to Qbar (greenfield) for the 1-year, 30-year, and 100-year storm events.
- Attenuation: Storage will be provided for the 1% AEP (1 in 100-year) event plus climate change allowance in rainfall intensity.
- Treatment: SuDS treatment train approach, in line with GDSDS and CIRIA C753, providing a minimum of two treatment stages for all runoff from paved surfaces before discharge.
- Discharge consent: Any connection to public infrastructure will be subject to approval and confirmation of downstream capacity.

- Overland flow routing: Designated exceedance routes will be identified to convey flows safely during events exceeding the design standard.

4.4 Strategic Surface Water Management Concept

The Surface Water Management Plan show in Figure 4-2 and included in Appendix A for the Northwest Quadrant (Naas) is based on a landscape-led, SuDS first approach, integrating drainage functions within the open space network, riparian corridors and movement routes. This strategic concept is illustrated on the Surface Water Management Plan drawing prepared as part of the Masterplanning process and forms the basis for the distributed system of SuDS features described in this document.

The strategy manages run-off as close to source as possible, following the principles set out in the GDSDS, the CIRIA SuDS Manual, and Kildare County Council's Sustainable Drainage Systems Guidance Document. The proposed arrangement algins with the existing topography, natural drainage patterns and the Green & Blue Infrastructure (GBI) framework.

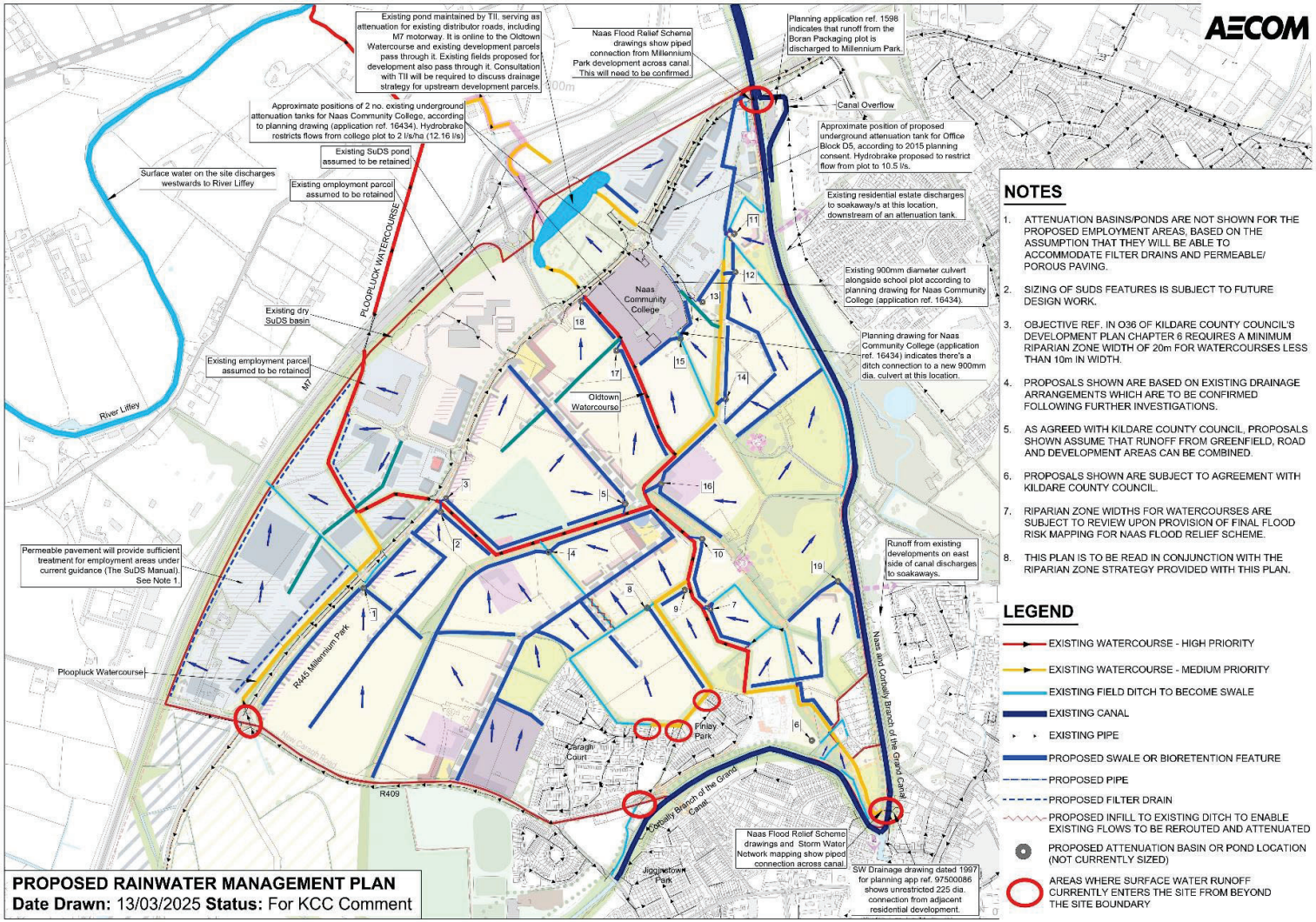


Figure 4-2 – Northwest Quadrant SWMP

4.4.1 Integrated SuDS Network

In line with the objectives set out in the Kildare County Council SuDS Guidance Document, 2024, the Framework Masterplan incorporates a connected network of SuDS components that provided interception, conveyance, treatment, storage and controlled discharge. The SuDS components incorporated reflect the four critical objectives that SuDS seek to meet, as outlined in Figure 4-3.

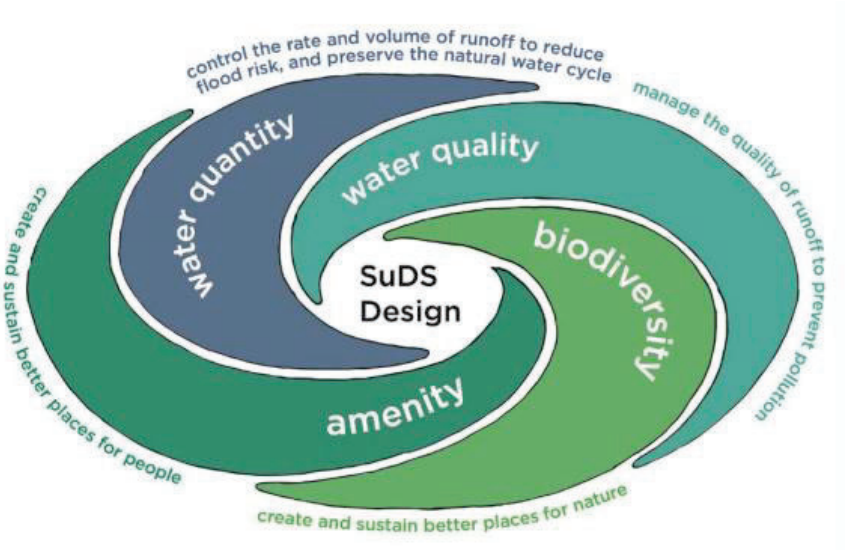


Figure 4-3 SuDS Design Objectives (Extract from KCC SuDS Guidance Document, 2024)

These include:

- Source Control measures within development parcels such as green roofs, bioretention areas, permeable paving, and rainwater harvesting systems, reducing run-off rates and volumes at building and plot level.
- Site Control features including swales, tree pits, and linear green corridors which convey and pre-treat run-off from roads and public realm areas.
- Regional Control within strategic open spaces where retention ponds and constructed wetlands provide storage while delivering amenity and biodiversity benefits.

These SuDS components are distributed across subcatchments responding to natural flow paths and existing watercourses.

4.4.2 Strategic Assumptions

The following baseline assumptions underpin the strategic SuDS proposals:

- Existing topography results in surface water naturally draining towards the internal watercourses and drainage ditches within the Northwest Quadrant lands.
- While infiltration opportunities may exist, attenuation with controlled discharge to watercourses is assumed at this stage pending detailed site investigations.
- Greenfield runoff rates (Qbar) will be used to control peak discharges from each subcatchment.
- The Framework Masterplan layout will maintain existing flow paths where possible, with exceedance routes directed through open space corridors and streetscape networks.

The arrangement and sizing of SuDS features shown on the Surface Water Management Plan drawing will be refined as detailed design progresses and ground investigation results become available.

4.4.3 Relationship with the Masterplan and Landscape Strategy

The strategic drainage concept is fully integrated with the emerging Landscape Masterplan. SuDS features form part of multifunctional open spaces, ecological corridors, and public amenity areas, ensuring that drainage is not treated as a standalone engineering solution but as a visible and positive contributor to the character of the Framework Masterplan.

Consistent with KCC guidance underground tanks and below-ground storage are avoided, with the strategy prioritising surface-based SuDS that can deliver multiple benefits relating to water quality, amenity, biodiversity, and climate resilience.

4.5 Drainage & SuDS Hierarchy

Surface water will be managed in the following order of preference:

1. Re-use/ Rain water harvesting: where opportunities arise for rainfall harvesting within the Northwest Quadrant lands or land parcels, these should be maximised.
2. Infiltration: where opportunities arise to discharge surface water run-off to ground, these should be utilised.
3. Watercourse: There are a number of existing watercourses within the Northwest Quadrant lands. Subject to attenuation of run-off within land parcels, these will be suitable to receive run-off.
4. Surface water sewers: there are no existing surface water sewer networks within the Northwest Quadrant lands.

This SWMP outlines the preferred approach for the management of runoff within the Northwest Quadrant lands to ensure no increase in flood risk to development within the plan area or elsewhere along with the delivery of wider water quality, amenity and biodiversity benefits.

The approach to this SWMP is as per the guidance from the CIRIA SuDS Manual which is summarised as follows:

- Identify existing and proposed flow routes,
- Identify suitable mechanisms for discharge of surface water from the Northwest Quadrant lands,
- Allocated a management train and appropriate number of subcatchments to provide the collection, treatment, storage and conveyance of runoff across the plan area,
- Identify a range of SuDS components which are in keeping with the landscape character and other objectives of the Framework Masterplan. At this stage, any definition of SuDS features for specific areas of the Framework Masterplan should not be treated as ‘fixed’ aspects of the design.

There are four main categories of benefits which can be achieved through the incorporation of SuDS measures within the drainage strategy. These relate to water quantity, water quality, amenity and biodiversity. The principle of SuDS is that they are designed to manage and use rainwater close to where it falls.

4.6 Flow Routes & Catchment Area

Surface water catchments have been defined based on topography, existing watercourses, and available outfalls. Existing flow paths will be maintained where possible, and the Framework Masterplan layout will accommodate run-off through SuDS and open space corridors. While opportunities for infiltration may exist, the current plan assumes runoff will discharge to watercourses, with detailed investigations required at later stages.

The natural hydrology and existing characteristics have been assessed as part of the flow route analysis to determine how the Northwest Quadrant lands behave naturally before development.

There are a number of existing watercourses and land drains within the Northwest Quadrant lands. Along with the provision of riparian strips along these existing watercourses, this has been incorporated in the SWMP for the Northwest Quadrant lands.

As proposals for the Northwest Quadrant lands progress, detailed SuDS design proposals will have to consider how flows along these flow paths will be managed.

There may be potential to discharge surface water to ground however no SI data is available at the time of preparation. Therefore, the modified flow routes are presented on the basis that all run-off will discharge to the existing watercourses within the Northwest Quadrant lands.

4.7 Quantity

The management of runoff volumes and peak flows is a key part of the surface water strategy, ensuring that development is safe and downstream areas are not adversely affected.

- Attenuation Storage: Runoff from across the Northwest Quadrant lands will be temporarily stored within SuDS features and subcatchments. This storage ensures that there is no unexpected flooding within the site, that buildings are protected, and that downstream flood risk is not increased. Storage is designed to accommodate rainfall events up to the 1% AEP (1 in 100-year) event, including climate change allowances.
- Discharge Rates: Peak surface water flows will be controlled to match greenfield runoff (Qbar), in line with Kildare County Development Plan objectives, ensuring that development does not increase flood risk elsewhere.
- Collection and Conveyance: SuDS features such as swales, ponds, and bioretention areas will be used to collect, store, and convey runoff across the Framework Masterplan. Locations and types of features will be chosen to suit the layout, landscape, and site constraints. While infiltration may be possible in some areas, current data assumes runoff will primarily be conveyed to watercourses.

This approach integrates flood risk management into the Framework Masterplan layout, allowing runoff to be controlled safely while supporting amenity, biodiversity, and multifunctional open spaces.

4.8 Amenity

SuDS features provide multiple benefits beyond drainage and flood risk management. When designed thoughtfully, they can enhance the quality and usability of public spaces while contributing to the visual character of the development. Key considerations include:

- Legibility and Understanding: Features such as swales, ponds, and rain gardens should be clearly visible and understandable to users, showing how water is managed. This also supports safe maintenance.
- Multi-functionality: SuDS features can serve as informal play areas, walking routes, or social spaces when not holding water. Open space corridors and landscaped water features can be integrated with sports areas, plazas, or pocket parks.
- Visual Quality: Vegetation, water, and natural materials can be used to create visually appealing spaces that complement the surrounding development and enhance streetscape character.
- Educational Opportunities: Water management features can be used to explain natural processes, climate resilience, and biodiversity benefits through signage or social engagement.
- Safety and Accessibility: All surface water features and open spaces should be designed in line with best practice for accessibility and safety, reducing hazards while allowing public enjoyment.

Through these approaches, SuDS become a visible part of the urban landscape, offering recreational, aesthetic, and social benefits in addition to managing rainfall.

4.9 Biodiversity

Incorporating biodiversity into the surface water management strategy ensures that SuDS and open space corridors support habitats, species connectivity and ecological networks. Key elements include:

- Habitat Creation: SuDS features such as ponds, wetlands, swales, and bioretention areas can create diverse habitats for plants, birds, amphibians and invertebrates. Using native plant species enhances ecological value.
- Connectivity: Watercourses, riparian zones, and SuDS corridors should be linked to form continuous blue/green networks, enabling wildlife movement across the site and connecting with surrounding habitats.
- Water Quality: Maintaining water at or near the surface allows sedimentation, filtration, and nutrient processing within vegetated systems, improving downstream water quality.
- Catchment-Scale Planning: Biodiversity should be considered at both local and catchment scales, ensuring that features contribute to larger ecological networks rather than isolated habitats.
- Maintenance and Adaptive Management: Management practices should enhance and protect habitats over time, including seasonal variation in water levels, planting, and invasive species control.
- Integration with Landscape Design: SuDS features should be visually and ecologically integrated into parks, streetscapes, and open spaces to maximise both functional and ecological benefits.

By considering biodiversity at the design stage, the Framework Masterplan can deliver multifunctional blue-green infrastructure that supports wildlife, improves ecological resilience, and contributes to the overall quality of the public realm.

4.10 Green & Blue Infrastructure (GBI)

Green and Blue Infrastructure (GBI) refers to interconnected networks of natural and semi-natural features that provide multiple benefits for water management, biodiversity, and public amenity. Within the Northwest Quadrant lands, GBI provides a strategic framework for linking watercourses, riparian zones, SuDS features, parks and open spaces into multifunctional corridors that deliver environmental, social and climate resilience benefits.

Key objectives for GBI within the Framework Masterplan include:

- Surface water management: Use natural corridors, vegetation, and SuDS features to control runoff, reduce flood risk, and improve water quality before flows reach downstream watercourses.
- Biodiversity and Habitat Connectivity: Maintain and enhance ecological networks, providing continuous habitats along corridors that connect watercourses, open spaces, and surrounding green areas.
- Amenity and Recreation: Create attractive, accessible spaces that integrate walking routes, cycle paths, and recreational areas with visible water management features, making water a valued part of the community environment.
- Climate Resilience: Provide adaptable landscapes that can accommodate extreme rainfall events, store water temporarily, and contribute to local cooling and flood mitigation.
- Integration with the Framework Masterplan Layout: Align GBI corridors with development parcels, proposed SuDS features, and riparian zones to ensure multifunctional use while safeguarding ecological and hydrological functions.

By embedding GBI principles early in the surface water strategy, the Framework Masterplan ensures that drainage measures are not only functional but also enhance the ecological and social value of the site.

4.10.1 Riparian Strips

Riparian zones are vegetated areas along rivers, streams, and other surface water bodies. They play a crucial role in protecting water quality, supporting biodiversity, and creating natural corridors for wildlife. In addition, riparian zones can function as informal floodplains, helping to manage surface water during heavy rainfall events.

Within the Northwest Quadrant lands, riparian strips form a key component of the broader Green & Blue Infrastructure (GBI) network, linking watercourses, SuDS features, and open spaces to create multifunctional, connected landscapes. They provide essential habitat continuity, support ecological networks, and enhance amenity value, while also contributing to the safe conveyance and temporary storage of surface water during storm events.

With the SWMP, riparian corridors have been proposed in response to site specific attributes and surface water management requirements. The corridor widths and treatments vary according to local topography, habitat value, and hydraulic function. In some locations, corridors may need to be wider to accommodate floodplain storage, existing vegetation, or public access routes, while in others a narrower corridor may be appropriate where space is constrained but hydrological and ecological functionality can still be maintained.

- Setbacks and Widths: In line with the Kildare County Development Plan (Section 10.10.1), a minimum setback of 10 metres from the edge of watercourses will be maintained for new developments. The exact width and treatment will, however, be determined through detailed design based on site-specific assessments of ecology, flood risk, and hydraulic connectivity.
- Habitat and Connectivity: Riparian zones support a wide range of plant and animal species distinct from the surrounding landscape. They also provide wildlife corridors, connecting habitats across the site and with adjacent green spaces.
- Floodplain Function: By retaining space along watercourses, riparian zones provide areas where floodwater can temporarily spread, reducing the risk of uncontrolled flooding to buildings and infrastructure.
- Water Quality Protection: Vegetation in riparian zones filters sediments and pollutants from surface runoff before it enters watercourses, contributing to improved water quality downstream.
- Integration with Framework Masterplan: Riparian zones will be incorporated into the design of open spaces, trails, and blue-green corridors to create multifunctional areas that deliver amenity, biodiversity, and flood management benefits.
- Planning Guidance: Riparian zones are defined in Planning for Watercourses in the Urban Environment (IFI, 2020) with three distinct zones. These guidelines inform design, management, and maintenance approaches to ensure ecological and functional performance.

Maintaining robust riparian zones is a core part of the Surface Water Management Plan, ensuring that watercourses are protected and enhanced while forming integral, multifunctional elements of the Framework Masterplan landscape. Figure 4-4 is an extract from the IFI document which illustrates the three zones.

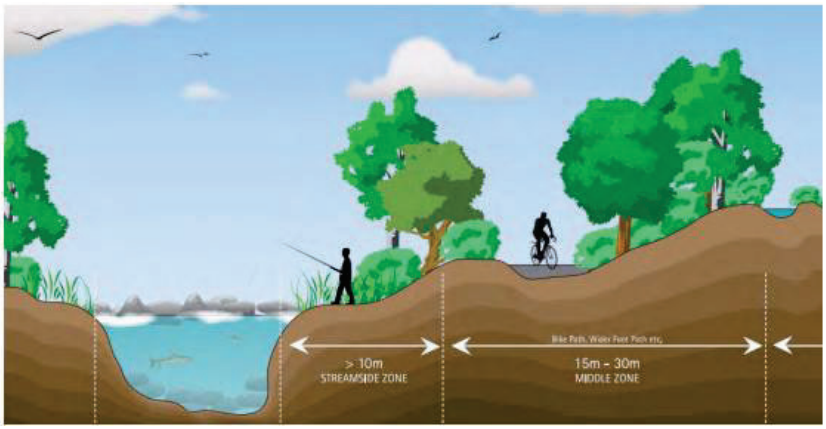


Figure 4-4 - Riparian Buffer zones (Source: Planning for Watercourses in the Urban Environment, IFI, 2020)

Table 4-6. Recommended riparian buffer zones illustrating the sub-zones and their functional uses (adapted from: Planning for Watercourses in the Urban Environment, IFI, 2020)

Characteristics	Streamside zone >10m	Middle Zone 15m – 30m	Outer Zone >8m
Function	Protect the physical integrity of the stream ecosystem.	Provide distance between upland development and streamside zone. Acts as a sump/filter for nutrients and sediment.	Prevent encroachment and filter hard surface runoff.
Width	Minimum 10m plus wetland and other habitat.	15-30m depending on stream.	8m minimum setback to structures.
Vegetative target	Native riparian vegetation.	Managed woodland, some clearing/open space allowed.	Woodland encouraged, but usually turfgrass.
Allowable uses	Very restricted except for fishing or walking trails.	Restricted, e.g. some recreational uses such as bike path or larger footpaths can function as a flood zone.	Unrestricted e.g. residential uses, including lawn, swales, most stormwater treatment will occur here.

4.10.2 SuDS Measures

SuDS features also form an integral part of the Framework Masterplan's Green and Blue Infrastructure (GBI), helping to manage surface water while contributing to biodiversity, amenity and ecological connectivity.

A range of potential SuDS measures are outlined below. Individual developments within the Northwest Quadrant lands are expected to select an appropriate combination of these features (or similar alternatives) to manage surface water effectively.

Key objectives for SuDS, including runoff reduction, water quality improvement and integration with amenity and biodiversity are highlighted throughout this section and should be incorporated into all development proposals.

It is an objective of this SWMP that each development parcel includes provision for at least two separate SuDS components, ensuring a robust and resilient approach to surface water management.

4.10.2.1 Green Roofs / Green Podiums

Green roofs / Green Podiums are a landscape layer over structures which contain vegetation, growing medium and water storage capability over a waterproof membrane.

Green roofs can be intensive (significant depth of growing medium supporting a range of vegetation types and suitable for amenity use) or extensive (lightweight thin growing medium supporting limited small plant species). Blue roofs which actively store water on the roof also fall into this category.

The benefits of green roofs / podiums include:

- Provision of interception and storage of rainwater slowing or reducing release to drainage system,
- Reduction in runoff volumes via plant uptake and evaporation,
- Provision of water quality improvements to runoff,
- Can be suitable as amenity open space or reduce visual impacts,
- Can support habitat for biodiversity.

Green roofs will typically be most suitable on larger buildings such as commercial buildings and apartment blocks however they may also be suitable in larger buildings within other development parcels.

Naas LAP Objective 5.3 notes the following in relation to green roofs:

NE 5.3: Encourage the use of green roofs such as residential, industrial, civic, commercial and leisure buildings.

Figure 4-5 – Example Green Roof Build up on a school building (Source: CIRIA C753 Sharrow School green roof)

4.10.2.2 Swales / Bioswales

Swales are shallow, flat-bottomed, vegetated open channels which are designed to convey, treat and attenuate surface water run-off. When incorporated into a design, they can enhance the natural landscape and provide amenity and biodiversity benefits. Swales can have a variety of profiles, can be uniform or non-uniform, and can incorporate a range of different planting strategies, depending upon the site characteristics and system objectives.

Typically, a swale is broad and shallow and covered by vegetation, usually grass, to slow the water facilitating sedimentation, filtration through the root zone and soil matrix, evapotranspiration and infiltration into the underlying soil.

A swale can have check dams or berms installed across the flow path, that temporarily pond runoff to increase pollutant retention and infiltration and further decrease flow velocity.

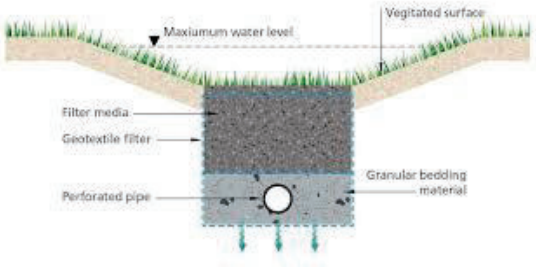


Figure 4-6 - Typical Swale Detail (Source: CIRIA C753)

These features are particularly suitable for receiving linear flows from roads and parking areas but can also receive point flows from gullies and house connections. Where used as a roadside feature they can receive flows via over the edge drainage where no kerbs are present or via regular kerb cuts.

Benefits of swales / bioswales include the following:

- Interception and storage of rainwater slowing or reducing release to drainage system,
- Reduction in runoff volumes via plant uptake and evaporation,
- Provision of water quality improvements to runoff via filtration,
- Can support habitat for biodiversity.

4.10.2.3 Trees & Tree Pits

Trees can be planted within a range of infiltration SuDS components such as bioretention systems, detention basins and swales, to improve their performance or they can be used as standalone features with tree pits. Tree pits and planters can be designed to collect and attenuate run-off by providing additional storage within the structure below. The soils around trees can also be used to filter out pollutants and sediments from runoff.

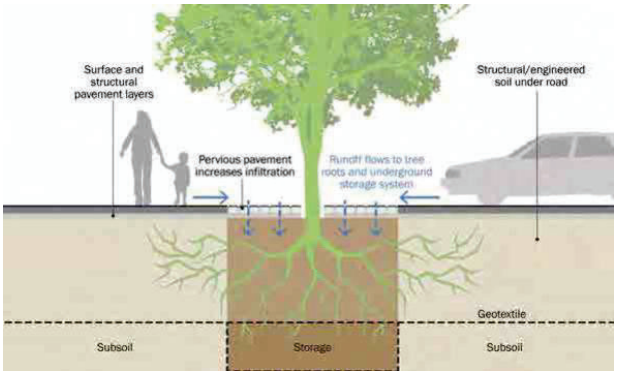


Figure 4-7 - Collection of surface water runoff by trees (Source: CIRIA C753)

4.10.2.4 Infiltration Systems

Infiltration Systems can take various forms and can provide conveyance, storage and promote infiltration of run-off to ground. These include soakaways, infiltration trenches, infiltration blankets and infiltration basins. Bioretention systems and pervious pavements can also be designed to allow infiltration from their bases.

These systems can contribute to reducing runoff and volumes while supporting baseflow and ground water recharge. The rate at which water can be infiltrated depends on the infiltration capacity of the soils.

- Soakaways are excavations that are filled with a void-forming material that allows temporary storage of water before it soaks into the ground.

- Infiltration trenches are linear soakaways where a perforated pipe can be included if required to distribute water along a trench.
- Infiltration basins are flat-bottomed, shallow landscape depressions that store runoff, allowing sediments to settle/ filter out before infiltrating to ground.
- Infiltration blankets are large shallow systems that are typically constructed using permeable aggregate or geocellular units that act as extensive soakaway systems.

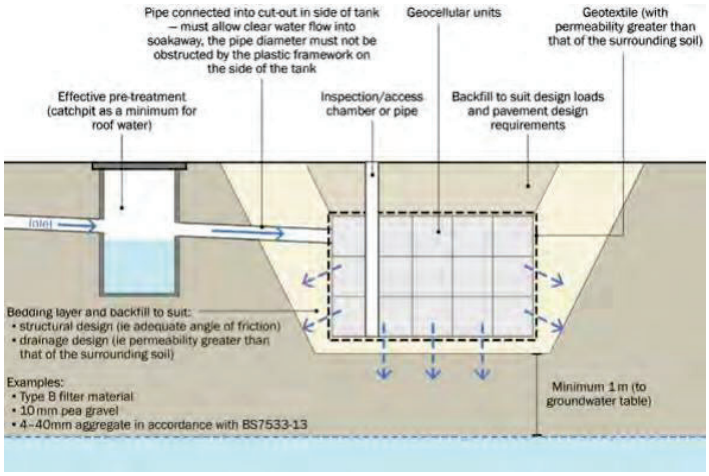


Figure 4-8 - Typical soakaway detail (Source: CIRIA C753)

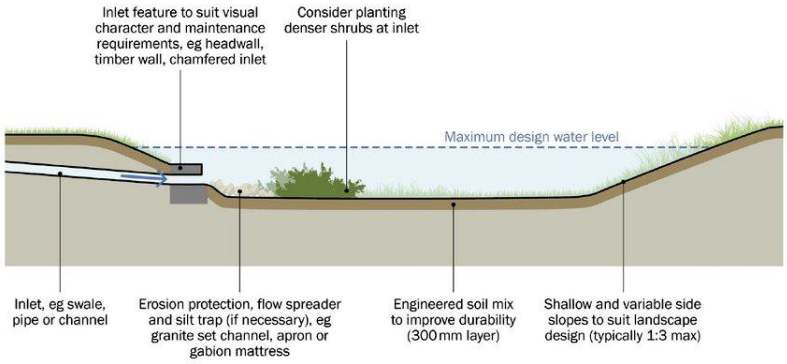


Figure 4-9 – Typical infiltration basin detail (Source: CIRIA C753)

4.10.2.5 Bioretention/ Rain Gardens

Bioretention systems, including rain gardens, are shallow landscaped depressions that can reduce run-off rates and volumes, and treat pollution through the use of engineered soils and vegetation. They are particularly effective in providing interception storage & treatment.

These are a flexible SuDS component that can be integrated into a wide range of developed landscapes using different shapes, materials, planting and dimensions. They are generally used for managing and treating run off from frequent rainfall events. Runoff collected by the system ponds temporarily on the surface and then filters through the vegetation and underlying soils.

Specified engineered soil mixes can be used as filter media to enhance bioretention treatment performance, and designs can be implemented that include submerged anaerobic zones to promote nutrient removal.

The filtered runoff is either collected using a perforated pipe system or, if site conditions allow, fully or partially infiltrated into the surrounding soil (subject to suitable site conditions).

Figure 4-10 - Example of a raingarden adjacent to a roadway (Carlow Town)

4.10.2.6 Rainwater Harvesting

Rainwater harvesting systems collect runoff from hard surfaces and store for reuse to offset the demand for supply from mains water systems. Runoff can be collected impermeable areas, stored, treated (where required) and then used as a supply of water for domestic, commercial, industrial and/or institutional properties. These systems have a number of benefits which include:

- They can meet some of the building's water demand, delivering sustainability and climate resilience benefits.
- They can help reduce the volume of runoff from a site.
- They can help reduce the volume of attenuation storage required on the site.

They provide interception of flows and reduce the volume of runoff from the site and provide benefits in terms of reduced load on potable water systems and climate resilience. Larger rainwater systems will be suitable for development with large roof areas and significant water demand.

4.10.2.7 Porous Paving

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers.

The water is temporarily stored beneath the surface before use, infiltration to the ground, or controlled discharge to a downstream system. These systems provide interception, storage, facilitate infiltration and provide treatment through filtration and chemical processes in the supporting layers. These types of systems in include modular paving with permeable joints, porous asphalt, grass reinforcement and engineered sport surfaces.

There are two types of pervious pavements that are defined on the basis of the surfacing materials:

Porous pavements infiltrate water across their entire surface material – e.g. reinforced grass or gravel surfaces, resin bound gravel, porous concrete or asphalt.

Permeable pavements have a surface that is formed of material that is itself impermeable. The surfacing material is laid to provide void space through to the sub-surface – e.g. paving

blocks are designed to allow rainfall to infiltrate through the joints or voids between the blocks into the underlying pavement structure.

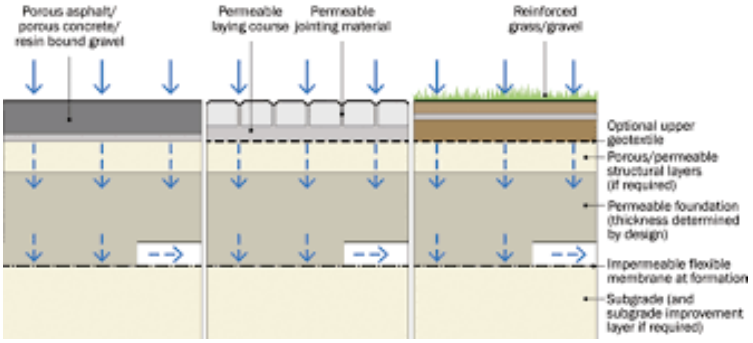


Figure 4-11 - Example of Porous Paving Build-up (Source: CIRIA C753)

4.10.2.8 Ponds

There are two types of ponds typically used within SuDS design: attenuation ponds and retention ponds.

Attenuation Ponds are designed to temporarily store run-off during rainfall events, releasing it at a controlled rate once the event has passed. These features remain dry or shallow most of the time, filling only during heavier rainfall and then emptying gradually via infiltration, evapotranspiration, or controlled discharge to a downstream system. As set out in Section 10.7 of the KCC Sustainable Drainage Systems Guidance document and in KCC CDP Objective IN O24, designers should "*Only consider underground retention solutions when all other options have been exhausted. Underground tanks and storage systems will not be accepted under public open space, as part of a SuDS solution*".

Figure 4-12 - Example of Attenuation Ponds (Attenuation Storage provided at Marina Park Cork)

Retention ponds are designed to hold a permanent body of water while providing additional storage capacity during storm events. They should be designed with varied side slopes, shallow margins, and aquatic planting to enhance habitat diversity and water quality.

Retention ponds may also be configured as constructed wetlands, which provide extended treatment through sedimentation and biological uptake, while delivering significant biodiversity and amenity benefits.

Constructed wetlands and retention ponds are particularly effective in integrating water management with landscape design, supporting ecological connectivity and creating multifunctional open space that contributes to visual amenity, biodiversity enhancement, and climate resilience.

The inclusion of ponds and constructed wetlands within the surface water management network provides a significant opportunity to deliver biodiversity and ecological value alongside drainage function. When designed in accordance with SuDS best practice, these features can:

- Support a diverse range of aquatic and marginal habitats, creating breeding and foraging areas for invertebrates, amphibians, and bird species.
- Promote native planting schemes that enhance pollinator support and ecological resilience while reducing long-term maintenance.
- Provide habitat connectivity between existing natural features such as the Canal, riparian corridors, and proposed green infrastructure networks across the Northwest Quadrant lands.
- Contribute to climate adaptation by increasing habitat heterogeneity, improving evapotranspiration, and providing local cooling effects.
- Enhance public amenity and education, allowing interpretation of SuDS and biodiversity features within accessible open spaces.

To maximise biodiversity outcomes, pond and wetland design should include varied depths, gentle side slopes, and zoned native planting to create a mosaic of wet, damp, and dry habitats. The design and species selection should follow *Kildare County Council's Sustainable Drainage Guidance Document* and *CIRIA C773: Biodiversity Benefits of SuDS*.

Figure 4-13 - Example of a Retention Pond (North Cotswold Hospital)

In summary, the Surface Water Management Strategy provides a clear framework for managing rainfall and runoff across the Northwest Quadrant lands. By combining SuDS measures, attenuation and flow control, riparian zones, and multifunctional blue-green corridors, the strategy ensures that flood risk is minimised, water quality is protected, and downstream areas are safeguarded. At the same time, surface water features are integrated

into open spaces and streetscapes to deliver amenity, biodiversity, and educational benefits. This approach ensures that water management is not a standalone function but a key part of the Framework Masterplan's landscape, ecological networks, and overall vision for a resilient, sustainable, and attractive urban environment.

5. Implementation & Integration

This chapter outlines how the surface water management strategy will be delivered, maintained, and coordinated with wider plans and projects. It also highlights site-specific constraints and opportunities that inform the location and design of SuDS, riparian zones, and other drainage features.

5.1 Operation and Maintenance

To ensure long-term effectiveness, all SuDS features, riparian zones, and drainage infrastructure will require routine operation, maintenance, and monitoring. Key elements include:

- Routine Inspection and Maintenance: Regular checks of swales, ponds, attenuation basins, green roofs, trash screens and other features to remove debris, check for damage, maintain vegetation, and ensure flows are unobstructed.
- Operational Management Regime: Trash screens require inspection immediately after severe rainfall events or during flood alerts.
- Monitoring Water Quality and Hydrology: Periodic monitoring to confirm runoff treatment and flow control measures are functioning as intended.
- Adaptive Management: Adjustments to maintenance practices based on seasonal changes, observations, or extreme weather events to protect infrastructure and ecological features.
- Roles and Responsibilities: Maintenance responsibilities may be shared between developers, management companies, or the local authority to ensure accountability and long-term performance.

Maintenance access, riparian zones, and flood-prone areas will influence the placement and design of features. Thoughtful design will balance functional requirements with ecological protection and public safety.

6. Summary & Recommendations

This chapter summarises the key findings, conclusions, and recommended actions arising from this Surface Water Management Plan. This SWMP is intended to provide a clear overview for stakeholders, planners and the public, highlighting how surface water will be managed sustainably across the Northwest Quadrant lands.

The Northwest Quadrant lands are predominantly undeveloped, with natural slopes, existing watercourses, and some drainage infrastructure conveying flows to the River Liffey. Most of the site is at low flood risk (Flood Zone C), with localized higher-risk areas near watercourses. Groundwater and tidal/coastal flood risk are minimal, and while geological conditions suggest some infiltration potential, no site investigation has yet been completed.

These conditions define the constraints and opportunities for sustainable surface water management, including the use of blue-green corridors, SuDS features, and riparian zones to manage runoff, protect water quality, and enhance biodiversity

6.1 Summary of Surface Water Management Strategy

The surface water management strategy has been developed to:

- Place-Making and Landscape Integration: The surface water strategy will play a key role in shaping the landscape structure, public open space network, and overall character of the Northwest Quadrant, ensuring that water management features are integral to the identity and spatial organisation of the development.
- Reduce flood risk by controlling runoff volumes and peak flows through attenuation, flow routing, and the SuDS hierarchy.
- Protect and enhance water quality by incorporating treatment measures, including bioretention, swales, and other natural features.
- Integrate drainage infrastructure with the Framework Masterplan layout, ensuring multifunctional benefits for amenity, biodiversity, and recreation.
- Maintain and provide riparian zones and ecological corridors to support wildlife, water quality, and floodplain function.
- Incorporate climate change allowances into design to ensure resilience over the life of the development.

By following these principles, the strategy balances technical compliance with national and local policy, environmental protection, and the creation of attractive, multifunctional open spaces while also informing the landscape structure and contributing to the overall character and identity of the Northwest Quadrant.

6.2 Recommendations for Implementation

To ensure the strategy is delivered effectively, the following recommendations are made:

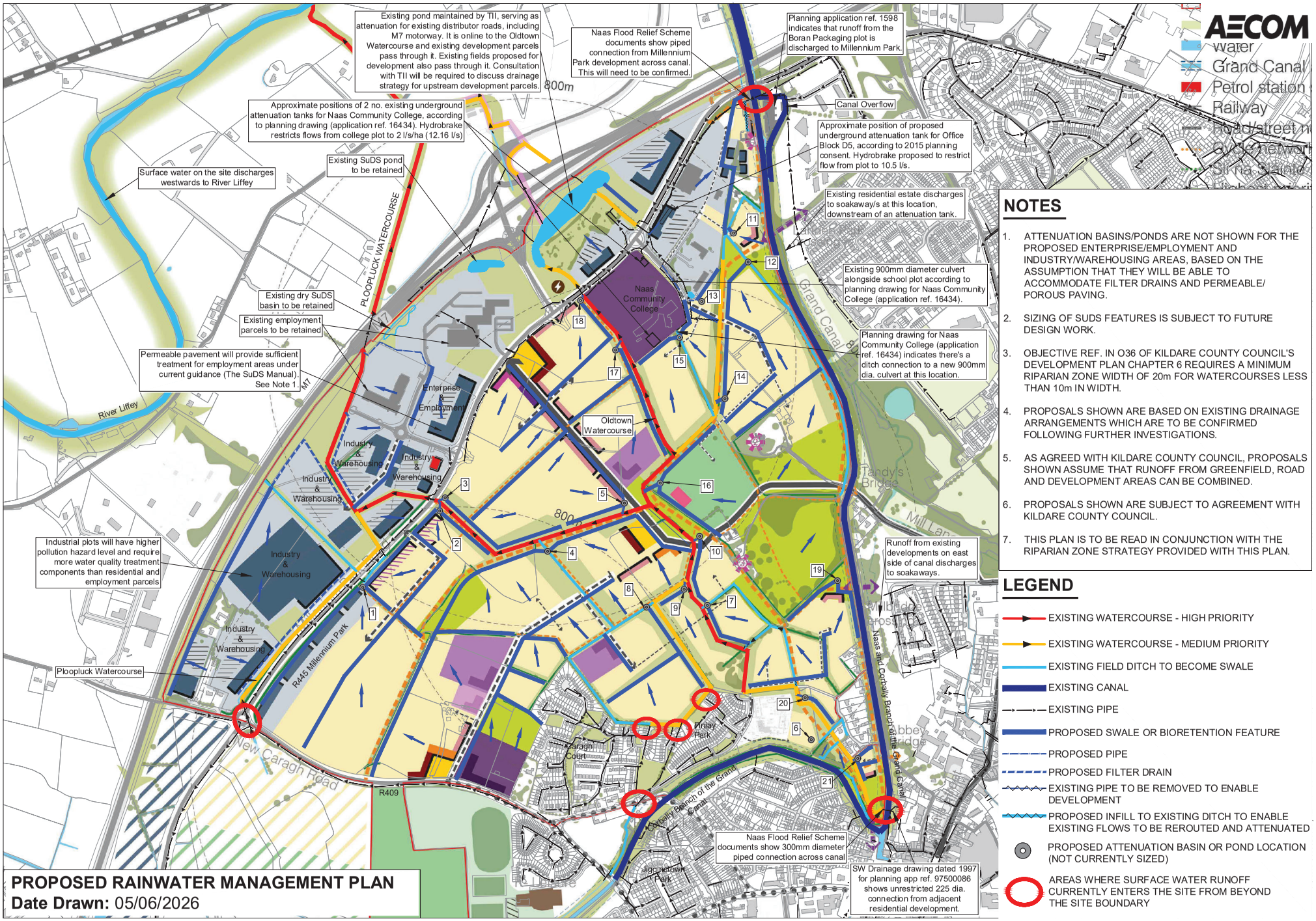
- SuDS Implementation: Each development cell should include a combination of SuDS features (at least two per cell) tailored to site conditions, landscape character, and ecological objectives.
- Riparian Zone Protection: Maintain and enhance vegetated buffer zones along all watercourses, with setbacks generally in line with policy requirements. A flexible, site-responsive approach has been adopted, allowing corridor widths and treatments to vary where appropriate based on local topography, flood risk, landscape design, and biodiversity opportunities, while ensuring that ecological and hydraulic functions are maintained.
- Quantity Control: Attenuation storage should be provided across subcatchments to control peak flows to greenfield runoff rates, including allowances for climate change.

- Maintenance and Monitoring: Establish routine inspection, maintenance, and adaptive management plans for all SuDS and riparian features, ensuring long-term functionality.
- Integration with Other Plans: Coordinate with the Naas Flood Relief Scheme, regional drainage strategies, and local planning policy to ensure the SWMP complements wider flood and ecological objectives.
- Flexible Design: SuDS features should be designed to allow adaptability, particularly where infiltration potential is uncertain or site conditions change during development.
- Multifunctional Open Space: Ensure that the proportion of open space designed to provide water management functions is optimised to remain usable and visually appealing throughout the year. Wet areas should be limited to what is necessary for attenuation and biodiversity, enabling open spaces to serve multiple purposes such as recreation, amenity, and education, in accordance with *Kildare County Council's Sustainable Drainage Guidance Document*.

In addition to effectively managing flood risk, the SWMP delivers wider benefits for the environment, public amenity, and climate resilience. The strategy enhances biodiversity, protects water quality, and creates attractive, multifunctional open spaces that support recreation, education, and social interaction.

To ensure these benefits are realised, detailed, phase-specific drainage and SuDS designs should be prepared as the Framework Masterplan progresses, incorporating site investigations and infiltration testing. Maintenance and monitoring plans should be formalised, and continued coordination with Kildare County Council, OPW, and other stakeholders is essential to achieve a resilient, multifunctional, and integrated surface water management system across the Northwest Quadrant lands.

Appendix A NWQ Surface Water Management Plan



NOTES

1. ATTENUATION BASINS/PONDS ARE NOT SHOWN FOR THE PROPOSED ENTERPRISE/EMPLOYMENT AND INDUSTRY/WAREHOUSING AREAS, BASED ON THE ASSUMPTION THAT THEY WILL BE ABLE TO ACCOMMODATE FILTER DRAINS AND PERMEABLE/ POROUS PAVING.
2. SIZING OF SUDS FEATURES IS SUBJECT TO FUTURE DESIGN WORK.
3. OBJECTIVE REF. IN O36 OF KILDARE COUNTY COUNCIL'S DEVELOPMENT PLAN CHAPTER 6 REQUIRES A MINIMUM RIPARIAN ZONE WIDTH OF 20m FOR WATERCOURSES LESS THAN 10m IN WIDTH.
4. PROPOSALS SHOWN ARE BASED ON EXISTING DRAINAGE ARRANGEMENTS WHICH ARE TO BE CONFIRMED FOLLOWING FURTHER INVESTIGATIONS.
5. AS AGREED WITH KILDARE COUNTY COUNCIL, PROPOSALS SHOWN ASSUME THAT RUNOFF FROM GREENFIELD, ROAD AND DEVELOPMENT AREAS CAN BE COMBINED.
6. PROPOSALS SHOWN ARE SUBJECT TO AGREEMENT WITH KILDARE COUNTY COUNCIL.
7. THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE RIPARIAN ZONE STRATEGY PROVIDED WITH THIS PLAN.

LEGEND

- EXISTING WATERCOURSE - HIGH PRIORITY
- EXISTING WATERCOURSE - MEDIUM PRIORITY
- EXISTING FIELD DITCH TO BECOME SWALE
- EXISTING CANAL
- EXISTING PIPE
- PROPOSED SWALE OR BIORETENTION FEATURE
- PROPOSED PIPE
- PROPOSED FILTER DRAIN
- EXISTING PIPE TO BE REMOVED TO ENABLE DEVELOPMENT
- PROPOSED INFILL TO EXISTING DITCH TO ENABLE EXISTING FLOWS TO BE REROUTED AND ATTENUATED
- PROPOSED ATTENUATION BASIN OR POND LOCATION (NOT CURRENTLY SIZED)
- AREAS WHERE SURFACE WATER RUNOFF CURRENTLY ENTERS THE SITE FROM BEYOND THE SITE BOUNDARY

PROPOSED RAINWATER MANAGEMENT PLAN
Date Drawn: 05/06/2026