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Surface Water Management Strategy

for the Proposed Variation No. 6 (Sallins Settlement Plan) of the Kildare County Development Plan 2023-2029 (as varied)

WATER & ENVIRONMENTAL CONSULTANTS

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1 INTRODUCTION

1.1 Terms of Reference

This Surface Water Management Strategy (SWMS) was commissioned by Kildare County Council (KCC) to inform the Proposed Variation No. 6 (Sallins Settlement Plan) of the Kildare County Development Plan (CDP) 2023-2029 (as varied). The proposed variation is hereafter referred to as 'Proposed Variation No. 6 (Sallins Settlement Plan)'.

The lands at Sallins, Co. Kildare are hereafter referred to as 'the Plan Area'. This SWMS should be read in conjunction with the Strategic Flood Risk Assessment (SFRA) prepared to inform Proposed Variation No. 6 (Sallins Settlement Plan).

1.2 Statement of Authority

This SWMS has been prepared and reviewed by the following qualified professionals:

- Joanna Poprawa *BEng (Hons) MSc* – Flood Analyst with experience in flood risk assessment and surface water management.
- Duncan Hartwick *BEng (Hons) BSc (Hons) PEng* – Senior Engineer specialising in hydrology, flood risk assessment, hydraulic modelling, surface water management, and Sustainable Drainage Systems (SuDS) design.
- Paul Singleton *BEng (Hons) MSc CEng MIEI* – Associate Director and Chartered Engineer specialising in flood risk assessment, hydrology, surface water management, and SuDS design, and a recognised industry professional providing training courses on these topics to the public and private sectors in Ireland and the UK.

1.3 Purpose and Scope

The purpose of the SWMS is to set out a framework for the delivery of SuDS to manage surface water within the Plan Area in a way that provides maximum water quantity, water quality, amenity, and biodiversity benefits.

The SWMS is ultimately intended to inform 'plan making', not to define outline and detailed drainage layouts, which would be prepared as part of SuDS strategies / plans developed to support planning application(s) at later stages.

Included with the SWMS is a SuDS concept masterplan indicating the preferred approach for integrating multi-functional SuDS components within the Plan Area to control the quantity and quality of runoff and to create and sustain amenity and biodiversity space. While any development proposal(s) for the Plan Area should carefully consider the findings and recommendations of the SWMS when developing outline and detailed drainage layouts, the SuDS concept masterplan is not fixed, and there is flexibility in terms of how the final layout is defined.

1.4 Applicable Guidance

The SWMS aims to ensure relevant policies / objectives from the Kildare CDP 2023-2029 and other applicable guidance documents are followed. SuDS are referred to extensively in the following chapters of the Kildare CDP 2023-2029 (as varied):

- Chapter 2: Core Strategy & Settlement Strategy
- Chapter 3: Housing
- Chapter 5: Sustainable Mobility & Transport
- Chapter 6: Infrastructure & Environmental Services
- Chapter 12: Biodiversity & Green Infrastructure
- Chapter 14: Urban Design Placemaking & Regeneration
- Chapter 15: Development Management Standards

The 'Strategic Flood Risk Assessment for the Kildare CDP 2023-2029' states that any surface water drainage design should be compliant with the following to ensure drainage from the Plan Area is managed sustainably:

- Department of Housing, Local Government and Heritage (DHLGH) Rainwater Management Plans – Guidance for Local Authorities (May 2024)
- DHLGH Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas (March 2022)
- KCC Sustainable Drainage Systems Guidance Document (2024)
- CIRIA SuDS Manual C753 (2015)
- Greater Dublin Regional Code of Practice for Drainage Works (2012)
- Greater Dublin Strategic Drainage Study (GDSDS) (2005)

The KCC Sustainable Drainage Systems Guidance sets out key principles and design requirements that any surface water management strategy within the Plan Area should adhere to in order to ensure sustainable and effective drainage solutions, in accordance with the following documents:

- Greater Dublin Strategic Drainage Study (GDSDS) (2005)
- Greater Dublin Regional Code of Practice for Drainage Works (2012)
- Building Regulations Technical Guidance – Document H
- CIRIA SuDS Manual C753 (2015)
- Design Manual for Urban Roads and Streets – Advice Note 5: Urban Drainage

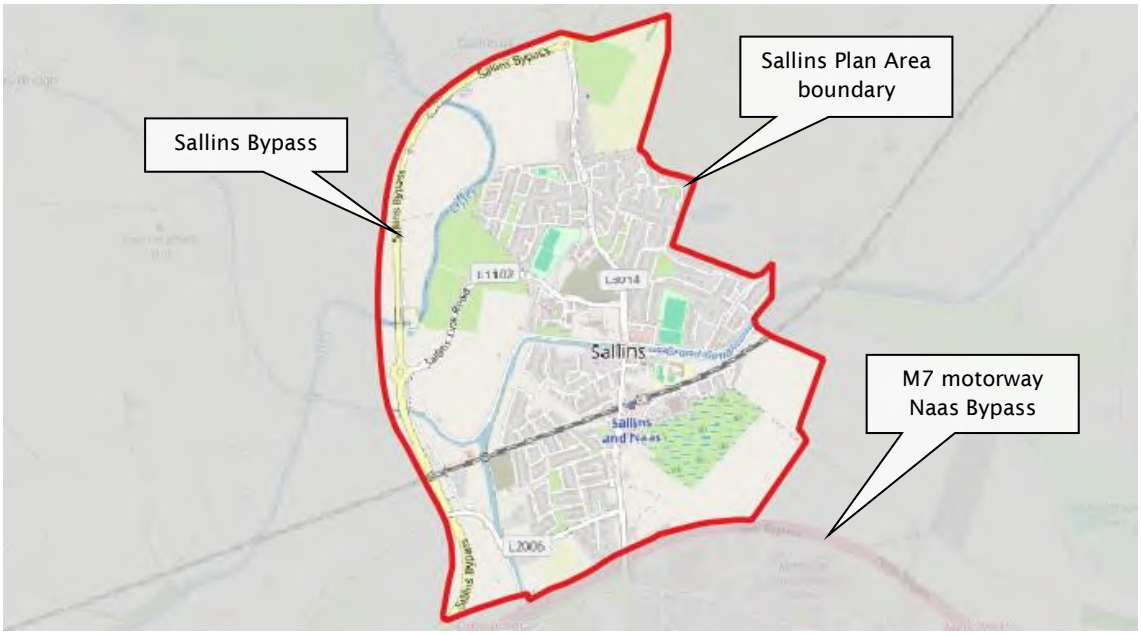
It is noted that updates to the above documents and / or new published documents during the lifetime of the Kildare CDP 2023-2029 are to be implemented as part of future schemes where appropriate.

2 PLAN AREA INFORMATION

2.1 Location and Boundary

Sallins is situated on the Grand Canal, in the low-lying agricultural landscape of County Kildare. Sallins is located approximately 3 km north of Naas and 35 km southwest of Dublin. The Plan Area is bisected by the Grand Canal, and is bounded to the south by the M7 motorway / Naas Bypass and to the west by the Sallins Bypass, as shown in Figure 2.1.

Figure 2.1: Plan Area Location and Boundary



2.2 Existing Land Use

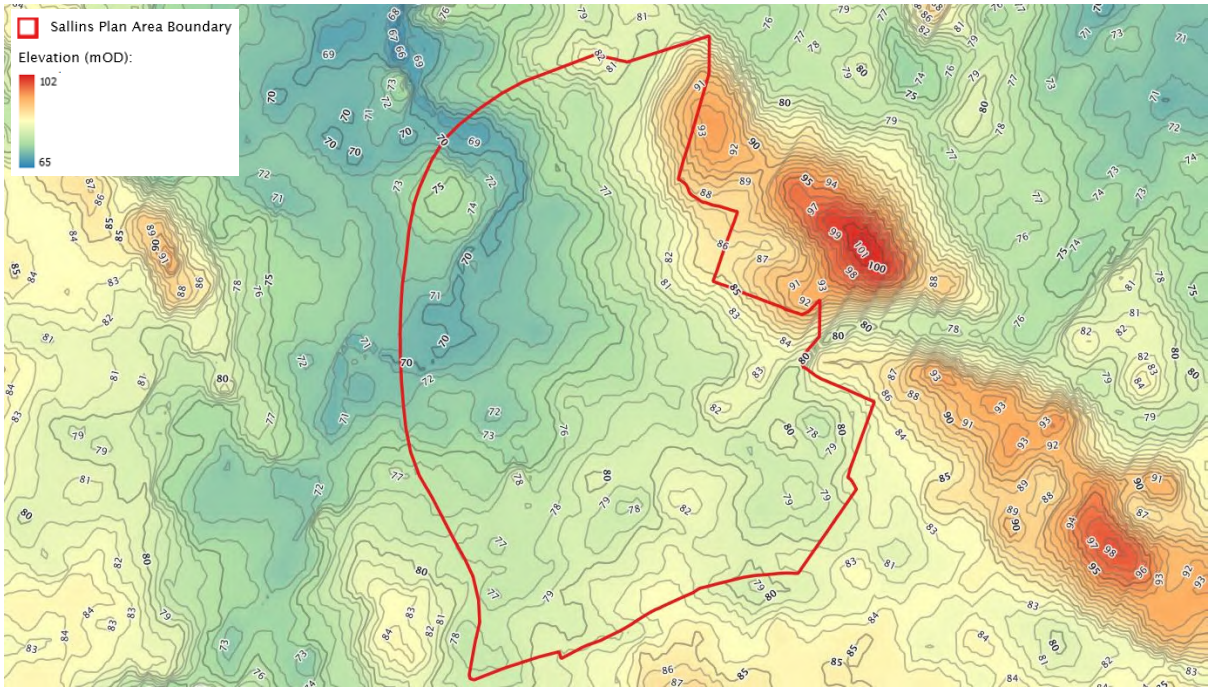
The Plan Area currently comprises c. 351 ha of residential and commercial infrastructure with some agricultural lands, as shown in Figure 2.2.

Figure 2.2: Existing Land Use

2.3 Topography

Based on 25 m DTM height data, existing ground levels within the Plan Area range from c. 91 mOD in the east to c. 69 mOD in the northwest, as shown in Figure 2.3.

Figure 2.3: Plan Area Topography



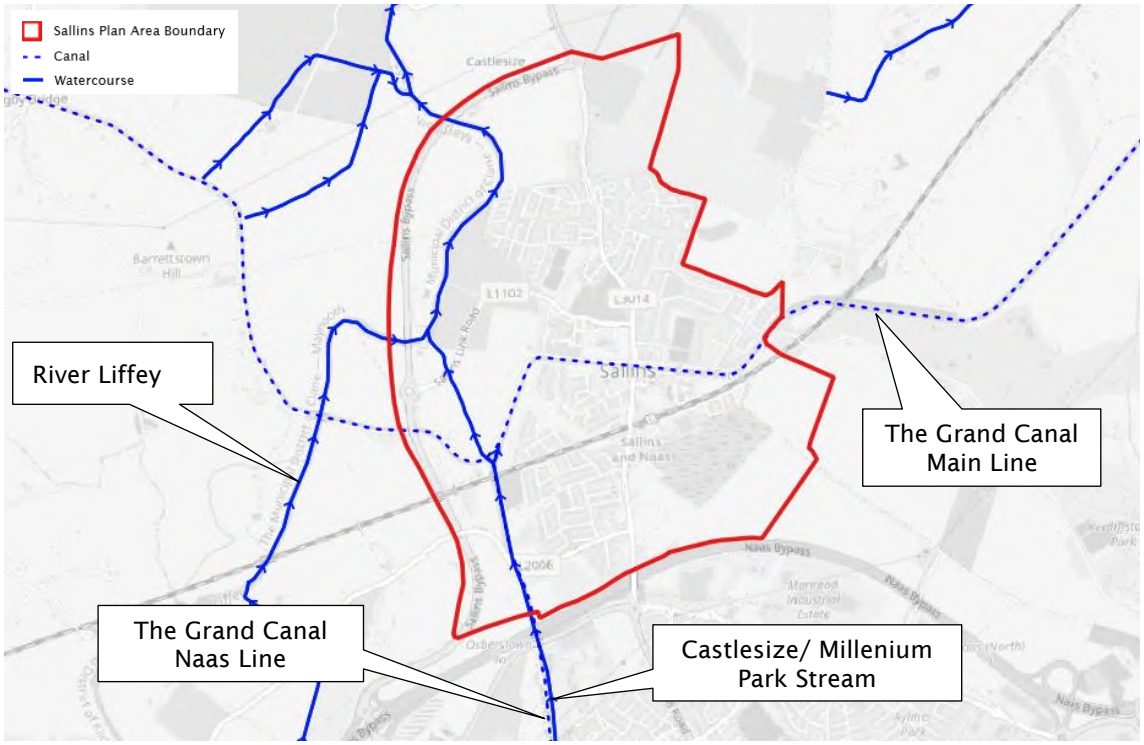
2.4 Water Environment

Environmental Protection Agency (EPA) 'Flow Network' data is presented in Figure 2.4 and has been found to be consistent with OPW FSU 'Rivers' data and KCC watercourses records. It is acknowledged that the EPA watercourse dataset is not intended to be exhaustive and does not capture all open waterbodies within the Plan Area as there are minor streams and ditches which will not have been captured / included

The River Liffey flows generally north along the western boundary of Plan Area, meandering into the north western portion of the Plan Area. The Millenium Park Stream and the Grand Canal Naas Line flow from south to north in both parallel and combined stretches between Naas and Sallins.

The Grand Canal runs from west to east through the centre of the Plan Area.

Figure 2.4: Watercourse Map



2.5 Geology and Hydrogeology

No site investigation / infiltration testing has been conducted for the Plan Area. Table 2.1 summarises geological and hydrogeological data taken from Geological Survey of Ireland (GSI) mapping that is considered pertinent to the Plan Area.

Table 2.1: Geological and Hydrogeological Data for the Plan Area

GSI Data Type	Summary
Overlying Soil / Existing Land Use	• Primarily developed lands / made ground (i.e., existing residential and other built development) • Mix of agricultural and undeveloped greenfield lands on outskirts
Subsoil Geology	• Moderate subsoil permeability occurs across most of the Plan Area, from the south to the north-central part, with high soil permeability in the north. A relatively small area of low soil permeability is present along the central section of the eastern boundary. • Till derived from the limestones from the south to the north central part and to the northeast; Gravels derived from the limestones to the north and northeast, Alluvium present to the northwest
Bedrock Geology	• Majority of Rickardstown Formation – cherty often dolomitised limestone from south to north. • Waulsortian Limestones – massive unbedded lime-mudstone to the northwest
Groundwater Body	• Naas Groundwater Body • Regionally Important Aquifer - Karstified (diffuse)
Groundwater Vulnerability	• High from the centre to the northeast and northwest • Moderate from south to the northcentre • Low to the east
Groundwater Drinking Water Protection Area	• N/A

2.6 Existing Utilities

No records of existing underground utilities have been found or made available as part of this SWMS. Any existing utilities found at a later stage that cannot be relocated or abandoned will need to be considered prior to progressing outline and detailed designs (including SuDS designs) within the Plan Area.

2.7 Zoning Objectives

Proposed Variation No. 6 (Sallins Settlement Plan) sets out a range of land use zonings and zoning objectives, as shown in Table 2.2. The Flood Zone maps included in Appendix A were prepared to assist with land use zoning decisions in areas that have been assessed as being at risk of flooding.

Land use zoning for the Proposed Variation No. 6 (Sallins Settlement Plan) have been overlain with Flood Zone mapping and Section 5 presents Justification Tests where required. Land use zoning vulnerability was agreed through consultation with KCC, as outlined in subsequent sections.

Table 2.2: Proposed Variation No. 6 (Sallins Settlement Plan) Land Zoning Objectives

Ref	Use	Land-Use Zoning Objective
A	**Town Centre**	To protect, improve and provide for the future development of the town centre.
B	**Existing Residential / Infill**	To protect and enhance the amenity of established residential communities and promote sustainable intensification.
C	**New Residential**	To provide for new residential development. • C (1) – C (5): Refer to Table 2.4 Estimated Residential Development Capacity. • Refer to Section 10 for Key Development Areas (KDAs).
E	**Community and Education**	To provide for community, recreation and educational facilities. Site Specific Objectives E (1) This site is identified for the expansion of the St. Laurence's National School. E (2) This site is identified for the provision of new post-primary school. E (3) This site is identified for the provision of a new primary school
F	**Open Space and Amenity**	To protect and provide for open space, amenity and recreation provision. Site Specific Objectives F (1) These lands are identified for the development of the Sallins Amenity Park (Phase One and Phase Two) catering for active and passive recreation.
H	**Industry and Warehousing**	To provide for manufacturing, warehousing and industrial development. Site Specific Objective Bodenstown Employment Area Urban Design Framework (refer to Section 10).
I	**Agricultural**	To retain and protect agricultural uses.

Ref	Use	Land-Use Zoning Objective
MU	**Mixed Use**	To provide for a mix of uses to include residential and commercial. This zoning allows for a wide range uses including residential, commercial, office and cultural.
R	**Retail and Commercial**	To support continued operation of existing retail and commercial uses.
SR	**Strategic Reserve**	To protect the integrity of the lands to provide for the future strategic expansion of the town over future plan period and ensure that development that would prejudice the future orderly expansion of the town will be resisted. The inclusion of these lands will not in any way infer a prior commitment regarding the nature of any future zoning. Such a decision will be considered within the framework of the need for additional zoned lands and the proper planning and sustainable development of the area.
U	**Transport and Utilities**	To provide for and improve public infrastructure utilities.

Note on Land Use Zoning Objectives and Matrix per Kildare County Council: The limitation described in this note applies to a relatively small number of instances where Flood Risk Zones A and B overlap with certain Land Use Zoning objectives. Uses under all Land Use Zoning Objectives (apart from where the Justification Test outlined in the Flood Risk Management Plan Guidelines has been passed) shall be limited to water-compatible uses in Flood Zone A, and less vulnerable or water compatible uses in Flood Zone B (as per the Flood Risk Management Guidelines), and detailed site-specific Flood Risk Assessment will be required in these areas. This limitation shall take primacy over any other provision relating to these land use zoning objectives.

2.8 Plan Area Constraints

Table 2.3 summarises the constraints / parameters that will inform the development of the SWMS.

Table 2.3: Plan Area Constraints / Parameters

Potential Constraint	Comment	Confidence (L / M / H)	Constraint on SuDS Design?
Flood Risk	Flood risk at the Plan Area is assessed in the SFRA.	H	Fluvial flooding at the site is set out in the SFRA under separate cover. SuDS design shall take account of the delineated flood extents within the Plan Area.
Drainage Infrastructure	The Grand Canal, River Liffey and a number of tributaries flow through the Plan Area. Existing open channel drains are also present within the Plan Area.	M	A detailed SuDS Strategy will be required to ensure that any existing drainage function is preserved.
Underground Utilities	No records of existing underground utilities have been found or made available as part of this SWMS.	N/A	CAT scan / trial pits will be required, the extent of which will depend on options taken to detailed design.
Topography	Based on LiDAR height data, existing ground levels range from c. 91 to c. 69 mOD, falling generally from the east of the Plan Area towards the west.	M	The topography of the Plan Area will influence the existing flow routes and therefore the preferred SuDS management train. Detailed design should be based on area-specific topographic survey.
Existing & Proposed Land Use	The Plan Area currently comprises the existing town of Sallins and areas of undeveloped land. Land use zonings would allow a range of mixed-use development.	M	SuDS components and design should be compatible with the design and landscape characteristics associated with commercial / industrial and / or residential development
Size of Plan Area	The Plan Area has an area of c. 3.51 km^2 (351 ha).	H	N/A
Ground Contamination	No site investigation / infiltration testing has been conducted for the Plan Area.	L	Ground contamination issues at the Plan Area are unknown. Site investigation / testing is required, the extent of which will depend on options taken to detailed design.

Potential Constraint	Comment	Confidence (L / M / H)	Constraint on SuDS Design?
Infiltration Potential	No site investigation / infiltration testing has been conducted at the Plan Area.	M	The Plan Area has a Winter Rainfall Acceptance Potential (WRAP) class of 2, which indicates relatively free draining soil and GSI mapping indicates moderate permeability subsoil.
Archaeological & Architectural Heritage	The National Monuments Service 'Historic Environment Viewer' indicates numerous archaeological / architectural heritage sites / monuments within the Plan Area. No further details have been made available as part of this assessment.	L	Potential impacts on archaeological / architectural heritage sites / monuments should be considered as part of any detailed design within the Plan Area.
Local Authority Requirements	KCC has not expressed any specific requirements at this stage in addition to those already set out in the CDP and SuDS Guide document.	M	Future detailed SuDS design should consider any further LA requirements, such as taking-in-charge and maintenance issues.

3 SuDS STRATEGY

The SuDS strategy outlines the preferred approach for managing rainfall runoff within the Plan Area to ensure no increase in flood risk to any development within the Plan Area or elsewhere while delivering of wider water quality, amenity, and biodiversity benefits. The approach follows the guidance in the CIRIA SuDS Manual, which may be summarised as follows:

- Identify existing and modified flow routes.
- Identify a suitable mechanism for surface water discharge to allow for Plan Area drainage.
- Allocate a SuDS management train and appropriate number of subcatchments to provide collection, conveyance, storage, and treatment of runoff throughout the Plan Area.
- Identify a range of SuDS components that are in keeping with the proposed landscape character and other objectives for the Plan Area. At this stage, any definition of SuDS features for specific areas of the Plan Area should not be treated as 'fixed' aspects of the design.

3.1 Flow Route Analysis

3.1.1 Existing Flow Routes

Flow route analysis was carried out to determine existing runoff characteristics at the Plan Area. General existing flow routes that enter and exit the Plan Area are shown in Figure 3.1.

The topography of the Plan Area is such that overland runoff would primarily flow from east to west towards the River Liffey. A significant hydraulic break across the Plan Area is provided by the Grand Canal while key surface water flow paths would be provided by roads within or adjacent to the Plan Area. Tributaries of the River Liffey and local open channel drains will also provide conveyance pathways for surface water runoff.

Detailed SuDS design for the Plan Area will need to consider how flows along these flow routes will be managed.

3.1.2 Existing Subcatchments

The existing flow route analysis has been used to delineate existing / natural surface water subcatchments within and across the Plan Area as presented in Figure 3.2.

As shown, subcatchments generally follow the outline of existing development in the centre of the Plan Area and natural topography / features towards the outer parts of Sallins. Subcatchment boundaries also follow local roads and the Grand Canal where surface water runoff from a number of areas is likely to meet and be conveyed along the existing flow routes.

Figure 3.1: Existing Flow Route Analysis

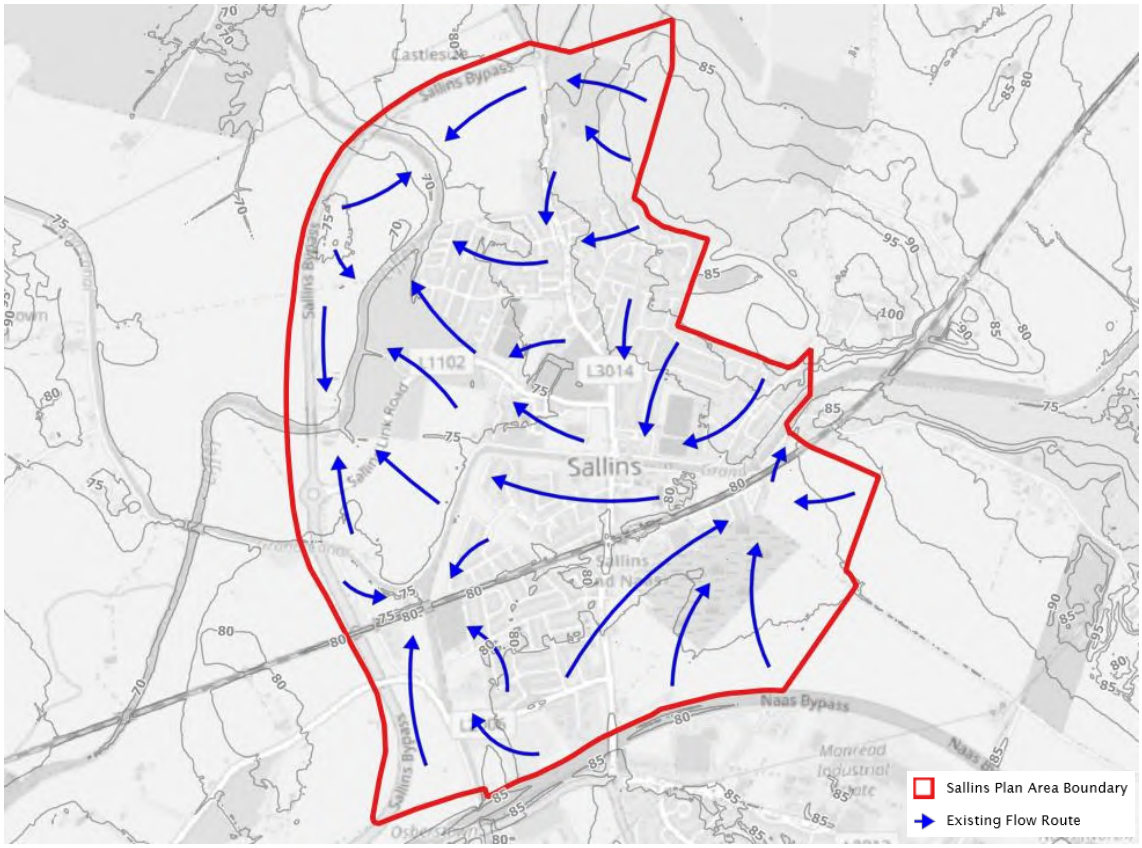
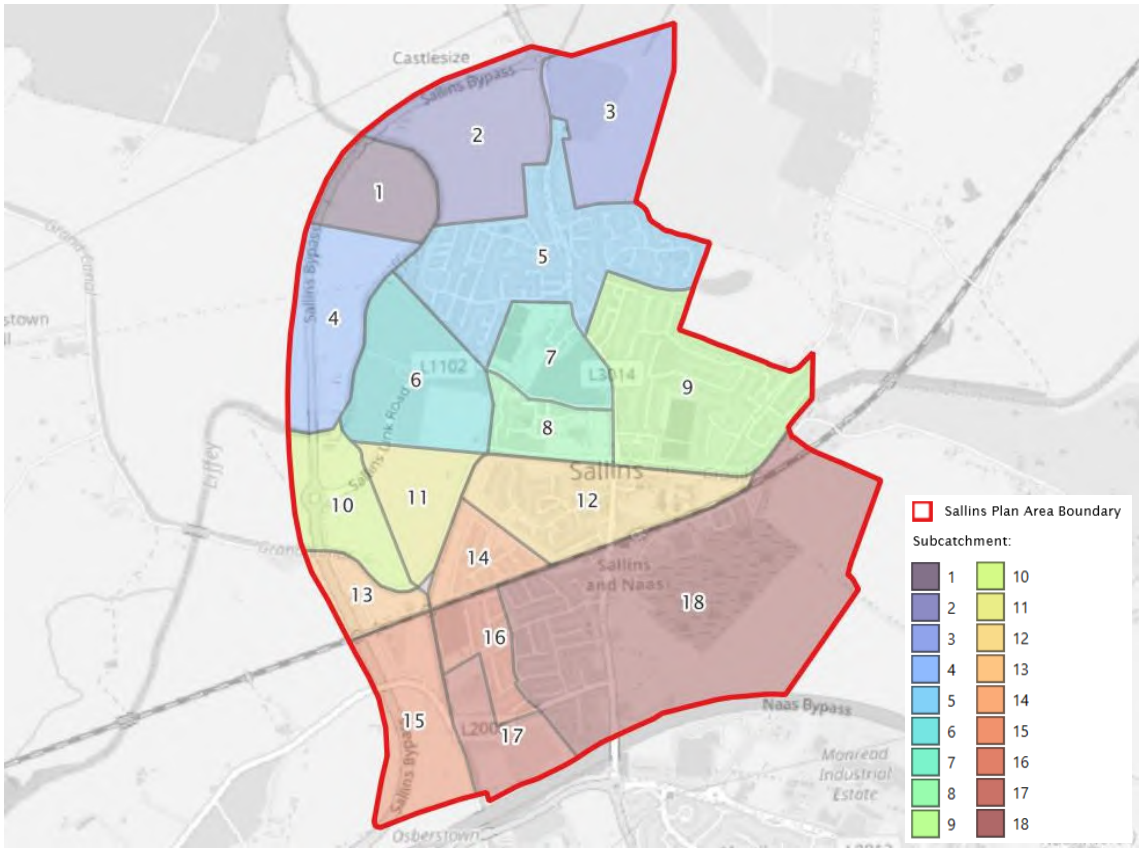


Figure 3.2: Existing Subcatchments



3.1.3 Modified Flow Routes

Modified flow route analysis identifies how existing / pre-development flow routes are modified by any proposed development and, as such, creates a framework for the selection of suitable SuDS components. Due to the absence of proposals for the Plan Area, it is not possible to undertake a modified flow route analysis at this stage. This should be carried out at outline / detailed design stage.

As discussed in Table 2.3, there may be potential for infiltration within the Plan Area. However, no site investigation / infiltration testing data is currently available. Assessment of modified flow routes at a future stage should consider the potential for infiltration as well as surface water runoff and discharge.

3.2 Drainage Hierarchy

The way runoff is dealt with within the Plan Area should adhere to the following drainage hierarchy (in order of decreasing preference):

i. Reuse – Where opportunities arise for rainfall harvesting within proposed development plans, these should be maximised.
ii. Infiltration – Subject to the outcome of site investigation / infiltration testing, infiltration should be used where the Plan Area is deemed suitable for infiltration.
iii. Watercourse – Where infiltration is not feasible, discharge to a watercourse or drain may be considered (e.g., to the River Liffey to the west / north-west of the Plan Area or one of the open channel drains within / adjacent to the Plan Area).
iv. Surface Water Sewer – No surface water sewer records have been made available to inform this assessment.
v. Combined Sewer – No combined sewer records have been made available to inform this assessment.

In line with the hierarchy presented above, the preferred discharge mechanism from the Plan Area will be infiltration into the ground, where the outcome of a site investigation / infiltration testing indicates sufficient permeability.

3.3 Water Quantity

Sufficient attenuation is to be provided to ensure future development is protected, no unpredictable flooding within the Plan Area, and no increase in flood risk elsewhere. Flows can be temporarily stored at collection points (i.e., source controls) along the conveyance route and at points of proposed storage.

Where infiltration is deemed suitable through site investigation / infiltration testing, sufficient storage shall be provided to accommodate up to the 1% AEP rainfall runoff with allowance for climate change. In this scenario, discharge from the Plan Area would only occur in the event of the design horizon being exceeded. Exceedance flow routes shall be considered as part of designs.

Where infiltration is deemed unsuitable through site investigation / infiltration testing, flows will be attenuated throughout the Plan Area with final flows attenuated to the rates prescribed in Table 3.1.

3.3.1 Controlled Flow Rates

The flow rates shown in Table 3.1 are in accordance with the requirements of the GDSDS and KCC guidance for restriction of post-development runoff to greenfield rates. They provide guidance on the extent to which flows should be controlled from any proposed development within the Plan Area if infiltration is deemed not feasible / not possible.

Greenfield rates were calculated using the Institute of Hydrology (IoH124) methodology with catchment-specific characteristics, including a winter rainfall acceptance potential (WRAP) class 2 and standard annual average rainfall (SAAR) depth of 786 mm.

Table 3.1: Attenuation Flow Rates

Return Period	Greenfield Attenuation Rate * (l/s/ha)	Controlled Attenuation Rate ** (l/s/ha)
Qbar (1 in 2.33 year)	1.49	2
3.33% AEP (1 in 30 year)	3.42	2
1% AEP (1 in 100 year)	4.23	2

* Long Term Storage provided (i.e., volume is controlled to greenfield volumes) – flows attenuated to respective greenfield rate
** Long Term Storage not provided (i.e., volume is not controlled to greenfield volumes) – all return periods attenuated to Qbar or 2 l/s/ha (whichever is greater)

3.3.2 Storage of Runoff and Discharge

Runoff should be attenuated within each subcatchment of the Plan Area (refer to Figure 3.2 for an example of how runoff from the Plan Area may be managed in subcatchments). SuDS components for collection, storage, and conveyance of flows should be selected based on their suitability for proposed development designs, with consideration given to relevant constraints.

A review of available soil data for the site suggests that infiltration may be an option for discharge of some or all of the runoff from the proposed development. However, as this will be confirmed at a later stage as part of detailed design, specification for an attenuation only system (that complies with KCC surface water drainage requirements) has also been considered and presented.

Where discharge is via infiltration, flows will be discharged to the ground at the respective infiltration locations. Attenuation features will control flow across a site / catchment from one component to another. It is noted that as well as being the preferred discharge option, infiltration would require overall lower storage volumes, as presented in the following sections.

3.3.2.1 Infiltration

In line with the drainage hierarchy outlined in Section 3.2, infiltration is the preferred method for disposal of surface water. Available data suggests relatively good permeability across the Plan Area so infiltration should be achievable. Infiltration volumes will be sized for the 1% AEP critical rainfall event with allowance for climate change.

Table 3.2 presents indicative storage volumes for infiltration features in Sallins. It is noted that these are based on an assumed infiltration rate and all features should be subject to detailed design based on site-specific infiltration test results.

Table 3.2: Indicative Infiltration Storage Volumes

Return Period	Indicative Infiltration Volume * (m^3 storage / m^2 development)
Qbar (1 in 2.33 year)	0.021
3.33% AEP (1 in 30 year)	0.035
1% AEP (1 in 100 year) + CC	0.053

* Infiltration rate based on typical infiltration coefficient of $1x10^{-5}$ m/s for well-drained soil (per Table 25.1 in the CIRIA SuDS Manual)

3.3.2.2 *Attenuation*

If infiltration if not feasible (e.g. due to impermeable soils, contaminated land etc.) attenuation storage will be sized for the 1% AEP critical rainfall event with allowance for climate change. The attenuation storage volumes shown in Table 3.3 are indicative only and assume no infiltration.

Table 3.3: Indicative Attenuation Storage Volumes

Return Period	Indicative Attenuation Volume * (m^3 storage / m^2 development)
Qbar (1 in 2.33 year)	0.024
3.33% AEP (1 in 30 year)	0.041
1% AEP (1 in 100 year) + CC	0.066

* All return periods attenuated to Greenfield runoff (i.e. Long Term Storage provided)

3.3.3 Designing for Exceedance

Overland flow routes should be managed in a safe manner using the drainage systems, roads, and public spaces to convey and control floodwater during exceedance events (i.e., events exceeding the 1% AEP design rainfall event). Plan Area levels and landscaping should be designed to route exceedance flows away from buildings. Exceedance outflows from the Plan Area should be designed to mimic the existing flow patterns and ensure that there is no increased risk to others outside the Plan Area.

3.3.4 Climate Change

The future impacts of climate change on rainfall should be accounted for in the design of a drainage scheme. Requirements for climate change allowances are set out in the OPW's 'Climate Change Sectoral Adaptation Plan' published in 2019, which recommends a 20% uplift in extreme rainfall depths for the Mid-Range Future Scenario (MRFS) and a 30% uplift for the High-End Future Scenario (HEFS).

In line with current Kildare CDP 2023-2029 guidance, the MRFS allowance is applied for climate change calculations carried out for this SWMS.

3.3.5 Urban Creep

Urban Creep is defined by Uisce Éireann as "the conversion of existing permeable areas within an agglomeration to impermeable surfaces".

The phenomenon of Urban Creep has long been identified as having the potential to have a significant impact on the drainage networks of urban agglomerations. Works such as building extensions, garden paving, conversion of lawns to hard standing for car parking or any such works that convert a permeable surface to an impermeable surface can all be considered to be Urban Creep.

As such, Urban Creep can increase the impermeable area of a development over time and should be accounted for as part of detailed design calculations per Uisce Éireann[1] and other available guidance.

[1] https://www.water.ie/sites/default/files/iwstandards/IW-TEC-800-14.pdf

3.4 Water Quality

3.4.1 Water Quality Requirements

Proposals for the Plan Area are likely to comprise commercial / industrial and / or residential development and therefore considered to be medium risk in relation to water quality. Treatment requirements are as follows:

- Roof only runoff – removal of solids.
- Roads used for vehicular movement – one to two stages of treatment dependant on SuDS component selected.

Design of individual SuDS components for water quality treatment should comply with the criteria set out in the CIRIA SuDS Manual (refer to the relevant chapter for each SuDS component).

Where site investigation / infiltration testing indicates that existing ground conditions have sufficient capacity for infiltration, groundwater risk screening should be undertaken to demonstrate manageable risk (as set out in Chapter 26, Tables 26.5 and 26.6 of the CIRIA SuDS Manual).

If infiltration is deemed suitable or if attenuation is proposed with a positive discharge point from the Plan Area, the 'Simple Index Approach' should be used to validate designs for water quality treatment (as set out in Section 26.7 of the CIRIA SuDS Manual). Application of treatment indices applied in the Simple Index Approach will depend on whether the proposed system is attenuation or infiltration (refer to Sections 26.3 and 26.4 of the CIRIA SuDS Manual, respectively).

Sufficient treatment is to be provided prior to flows being attenuated in any SuDS areas being promoted for amenity and biodiversity functions.

3.4.2 Construction Management

A Construction Management Plan will be required to outline how surface water runoff will be managed during construction and to ensure appropriate mitigation is in place to minimise risk of flooding and pollution during construction.

3.5 Amenity

Amenity focuses on the usefulness and aesthetic elements of SuDS design associated with features at or near the surface and considers both multi-functionality and visual quality.

The following are highlighted for consideration as part of the development of the SuDS design:

- SuDS should be 'legible' (i.e., understandable in terms of their operation to people using the area and to maintenance personnel).
- The visual character of any SuDS component will enhance the development.
- Spaces and connecting routes are multi-functional and can be used when not providing a SuDS function for surface water management.
- Designs should ensure proposed developments are generally accessible and 'safe by design'.
- Consideration should be given to information boarding to inform Plan Area users of the benefits of the SuDS scheme and also give guidance to the potential of temporary or permanent presence of surface water storage.

3.6 Biodiversity

Biodiversity must be considered in the design at a catchment scale to create sympathetic blue-green infrastructure and at local scale to provide habitat and connectivity linkages within and around the Plan Area. The following are highlighted for consideration as part of the development of any SuDS design:

- Ensure water quality within the water environment by following the steps of the simple index approach (as set out in Chapter 26, Box 26.2 of the CIRIA SuDS Manual).
- Demonstrate ecological design and the creation of habitats within the SuDS corridor.
- Keep water at or near the surface as it flows through the SuDS management train towards to wider landscape to ensure habitat connectivity.
- Confirm management practices to enhance habitat development during maintenance.

3.7 SuDS Components Audit

Table 3.4 presents a comprehensive audit of potential SuDS components deemed suitable based on the characteristics of the Plan Area. It is noted that this is not an exhaustive list, and further information relating to the Plan Area is likely to result in refinement.

Table 3.4: SuDS Component Audit

SuDS Component	Description	Suitable?	Rationale
Green / Blue Roofs	Green / blue roofs are areas of living vegetation installed on the top of buildings.	Yes	Proposed roofs have potential for green / blue roof solutions to reduce runoff, attenuate peak flows, and promote biodiversity. This would satisfy objectives of the Kildare CDP 2023-2029 (HO O50, IN O23), which require the use of green roofs, particularly on commercial buildings, as part of the overall surface water management strategy for each development, where appropriate. It is noted that the use of green roofs may be influenced by the required landscape character for the Plan Area.
Infiltration Systems	Infiltration systems allow surface water runoff to infiltrate and filter through to the sublayer layer before returning to the water table.	Yes	GSI data and the presence of open channel watercourses / drains indicate that the Plan Area may be suitable for infiltration. In line with the drainage hierarchy, infiltration should be prioritised over discharge to surface water bodies or sewers where possible, subject to site investigation / infiltration testing.
Filter Strips	A strip of vegetation being an impermeable surface and SuDS components.	Yes	There is potential to incorporate filter strips into development proposals to collect and treat surface water runoff.
Filter Drains	Filter drains, also known as French drains, are open trenches filled with stones.	Yes	There is potential to incorporate filter drains into development proposals to collect and treat surface water runoff.
Swales	Swales are shallow, flat-bottomed vegetated channels that collect, treat, convey, and store runoff.	Yes	Swales could be suitable to convey flows between different SuDS components and connect separate areas of green space.
Bioretention Systems & Rain Planters	Bioretention systems are shallow landscaped depressions containing engineered soils and vegetation, used to reduce runoff rates and volumes and to treat pollution. Rain planters are a type of raised bioretention system.	Yes	There is potential to incorporate bioretention systems and rain planters into development proposals to collect and attenuate roof and road runoff, treat surface water, and provide amenity and biodiversity benefits.

SuDS Component	Description	Suitable?	Rationale
Trees & Tree Pits	Trees and tree pits attenuate surface water runoff using the void space in each tree's root zone.	Yes	There is potential to incorporate trees and tree pits into development proposals.
Permeable Pavements	Permeable pavements allow rainwater to infiltrate through the surface into underlying structural layers where it is temporarily stored before infiltrating into the ground or being discharged downstream.	Yes	New roads and hardstanding areas will inevitably be provided as part of development proposals and, as such, there is scope to include permeable pavements. KCC currently take in charge permeable paving (IN O23). This requires consideration in terms of maintenance.
Rainwater Harvesting	Rainwater harvesting involves the collection and reuse of rainwater runoff from roofs.	Yes	Rainwater harvesting could be used to reduce surface water runoff and demand on potable water supplies. While it is unlikely to yield sufficient decreases in runoff rates to satisfy the requirements of the drainage strategy, it may be considered at the discretion of clients / developers. This would satisfy objectives of the Kildare CDP 2023-2029, which require the consideration of rainwater harvesting systems in new commercial developments.
Attenuation Tanks	Attenuation tanks are used to provide below-ground storage for before infiltrating into the ground or controlled release or use.	Possible	It is noted that removal of silt ingress from attenuation tanks is a significant maintenance risk due to the lack of direct accessibility associated with below-ground features. Below-ground storage tanks should therefore only be used as a last resort where it has been demonstrated that other green infrastructure / SuDS measures are not feasible. Kildare CDP 2023-2029 also states: *"in the event that underground attenuation storage structures are required, they will not be accepted under areas of public open space, save in exceptional demonstrable situations".* Preference should be given to above-ground attenuation SuDS components to maximise benefits for water quality, amenity, and biodiversity and to satisfy the objectives set out in the Kildare CDP 2023-2029. This SWMS has found no reason why above-ground SuDS components would not be feasible.

SuDS Component	Description	Suitable?	Rationale
Detention Basins	Detention basins are landscaped depressions that are normally dry except during and immediately after rainfall events.	Yes	There is potential to incorporate detention basins into development proposals to attenuate flows, reduce runoff rates, and improve water quality prior to discharge. They can be multi-functional, doubling as open amenity space. This would satisfy objectives of the Kildare CDP 2023-2029, which encourage the incorporation of SuDS into all parts of a development.
Ponds & Wetlands	Ponds and wetlands are features with a permanent pool of water that provide attenuation and treatment of surface water runoff.	Yes	There is potential to incorporate ponds and wetlands into development proposals in line with Kildare CDP 2023-2029 objectives. Ponds with a permanent water level would provide amenity and biodiversity benefits within areas of open green space and can be designed to also provide a surface water storage and treatment benefit.

4 SUMMARY AND RECOMMENDATIONS

4.1 Summary

This SWMS outlines the approach and criteria that should be followed when developing a SuDS design as part of any future development proposals for the Plan Area. The report includes design considerations to ensure quantity, quality, amenity, and biodiversity benefits. It also highlights existing flow routes and subcatchments within the Plan Area.

The SuDS approach outlined in this document should be developed through outline and detailed design in parallel with development and finalisation of future proposed development layouts.

4.2 SuDS Concept Masterplan

A SuDS concept masterplan indicating the preferred approach for integrating multi-functional SuDS components within the Plan Area in line with the above principles / criteria is included in Appendix A. It is noted that attenuation features are used where controlled discharge to an open waterbody is feasible (and where infiltration potential likely to be reduced) while all other locations are proposed to be infiltrating SuDS components.

While any development proposal(s) for the Plan Area should carefully consider the findings and recommendations of this SWMS when developing outline and detailed drainage layouts, the SuDS concept masterplan is not fixed, and there is flexibility in terms of how the final layout is defined.

4.3 Recommendations

In addition to the general design criteria outlined in this SWMS, the following recommendations are made for future SuDS strategies / plans for the Plan Area.

- The Plan Area has been identified as having potential for infiltration, subject to site investigation / infiltration testing. Where infiltration is not feasible, provision of attenuation storage with positive discharge outlet will be required.
- KCC will be required to be satisfied through demonstration (i.e., site investigation and risk screening / assessment) that there is sufficient capacity within the Plan Area geology to infiltrate and that the risk to receiving groundwater can be suitably managed.
- Future proposed development layouts shall consider the existing flow route analysis and be undertaken in conjunction with SuDS designs to facilitate consideration of modified flow routes.
- SuDS strategies / plans shall provide a management train through definition of subcatchments to maximise treatment and storage capacity.
- Application of greenfield runoff rate, dependent on adequate provision of long-term storage / losses is to be agreed with KCC.
- Developed SuDS designs shall demonstrate that there is no increased flood risk to others, including residual risk from exceedance flow paths.
- Ownership and maintenance obligations for surface water drainage features shall be established and provision made by the relevant party for preventative inspection and maintenance.
- A Construction Management Plan will be required to ensure appropriate mitigation is in place to minimise risk of flooding and pollution during construction.

Appendix A

SuDS Concept Masterplan

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OVERVIEW

LEGEND

- WATERCOURSE
- CANAL
- OPEN DRAINAGE
- EXISTING SURFACE WATER MANAGEMENT FEATURE (E.G. BASIN, POND / WETLAND)
- PROPOSED SuDS FEATURE (E.G. INFILTRATION OR ATTENUATION BASIN)*

*INDICATIVE LOCATION ONLY

PROJECT LOCATION
SALLINS, CO. KILDARE

DRAWING TITLE
SURFACE WATER MANAGEMENT STRATEGY

DRAWN BY	CHECKED BY	REVISION
DH	PS	4

FIGURE NO.	DATE
M02215-10_SWMS_01	22/04/2026

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OVERVIEW

LEGEND

- WATERCOURSE
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PROJECT LOCATION		
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DRAWING TITLE		
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