An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Nature Based Management of Urban Rainwater and Urban Surface Water Discharges

A National Strategy

2024

Prepared by the Department of
Housing, Local Government and Heritage
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This strategy has been prepared by the Department of Housing, Local Government and Heritage (Water Division) as a non-statutory road map of potential actions which may assist in the implementation of nature-based solutions to surface water management in settlements. A working group was established to oversee the development of the project to deliver an implementation strategy for nature based Solutions on a national scale. This working group will continue to oversee and review this strategy.

Assistance and input has been received from the organisations listed below:

Department of Housing Local Government and Heritage (DHLGH) – Water and Planning Divisions

Local Authorities Waters Programme (LAWPRO)

Office of Public Works (OPW)

Uisce Éireann (UE)

Department of Transport (DOT)

Department of Environment, Climate and Communications (DECC)

National Transport Authority (NTA)

Environmental Protection Agency (EPA)

Health Services Executive (HSE)

Transport infrastructure Ireland (TII)

Cork County Council

Tipperary County Council

Kildare County Council

Executive Summary

The National Planning Framework 2018 strategy promotes urban led compact growth, focused on existing cities and towns, as an alternative to urban sprawl. This is in line with international trends towards increased urbanization. According to the latest census in Ireland (2022, CSO) 70% of the population lives in urban areas.

Ireland is also experiencing climate change which has already resulted in significant changes in weather patterns since the middle of the 20th century.

These existing climate impacts will continue well into the future despite continuing efforts to reduce further climate change (climate change mitigation)

Recent research, based on an analysis of European flooding records from 1960 to 2010, suggests that increasing autumn and winter rainfall has already resulted in increasing floods in north-western Europe, including Ireland.

In urban areas, a large proportion of the surface area is made up of hard surfaces that is impermeable. This means that all the rainwater falling on that area will remain on the surface and must be managed by an urban drainage or rainwater management system.

As rainfall intensity increases, the capacity of urban drainage systems is exceeded, resulting in surface flooding.

Urban rainfall results in pollution of watercourses and the environment through two mechanisms:

- Rainwater falling on many urban surfaces such as roads, streets and roofs will become contaminated by a wide range of pollutants before entering the drainage system and being discharged into receiving waters.
- In many older urban areas, the drainage system is combined where rainwater runoff is mixed with sewage and wastewater. As rainfall increases beyond the sewer capacity, these systems overflow into local waterbodies, with resultant pollution.

The issue of pollution from urban runoff is being addressed in the third cycle of the River Basin Management Plan and this strategy forms one of the actions within that plan.

It is neither practical nor sustainable to replace our urban drainage networks with larger pipes. It is also not possible to stop rainwater falling onto urban areas, with increasing intensities likely.

If the above risks of flooding and pollution arising from urban rainfall are to be mitigated, the only viable and sustainable solution is to reduce the negative impacts of urban impermeability through redesigning and softening our urban landscapes. The proposed approach is to integrate planted areas into urban areas as “nature-based rainwater management solutions” are specifically designed to store and treat rainwater runoff prior to discharging it back into the urban drainage system.

This strategy sets out how to implement this approach to urban design and move away from the current approach, with its focus on hard surfaces.

It is recognized that, in order to do this, many different agencies and departments at national and local level must work together.

It is also recognized that it is better if a “whole of settlement” approach is taken to the management of rainwater and how best to adapt the urban area as a whole to manage rainwater using nature-based methods.

These nature-based solutions (NbS) are designed primarily to take in rainwater runoff, store the rainwater or “slow the flow” and, in doing so, remove many of the pollutants before allowing the treated runoff back into the drainage system. While this is their primary role, they are also planted and landscaped appropriately and contribute towards a more pleasant urban environment which can be used to prioritise pedestrians, cyclists and other active and sustainable travel modes.

In recognition of these multiple benefits, this strategy has been divided into a number of areas of activity and policy each of which can, through taking specified measures, promote and support the proposed approach.

These include proposed actions in Planning for nature-based solutions, Climate Adaptation, Water Services, Roads & Transportation, and Funding.

The strategy also proposes measures to highlight and deliver on the multiple benefits of the proposed approach to nature-based management of urban rainwater in areas such as public health and wellbeing as well as climate adaptation and the environment.

These include proposed actions under education and training as well as community engagement and public health promotion.

It is intended that this strategy will encourage and inform a softer, greener, more climate adaptive and less polluting approach to urban growth and, thus, promoting more attractive places for living, working and leisure.

Chapter 1 Vision and Overview

1.1 Urban Sustainability

The United Nations Sustainable Development Goals were set out in 2015 and include SDG No. 11 which is to “make cities and human settlements inclusive, safe, resilient and sustainable”.

There are a number of sub-headings to this goal including:

- Affordable and sustainable transport systems
- Inclusive and sustainable urbanization.
- Reduce the adverse effects of natural disasters.
- Provide access to safe and inclusive green and public spaces.

As stated on the UNSDG website, *“The world’s population is constantly increasing. To accommodate everyone, we need to build modern, sustainable cities. For all of us to survive and prosper, we need new, intelligent urban planning that creates safe, affordable, and resilient cities with green and culturally inspiring living conditions.”*

This national strategy seeks to promote a new approach to urban design and place making that can, through the appropriate use of nature-based methods and the appropriate design and use of urban space, achieve many of the ambitions set out in SDG 11.

While the focus of this strategy is on the nature-based management of urban rainwater, the strategy will also demonstrate the many synergies between this approach and a wide range of urban policies, including planning, climate adaptation, sustainable transport, as well as public health and wellbeing.

1.2 Rainfall

Rainfall is a naturally occurring phenomenon. In Ireland, we are accustomed to regular rainfall events across the entire year.

It is accepted that, arising from ongoing climate change, the pattern of rainfall is changing in Ireland, with increased frequency of more intensive rainfall events, the type of rainfall that was previously associated with warmer areas of southern Europe.

The overall amount of rainfall is also predicted to rise, particularly in Autumn and Winter.

Rainfall is necessary for life, and, in most cases, rainfall is absorbed into the soil, with further runoff ending up in local rivers and streams.

The capacity of soils to absorb and store rainfall varies, depending on soil types, underlying geology and the contours of the area.

Soil absorption not only slows the flow of rainwater into the rivers and streams, but also serves to reduce any sediments or pollutants within the surface runoff before it enters the various waterbodies.

However, if that capacity for absorption is reduced or eliminated through urban development, for example, then the rainwater will flow directly into the local rivers and streams.

1.3 Urbanisation and Rainwater

As described earlier, soil is the earth's living skin and provides us with essential services for life in our planet: production of food; infiltration and cleansing of water and protection against flooding; habitats for flora and fauna; areas for recreation and wellbeing and the regulation of local climactic conditions.

"It is such a crucial resource that it can't be ignored. However, particularly in urban areas, soil is being sealed off through urban expansion, housing, and infrastructure". [EU Environment Agency – Urban Soil Sealing in Europe]

Areas of soil sealing are growing across all urban areas. This is caused, not only by urban expansion, but also by the sealing of existing natural soil surfaces such as urban verges and gardens, the construction of house extensions, patios, conservatories, the use of artificial lawns etc.

The extent of urbanization is driven by a general move of populations from rural areas into urban areas. Compact and sustainable urban growth with higher population densities is promoted in the 2018 National Development Plan.

According to the latest census in Ireland (2022, CSO) 70% of the population lives in urban areas.

As areas of soil are sealed over, they become impermeable. This means that all of the rainwater falling on that area will remain on the surface and must be managed through the installation of an urban drainage system. This applies to all urban areas, regardless of scale

1.4 Urban Drainage

Traditionally, urban areas have been designed so that rainwater is directed from buildings and impermeable surfaces into collections points (gullies) and from there into an underground network of pipes, ultimately discharging into local rivers and streams.

In many older urban areas (19th. and early 20th. century) these drainage networks evolved to cater for both urban rainwater runoff and sewage / wastewater. These latter systems are referred to as “combined sewers”. During heavy rainfall, high levels of rainfall in a short period of time would often overwhelm the system and it was the usual practice to reduce flood risk by relieving the system of some of the excess flow at selected points by providing Storm Water Overflows (SWOs). In most cases, SWOs take the form of a device or structure that allows the discharge of excess flow to the nearest suitable waterbody.

The expansion of urban areas has long been identified as having the potential to have a significant impact on all drainage systems, whether separate or combined. The cumulative impact of works such as building extensions, garden paving, and conversion of lawns to hard standing for car parking or any such works that convert a permeable surface to an impermeable surface can all have significant impact. The

cumulative impacts of all this additional hard standing area contributing surface water runoff to sewer networks can be very significant.

All urban drainage networks have, by definition, a limited capacity to deal with runoff volumes. When the volume of rainwater runoff in a given area exceeds the capacity of the drainage system, the result is some form of flooding.

In many cases this can be minor (such as on street ponding) but, as rainfall intensity increases the volume of water that remains on the surface increases with a resultant increase in flooding. This, in turn, leads to rainwater flowing over the urban surface, with flow direction determined by the urban contours, with an increasing risk of significant flooding across the urban landscape.

Flooding arising from excess flows in combined sewers will have the added impact of being contaminated with sewage and wastewater.

However, even where urban rainwater runoff is drained separately it will collect a wide range of pollutants and toxins that accumulate on urban surfaces that accumulate on urban surfaces, including animal faeces, microplastics, complex hydrocarbons and heavy metals and deliver these pollutants to the receiving waters.

The polluting impact of urban runoff has been increasingly recognized as one of the top five significant sources of pollution on waterbodies in Ireland.

The issue of pollution from urban runoff is being addressed in the third cycle of the River Basin Management Plan and this strategy forms one of the actions within that plan.

1.5 Nature Based Urban Rainwater Management

There are two established trends that, taken together, mean that the traditional approach to urban design is not sustainable.

These are.

- the continuing growth in urban population
- the changes in climate that have already happened and will continue to take place, with predicted increases in rainfall intensity and longer periods of summer drought with high temperatures.

In terms of urban rainwater management, the recommended approach is to seek to replicate the capacity of greenfield areas to absorb, store and treat rainwater, insofar as possible.

This is not a new concept but one that has been adopted across the world. It is an approach whereby urban areas that would, traditionally, have been dominated by paved areas incorporate specially designed landscaped areas into which urban rainwater runoff is directed.

Various terms are used to describe this approach, including water sensitive urban design, “sponge city”, nature based sustainable urban drainage, or urban nature-based solutions.

These landscaped areas are primarily designed to take in, store and treat urban runoff and to then discharge the treated runoff at a slower rate back into the existing urban drainage network.

While the design will allow excess flows to bypass the landscaped areas and flow directly into the existing drainage network, the landscaped areas will have removed most of the pollutants which are contained within the “first flush” of runoff from the paved landscape.

Reducing the percentage of impermeable surfacing and increasing the area of urban landscaping result in multiple benefits in addition to the reduction in rainfall induced flood risk and runoff pollution. These benefits include reduced “heat island” effect and urban noise, a more pleasant urban environment that supports active and sustainable transport modes and increased biodiversity.

Ideally the integration of nature-based rainwater management will form part of an overall approach to urban development across the settlement.

The purpose of this National Strategy is to demonstrate how this nature-based approach to urban rainwater management and urban design can be implemented across new and existing urban areas, whether in large cities, suburbs, or towns.

1.6 A Strategy to deliver.

One dictionary definition of “strategy” is “a plan of action designed to achieve a long-term or overall aim.”

This strategy is a roadmap setting out how to mainstream nature based urban rainwater management into all relevant policies and practices.

The strategy is divided into a series of objectives with a chapter devoted to each objective.

Each objective will have the following structure:

- Introduction
- The Current Situation
- Key Challenges
- Objectives and Strategies
- Indicators and Targets (Table)

In the latter table, clearly stated and measurable actions will be set out to be taken in the short (to end 2027), medium (to end 2035) and long (to end 2045) terms and performance will be monitored against these targets.

Chapter 2 Legal and Regulatory Context

2.1 Environmental

2.1.1 Water Framework Directive

The European Union's Water Framework Directive (WFD) requires Member States to use their River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs) to protect and, where necessary, restore water bodies in order to reach good status, and to prevent deterioration. Good status means both good chemical and good ecological status.

Ireland is currently drafting its third cycle RBMP. This draft plan has identified urban runoff as a significant risk and, in section 5 of the draft plan, it is stated that "Urban runoff pressures on water quality are primarily made up of direct surface water discharges to water and storm water overflows from combined sewers. Separated sewers discharging rainwater may also be an important pathway for pollutants, such as metals and plastics. Urban run-off, which is a mixture of sewer leakage, run off from paved and un-paved areas and misconnections are a significant contributory factor to the pressures on our water quality."

The draft RBMP goes on to acknowledge the need to move towards a more nature-based approach and states that "A working group was established jointly by the

CCMA and DHLGH to oversee the development of a project scope to deliver an implementation strategy for nature based Sustainable Urban Drainage Systems on a national scale. This strategy will support the City and County Development plans in the implementation of nature-based solutions to surface water management through water sensitive urban designs."

2.1.2 Urban Wastewater Treatment Directive

The European Union's Urban Wastewater Treatment Directive (UWWTD) aims to protect human health and the environment from the effects of untreated urban wastewater. It therefore requires EU countries to ensure that towns, cities, and settlements properly collect and treat wastewater.

This directive was adopted in 1991. In 2022, the EU Commission issued proposals to revise and update the UWWTD. Among other measures, the proposals seek to remove remaining urban pollution sources, not adequately covered in the original UWWTD.

One such identified source of pollution is urban rainwater runoff. "To reduce pollution due to rain waters, member states will be required to establish and implement integrated water management plans in all large agglomerations and in those above 10,000 population equivalent where there is a risk for the environment. Priority will be given to preventive measures including green infrastructures." (Explanatory Memorandum Proposal for a directive of the European Parliament and of the Council concerning urban wastewater treatment (recast) 2022/0345 (COD))

2.2. Flood Risk Management

Much of Ireland's current flood management policy arises from the 2004 Report of the Flood Policy Review Group (OPW).

The Flood Risk Management Planning Guidelines for Planning Guidelines issued by DHLGH in 2009 under section 28 of the Planning and Development Act 2000 (as amended) arose from and were based on that report. As noted in section 1.9 of the 2009 Guidelines "These Guidelines have been developed as a direct response to the (2004) report".

The scope of the 2004 flood policy review report was based on a definition of flooding set out in section 1.1.1 of that document as follows:

“It must be emphasised here that flooding in this context means unusual or severe fluvial or tidal flooding.

It does not include flooding arising from storm water and surface water runoff, nor from roads, which are the responsibility of local authorities and/or the National Roads Authority (NRA) under the aegis of the Department of the Environment, Heritage, and Local Government.”

Subsequent policies in this area, including the 2009 Planning Guidelines following the approval of the 2004 Review, have largely followed this scope definition.

Notwithstanding the exclusion of urban rainfall (pluvial) flood risk from the scope of the 2004 Review Report, the following is included under section 3.5 “Summary”.

- Efforts for avoiding flood problems should be focused on urban areas (where the major concentration of population and goods are located).

The OPW Planning Guidelines were a recognition of the importance of planning and development policy in managing flood risk.

Section 1.6 sets out the Core Objectives of the Guidelines as follows:

- Avoid inappropriate development in areas at risk of flooding.
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off.
- Ensure effective management of residual risks for development permitted in floodplains.
- Avoid unnecessary restriction of national, regional or local economic and social growth.
- Improve the understanding of flood risk among relevant stakeholders.
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

Section 2.2 set out two main flood types, coastal and inland.

The Guidelines recognise that “inland flooding” can arise from “overland flow (which) occurs when the amount of rainfall exceeds the infiltration capacity of the ground to

absorb it". As noted earlier, in urban areas, the effect of soil sealing is to eliminate or greatly reduce the capacity of the ground to absorb rainwater.

The Guidelines also note, in the same section, that "Flooding from artificial drainage systems results when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity and the system becomes blocked, and / or cannot discharge due to a high water level in the receiving watercourse. This mostly occurs as a rapid response to intense rainfall. Together with overland flow, it is often known as pluvial flooding."

The section goes on to note that "Flooding arising from a lack of capacity in the urban drainage network has become an important source of flood risk, as evidenced during recent summers."

The previously stated "Core Objectives" focus on reducing flood risk through linking spatial planning and development. These objectives are based on the concept of flood risk mapping and making decisions on land use based on these risk maps. However, pluvial or rainfall induced flood risk is not amenable to this approach as rain can and does fall anywhere with highly variable intensities and durations.

As a result, the 2009 Guidelines does not provide any specific guidance on how to manage the specific risks arising from pluvial flood risk in general and urban pluvial flood risk in particular.

In this strategy for the implementation of nature based urban rainwater management, it is maintained that urban rainwater induced flooding (pluvial flooding) is not caused primarily by a lack of capacity in the urban drainage network. The continued sealing of almost all urban surfaces, lack of capacity in the urban drainage network, together with changed rainfall patterns as a result of climate change has together increased the risk of urban rainwater induced flooding.

No piped drainage network can have sufficient capacity to deal with the ever-increasing volumes of overland rainwater flows caused by these combined factors.

2.3 Climate Adaptation

It is important to note that the global climate has already changed as a result of human activity. These changes in climate have accelerated since the middle of the 20th century.

These existing climate impacts will continue well into the future despite continuing efforts to reduce further climate change (climate change mitigation)

Recent research, based on an analysis of European flooding records from 1960 to 2010, suggests that increasing autumn and winter rainfall has already resulted in increasing floods in north-western Europe, including Ireland [Günter Blöschl et al. Nature Vol. 573 September 2019]

The European Union has established a platform called “EU ClimateAdapt” and it is noted within that platform that “all cities are likely to be affected and climate change will impact many aspects of urban living, quality of life and the provision of essential services such as transport, water, energy, health care etc.

Poor urban design can aggravate the impacts of climate change. For example, soil sealing, a prevalence of built areas and lack of green space leads to higher urban temperatures and thermal discomfort (the so-called 'urban heat island effect'); the impermeability of the sealed areas reduces natural drainage which, particularly during heavy rains, can lead to urban floods. Urban design aimed at tackling climate change, for example, through boosting green infrastructure, could have numerous co-benefits even beyond the increased resilience of a city including improved air quality, better health, support for biodiversity and enhanced quality of life.”

In Ireland the Government published the National Adaptation Framework (NAF) in 2018 and a revised draft NAF has completed the public consultation phase on 19th. February 2024.

In the Overview at the start of the 2018 NAF, it is stated that “climate adaptation is the approach for addressing the current and future risks posed by a changing climate. The aim of adaptation is to reduce the vulnerability of our environment, society and economy and increase resilience. Adaptation also brings opportunity through green growth, innovation, jobs, and ecosystem enhancement as well as improvements in areas such as water and air quality.”

2.4 Spatial Planning and Land Use

Spatial planning and land use policy in Ireland is set out in the National Planning Framework 2018 (NPF), the Regional Spatial and Economic Strategies for the

regions and the County or City Development Plans adopted by individual planning authorities.

The NPF includes National Policy Objective 57 which is to “Enhance water quality and resource management by:

- Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities.
- Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.
- Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places.

National Policy Objective 58 is that “Integrated planning for Green Infrastructure and ecosystem services will be incorporated into the preparation of statutory land use plans”.

The Office of the Planning Regulator (OPR) has an oversight role in relation to the legal and regulatory planning framework.

There is provision for nature-based solutions in the forthcoming Planning & Development Act 2024.

This strategy, which is an action identified in the third cycle of the River Basin Management Plan, is also supported by the forthcoming Water and Planning Guidance which will be subject to public consultation.

2.5 Roads and Transportation

The area of Roads and Transportation in Ireland comes under the remit of the Department of Transport and national agencies such as the National Transport Agency (NTA) and Transport Infrastructure Ireland (TII).

Local Authorities, acting as Roads Authorities, implement plans and projects in conjunction with these national agencies as well as having a key function in maintaining the roads and streets.

One of the main design manuals related to urban areas is the Design Manual for Urban Roads and Streets (DMURS) published jointly by the Department of Transport and the Department of Housing, Local Government and Heritage. The use of DMURS is mandatory for all roads authorities and applies to all roads and streets in urban areas (Circular RW 6/2013 and PL 17/2013).

In section 4.2.7 of DMURS the issue of surface water is addressed as follows:

> "Streets also support an important drainage function within built-up areas. The shift toward sustainable forms of development has seen the emergence of Sustainable Urban Drainage (SUDs) systems. SUDs consist of a range of measures that emulate a natural drainage process to reduce the concentration of pollutants and reduce the rate and volume of urban run-off into natural water systems (and thus the pollutants it carries). The incorporation of SUDs elements into the fabric of the street itself can also serve to increase legibility and add value to place."

In section 4 of the 2014 TII document "Drainage Design for National Road Schemes -Sustainable Drainage Options", sustainable drainage solutions are defined as follows "Sustainable drainage is a broad term that is centred on clear objectives related to both volumetric and quality control on storm runoff and the promotion of habitat diversity".

The benefits are set out which include the following:

- Reduce runoff rate and reduce risk of flooding.
- Reduce pollutant concentration in discharge.

Chapter 3 Review of Progress and Remaining Challenges

The Local Authority Waters Programme (LAWPRO), a shared service that advises and assists Local Authorities and other stakeholders on matters relating to the E.U. Water Framework Directive, had received feedback on the issue of urban runoff and the need for a more nature-based approach since the previous RBMP 2018 to 2021 and arranged a Webinar in 2020 in conjunction with the Irish Planning Institute, Engineers Ireland and the DHLGH Water Section.

As noted in section 2.1.1, the draft third cycle RBMP, in acknowledging the need to move towards a more nature-based approach to urban rainwater management, states that “A working group was established jointly by the CCMA and DHLGH to oversee the development of a project scope to deliver an implementation strategy for nature based Sustainable Urban Drainage Systems on a national scale. This strategy will support the City and County Development plans in the implementation of nature-based solutions to surface water management through water sensitive urban designs.”

This work commenced in 2021 with a scoping exercise that included consultation with a wide range of stakeholders, including all Local Authorities, relevant state agencies and professional bodies.

The output was a Scoping Report, published at the end of 2021, which included a roadmap setting out the necessary steps to develop a national implementation strategy.

During the consultation process, it became apparent that there was a need for some form of practical guidance as to how nature-based solutions to urban rainwater management could be implemented.

As a result, an Interim Guidance document was published at the end of 2021.

During the scoping study, it was also recognised that, in order to integrate a new, nature-based approach to urban rainwater management into an overall design approach, it would be necessary to incorporate such an approach into relevant transportation design manuals.

Work got underway in 2022 on the preparation of a new Advice Note to form part of the Design Manual for Urban Roads and Streets (DMURS). The new Advice Note No. 5 was adopted and published jointly in June 2023 by the Department of Transport and the Department of Housing, Local Government and Heritage.

This was followed by the publication in September 2023 by the National Transport Authority of an Advice Note “Greening and Nature-based SuDS for Active Travel Schemes”.

During the period from 2021 and following the publication of the Scoping Report and the Interim Guidance document, progress has been made in implementing nature-based rainwater management solutions in urban areas. The purpose of this national implementation strategy is to build momentum and encourage further measures that can lead to a significant improvement in the implementation of NBS.

The following chapters of this national implementation strategy identify a number of aims with clear steps that could be taken in order to deliver widespread implementation of a new nature-based approach to rainwater management that is fully integrated into all future urban planning, designs and capital projects.

Chapter 4 Proposed Strategy on Planning for Nature based Solutions

Encourage greater integration of nature - based rainwater management into urban spatial planning policies and decisions, urban settlement strategies, policies in relation to open spaces and other relevant urban strategies.

4.1 Introduction

Land use and spatial planning plays an important role in the management of rainwater in urban areas, from the plan making stage through to development management. Many local authorities have incorporated green (and blue) infrastructure strategies into their statutory plans that promote NBS at a city/county and/or local level. At detailed design stage NBS is delivered through surface-based features such as rain gardens, planted areas, urban trees, swales, and various retention, storage and treatment areas. Green roofs and green walls may also be incorporated into buildings and other structures.

Unlike the previous practice of dealing with urban rainwater runoff using underground drainage systems, the proposed approach impacts on the nature and form of urban surfaces including roads, streets, public realm, car parking, open spaces, recreation areas, riverside areas, public parks etc.

This means that those responsible for land use and spatial planning in the urban areas will also be centrally involved in the delivery of nature based urban rainwater management solutions.

4.2 The current situation

In 2005, the four Dublin Local Authorities published the Greater Dublin Strategic Drainage Study (GDSDS).

The Greater Dublin Strategic Drainage Study, Volume 2, Technical Document on New Development, introduced recommendations that new developments use Sustainable Urban Drainage Systems or SuDS.

The subsequent Greater Dublin Regional Code of Practice for Drainage Works recommends that all new developments “incorporate Sustainable Drainage Systems (SuDS). Rainwater should be infiltrated to the ground and/or discharged via a SuDS system to a surface water drain or watercourse”.

Following the publication of the GDSDS by the four Dublin Local Authorities, most other Local Authorities adopted these SuDS policies and included the requirement that new developments use SuDS in the written statements forming part of their City and County Development Plans.

4.3 Key Challenges

Since the publication of the GDSDS, the proposed adoption of a nature based sustainable approach to urban drainage has, in general, not been followed.

Section 4.2 of the GDSDS states “Sustainable Drainage Systems (SuDS) thus involve a shift in our way of managing run-off from solely looking at volume control, to an integrated approach which considers land use planning, water quality, water quantity, amenity and habitat enhancements.”

Furthermore, the situation in terms of water quality damage and flood risk arising directly from urban rainwater has continued to deteriorate with increased urbanisation, increased traffic volumes and ongoing climate change.

The challenges are, put simply, to reverse these trends and ensure greater implementation of urban nature-based rainwater management.

The Local Authorities Water Programme Office (LAWPRO) has hosted a series of online webinars from 2019 through to 2022 in relation to this matter and, as part of that exercise, has carried out surveys of a wide range of practitioners as to the reasons, as they see it, for the ongoing difficulties being encountered in the implementation of a nature based sustainable approach to urban rainwater management. Areas identified in the surveys that require further support included policy, legislation, leadership, governance, technical guidance, training, local authority capacity and a dedicated funding source

These surveys, together with a wider stakeholder engagement carried out during the scoping exercise, has informed the proposed steps set out under this and other objectives of this implementation strategy.

4.4 Objectives and Strategies

In the context of urban rainwater management, it has been recognised internationally that the optimal approach is to manage the rainwater in an integrated manner over the entire urban area, rather than seek to address the issue at individual site or street level.

The Objectives and Strategies of this strategy are that,

- to the greatest extent possible, rainwater falling on urban areas (existing and proposed) will be managed as close to the location where it fell by diverting runoff into appropriate nature-based features where it can be stored and treated, prior to discharge back into the existing urban drainage system or receiving waters and
- that excess flows will be managed to reduce flood risk and the risk of pollution through identification of overland flow routes and the directing of flows into suitable surface and nature-based storage or retention areas, prior to allowing

these flows back into the existing urban drainage system or the receiving waters.

- The design of nature-based rainwater management features will also seek to maximise the ancillary benefits of this approach in areas such as biodiversity, placemaking, health and wellbeing.

The strategy to achieve these objectives can be divided into two main action areas as follows:

4.4.1 Rainwater Management Plans (RMPs)

It has been recognized that, in order to introduce new and more nature-based methods of managing rainwater in an urban area, it is preferable to have an overall picture of how rainwater will behave in the particular context of that urban area.

This has led to the development of the concept of “whole of settlement” rainwater management plans or surface water management plans, based on available data.

Many of the better-known examples internationally relate to large cities such as Copenhagen (Cloudburst Management Plan) or Vancouver (Rain City Strategy and Surface Water Management Plan). However, the principles can be applied to a wide range of urban sizes and types.

It is acknowledged that, in many cases, detailed topographical data may not be available for a particular urban area and the technical knowledge, and resources may be limited.

It is also important to note that RMPs primarily consider how to manage rainwater on the surface of the urban area and do not need to include detailed models of existing drainage networks.

Having a basic rainwater management plan for an urban area, based on the best available data and available technical resources, is preferable to waiting for a more developed plan that is dependent on further, more detailed data and analysis.

The key message of rainwater is that a local authority should incorporate nature based urban rainwater management solutions as part of the overall approach to rainwater management planning.

The preparation of RMPs for urban areas will assist local authorities and inform broader land use and special planning policy. In order to facilitate this, a Rainwater Management plan Guidance document for |Local authorities has been developed.

The guidance document can be used for a wide range of purposes, from public education and consultation to the preparation of a brief or request for tender when procuring consultants.

4.4.3 Relevant Recent Planning Policy

The National Policy Objectives of the NPF are further elaborated on in recent Development Plan Guidelines for Planning Authorities (2022). Section 8.1.8 of the Guidelines Flooding and Water Management in Mitigating and Adapting to Climate Change Guidelines refers to the Best Practice Interim Guidance Document 'Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas' which the promotes a more systemic and plan-led approach to water sensitive urban design that combines nature-based solutions with spatial planning.

The Sustainable Residential Development and Compact Settlement Guidelines were adopted in 2024 and include the following:

“Development plans should include (or be informed by) a Green and Blue Infrastructure Strategy and include objectives for the conservation, restoration and enhancement of natural assets and GBI networks.

> The following key principles should be applied in the preparation of local plans and in the preparation and consideration of individual planning applications,
>
> > (c)Promote urban greening and Nature-based Solutions (including Sustainable Drainage Systems and slow-the-flow initiatives) for the management of urban surface waters in all new developments and retrofitting in existing areas to ensure that the benefits of ecosystem services are realised. Planning authorities should adopt a nature-based approach to urban drainage that uses soft-engineering techniques and native vegetation (including the protection of the riparian zone) to minimise the impact on natural river processes. “

The SRDCSGs also recommend that Surface Water Management Plans be prepared (including Nature-based Solutions to drainage) for 30 or more residential units, 3000sq.m of mixed-use development and/or where public realm improvements are proposed (i.e. via Part 8). It is also noted a Surface Water Management Plan

should be developed in combination with the Landscape Report/Masterplan to include Nature-based Solutions to drainage.

4.5 Indicators and Targets

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
RMP Template	Template in Place	Draft in place	Template Completed	Template Updated	Template Updated
Planning Guidelines and Guidance	Planning Guidelines and guidance to outline requirements and best practice outcomes for NBS in urban areas, where relevant.	Sustainable Residential Development and Compact Settlement Guidelines (SRDCSG)	Design manual (to supplement SRDCSG to provide best practice examples of NBS	Guidelines and Guidance reviewed and updated as appropriate	Guidelines and Guidance reviewed and updated as appropriate
Data for RMPs	Summary of Required data included in RMP	Not in place	Guidance issued re data requirement and how to use “best available data”	Updated Guidance and expanded data sets relevant to RMP preparation.	Updated Guidance and expanded data sets relevant to RMP preparation.
Examples of Best Practice	Details of completed urban RMPs in Ireland, lessons learned etc.	Not available	Initial Information collated from LAs where RMPs are in place.	Expanded details of completed RMPs, best practice, etc.	Expanded details of completed RMPs, best practice, etc.
RMPs in Place	Number of urban areas with completed RMPs	Limited number	Every LA to have one example of a completed urban RMP	RMPs to be in place or underway for most urban areas	RMPs to be in place or underway for all urban areas.

Chapter 5 Proposed Strategy on Climate Adaptation

To coordinate with the Department of Environment, Climate and Communications and other key climate adaptation stakeholders to ensure that the role of nature based urban rainwater management is identified and promoted as a key element of building and maintaining urban climate resilience and adaptation.

5.1 Introduction

The IPCC (2012) concluded that:

- It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy rainfalls will increase in the 21st century over many areas of the globe.

The (draft) 2024 National Adaptation Framework prepared by the Department of Environment, Climate and Communications (DECC) recognises that “urbanisation and increasing population are also likely to pose further challenges to adaptation. Failing to consider climate risks and adaptation is likely to enhance existing vulnerabilities and could potentially give rise to new ones.

This is why adaptation is important now to build a climate resilient Ireland.”

A 2020 Environmental Protection Agency (EPA) report stated that:

“Globally, climate change will have wide-ranging effects on all aspects of society, the environment, and the economy.

This is particularly the case for urban areas, which represent only a small fraction of the Earth's surface (less than 3%) but are where more than half of the global population resides and concentrations of assets and economic activities are found.

While urban areas will generally experience the same exposure to climate change as their surrounding regions, climate change poses particular risks for urban areas.

This is as a result of the process of urbanisation, which results in changes in land use, land cover and land surface characteristics that subsequently modify the local climate, moisture exchanges and ecosystem services, promoting heat trapping and storage.

Actions to adapt to our current and future climate need to be taken to manage climate change risk. Adaptation involves taking action to reduce the adverse impacts of climate change while taking advantage of any opportunities that these changes might bring.

Planned adaptation actions in conjunction with ongoing mitigation strategies are essential. Furthermore, because of the enhanced vulnerability of urban areas, the adaptation of cities to climate change impacts is now considered a priority in developing adaptation strategies."

(Assessing Vulnerability to Climate Change: An Approach Illustrated through the Large Urban Scale Adaptation (Urb-ADAPT) Project (2015-CCRP-MS.25) EPA Research Report)

5.2 The Current Situation

The 2018 National Adaptation Framework set out the context and need for climate adaptation.

It stated, in Chapter One, that:

- Extreme precipitation events over most of the mid latitude land masses and over wet tropical regions will very likely become more intense and more frequent by the end of this century, as global mean surface temperature increases.

- Climate change not only means changes in the average climate such as temperature but also changes in the frequency and intensity of extreme weather and climate events.
- It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy rainfalls will increase in the 21st century over many areas of the globe.
- The level of uncertainty associated with climate change projections does not however imply a “wait-and-see” attitude to adaptation.
- Adaptation is the only way to deal with unavoidable impacts of climate change and additionally offers an opportunity to adjust economic activity in vulnerable sectors and support sustainable development.
- Examples of adaptation measures might include using scarce water resources more efficiently and adapting building or planning codes to (cater for) future climate conditions and extreme weather events.
- Due to the slow response time of the climate system, changes are projected to continue and increase over the coming decades. Even if GHG emissions came to an end, some changes, such as sea-level rise, are projected to continue up to and beyond the end of this century.

The 2018 NAF does not identify a specific urban adaptation sector but is strong on the role of Local Authorities in implementing adaptation solutions on the ground.

The 2018 NAF states that “Work to date by sectors has identified local authorities as a key stakeholder responsible for implementing adaptation actions in their area” and “Each local authority should make and adopt local adaptation strategies based on the regional governance approach to adaptation planning which will be established under the Framework.”

Established in January 2018, the four Climate Action Regional Offices (CAROs) are intended to coordinate climate mitigation and adaptation in their respective regions and support local authorities in the development and implementation of their climate action obligations, in line with that regional governance.

In May 2020, the Climate Change Advisory Council published “Adaptation Challenges and Opportunities for Irish Cities” (Working Paper No. 6). This looks at

the five Irish cities and, in terms of climate adaptation, appears to focus on sea level rise, fluvial flood risk and the “heat island” effect.

The report is silent on the need to adapt to more frequent and intense rainfall events.

In April 2021, the CCMA and CAROs published “Delivering Effective Climate Action 2030”.

This includes the following key objectives under “Strategic Goal 3 - Delivering Climate Adaptation and Climate Resilience”.

3.1 Continue implementation of local authority climate adaptation strategies, enhance access to climate risk data and assist communities in local resilience planning.

3.2 Capture the opportunities from climate action by enhancing our natural environment, buildings and infrastructure to increase the climate resilience of our organisations, our infrastructure and our communities.

3.3 Prioritise nature-based solutions, where possible.

The EPA published Research Report No. 230 in 2015 “Assessing Vulnerability to Climate Change: An Approach Illustrated through Large Urban Scale Adaptation (Urb-ADAPT)”

“The aim of this report is to provide guidance on how to take vulnerability into account when developing climate adaptation plans for urban areas.”

In section 3.4 it is stated that “For the purposes of the Urb-ADAPT project, data on exposure to pluvial flooding and sensitivity and adaptive capacity have been standardised at the CSO small-area scale and then integrated to develop a flood vulnerability indicator.

Figure 3.5 illustrates vulnerability to pluvial flooding in Dublin city and highlights the effects of sealed surfaces, located primarily in the city centre and surrounds, on exacerbating vulnerability to pluvial flooding impacts.”

5.3 Key Challenges

In terms of the policy documents currently in place, as referenced earlier, in general there is limited acknowledgement of the need to radically intervene in the urban

landscape to ensure that the urban areas adapt to existing and future climate change.

In 2021, the European Commission published its new EU Strategy on Adaptation to Climate Change[1] which reinforces the importance of mainstreaming of climate change adaptation into EU sectoral policies and funds.

This included a revised list of sectors which included one designated as “Urban”.

In the draft 2024 NAF, table 10 provides a comparison of these EU Sectors with existing Irish Sectors and proposes some additional Irish Sectors to better align Ireland’s position with the European reporting structures. This analysis reflects recommendations of the Climate Change Advisory Council (CCAC) as well as existing statutory requirements on climate change adaptation in particular those aimed at the local authority sector brought in in 2021.

Governance of adaptation is particularly challenging given the scope of the impacts of climate change and the number of individual stakeholders involved. It is important that adaptation structures leverage existing structures as much as possible and mainstreams adaptation into relevant policy areas. This requires expert input in the area best placed to deliver systemic change.

While the new NAF acknowledges that “Urban areas are vulnerable to climate change e.g., increased surface water flooding due the high levels of impervious surfaces”, an “Urban” sectoral designation will not be included as a separate sector in the 2024 NAF.

Under the Climate Act, the responsibility for developing any new Sectoral Adaptation Plan falls under the remit of the appropriate Minister.

Given the need to consider existing structures managing climate action at local level that are established in law and the absence of a specific lead Department covering urban policies, the creation of a sector covering “urban” is not included in the new draft NAF at this time.

The draft NAF however recognises the importance of planning policy in facilitating adaptation. It does include a commitment from the Department of Housing, Local

1 Climate Adapt (2021)

Government, and Heritage to scope out potential for a “Built Environment/Planning” SAP.

This scoping exercise may provide an opportunity to explore the inclusion of urban adaptation in future sectoral adaptation plans.

In addition to this scoping exercise on the Built Environment and Planning to be undertaken by DHLGH, the draft NAF also takes the approach that Adaptation in the “Urban” sector will be dealt with “as a cross sectoral consideration” and captured through LA CAPs which are a statutory requirement for all local authorities under the Climate Action and Low Carbon Development Acts 2015 to 2021 (The Climate Act). A complication in the proposed approach to urban adaptation is that there is also a reliance on the 31 individual LACAPs rather than a single SAP.

The draft 2024 NAF recognises the risk inherent in relying on “cross sectoral” designations noting that “It is vital that there is a level of accountability in place to ensure these cross-cutting areas are not forgotten”. It may prove challenging to deliver increased climate resilience and adaptation in our urban areas under the proposed method of dealing with urban area.

5.4 Objectives and Strategies

The overall objective is to deliver measurable improvement in climate adaptation and resilience across as many urban areas as possible, using nature-based solutions.

This recognizes the fact that the main impacts of climate change on urban areas are:

- Increased volumes and flow rates of rainwater runoff arising from increased frequency and intensity of rainfall events taken together with the widespread sealing of urban surfaces with impermeable surfaces. This, in turn, increases the risk of flooding and the pollution of watercourses from rapid and contaminated urban runoff.
- Increased urban temperatures, also referred to as the “Urban Heat Island effect” arising from the combination of rising temperatures and the widespread sealing of urban surfaces with impermeable and heat reflecting materials.

Both above impacts can be significantly mitigated by changing the urban landscape from one that is, primarily, composed of hard impervious materials to one that has

significant areas of appropriately designed and constructed nature based landscaped features.

The strategies to achieve this level of urban climate adaptation and resilience are those already listed in Chapter 4 supplemented by the following:

- The 2024 NAF inclusion of a scoping exercise for the Built Environment to be developed by the Department of Housing, Local Government and Heritage so that it includes the area of urban climate adaptation.
- It is recognized that the Climate Advisory Regional Offices (CAROs) already work with LAs in promoting adaptation in general, as per 2024 work programme item "Support the sector to build capacity and integrate climate adaption into LA functions and services."
- Pending the development of a future Built Environment / Planning adaptation sector incorporating urban adaptation and noting that most LAs will have produced new five-year CAPs by the end of 2024, explore with the Climate Advisory Regional Offices (CAROs) how they can specifically promote urban climate adaptation and resilience measures using nature-based solutions across the LA Sector.
- In advance of the next cycle of LA CAPs examine how best to integrate NBS into LACAP guidance on adaptation.
- It is important that the SAP covering the existing flood risk sector recognizes the need to integrate any proposed adaptation measures under that SAP with urban pluvial flood risk adaptation measures.

5.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Urban Adaptation	LAs to promote urban climate adaptation supported by the CAROs.	LACAPs 2024 to 2029 - have been adopted	Discussion on Built Environment/ Urban Adaptation Plans to be drafted by LAs for towns above 10k population.	Potentially Built environment/ Urban Sectoral Adaptation Plans in place (see below)	Potentially Built Environment/Urban Sectoral Adaptation Plans in place (see below)
LACAP Guidance	Examine how best to integrate NBS into LACAP guidelines if new guidelines are developed.	LACAPs 2024 to 2029 - have been adopted	Discussion on New Guidance, if appropriate, to be agreed for next round of LA CAPs	New Guidance to be devised, if appropriate	LA CAPs to include nature based urban adaptation measures, if appropriate.
Built Environment / Planning Adaptation sector to include urban adaptation.	Revised or Updated SAP to include a sector that includes urban adaptation.	No such sector is currently in place.	DHLGH and DECC to have agreed to include Urban adaptation in the scoping exercise for the new Built Environment / Planning sector.	Potentially, to have Built Environment / Planning Sectoral Adaptation Plan in place, subject to scoping exercise. .	
Flood Risk	Integration and coordination of OPW "Flood Risk" sectoral adaptation plans with Urban (pluvial) flood risk adaptation plans.	OPW is lead agency for flood risk SAP	Targets to be agreed	Targets to be agreed	Targets to be agreed
Urban Heating	Recognition of role of urban nature-based solutions in mitigation.	Urban greening is recognized but not integrated with rainwater management.	Targets to be agreed	Targets to be agreed	Targets to be agreed

Chapter 6 Proposed Strategy Number 3 – Uisce Éireann

Dunhill Integrated Constructed Wetland

To coordinate the requirement for nature based urban rainwater management with Uisce Éireann's (UÉ) Water Services Strategic Plan 2050

6.1 Introduction

Uisce Éireann is a publicly owned, regulated, commercial state body with responsibility for the operation and maintenance of water and wastewater assets across the length and breadth of Ireland. Each day approximately 1.7 billion litres of raw water are collected from the environment and treated so that it is safe to drink. To get water to homes and businesses a combination of gravity and energy is used to transfer it through 64,000km of pipes. Approximately 1.2 billion litres of wastewater are collected from homes and businesses through 26,000km of sewers before treating it and returning it to the environment.

The effective collection and treatment of wastewater prior to discharge back to the environment is essential to protect the quality of that environment and the resource that it provides now and into the future.

The standards to which the wastewater infrastructure must operate are set out in regulations, primarily the Urban Waste Water Treatment Regulations (which

implement the Urban Waste Water Treatment Directive, UWWTD) and the Wastewater Discharge Authorisation Regulations, under which the Environmental Protection Agency (EPA) set discharge controls. Other legislation and policies designed and enforced to govern wastewater management in Ireland include:

- The Water Framework Directive (WFD) is the overarching European Directive relating to water policy in the European Union. It aims to protect and restore the water environment so that all water bodies are at 'Good Ecological Status' or better.
- The Water Services Policy Statement sets out the priorities of the Irish Government regarding the provision of water services during the period specified in the statement.
- The Water Services Strategic Plan (WSSP 2050), currently in a consultation phase, sets out Uisce Éireann's objectives for the next 25 years, and the means by which they will achieve them. It aligns to the requirements set out in the Water Services (No. 2) Act 2013.

A large proportion of urban sewer networks were historically designed to function as combined systems, carrying both wastewater and surface water runoff from hard-standing areas (e.g. roads, pavements, roofs, car parks). During periods of heavy rain, surface water runoff mixes with wastewater and frequently overwhelms sewer network capacity resulting in the release to waterbodies of untreated discharges at storm water overflows (SWO) or the flooding of urban areas and properties.

In addition to problems caused by flooding and untreated discharges, surface water runoff in wastewater systems will result in additional energy usage and costs at pumping stations, additional wastewater treatment costs and an increased rate of asset maintenance and depreciation at both treatment plants and pumping stations.

The use of a nature based urban rainwater management approach could significantly reduce the impact that surface water runoff has on people and the environment by redirecting, holding back and treating flows currently entering the combined sewer network during heavy rainfall events. It is recognised as the most sustainable method of managing rainwater in the urban environment, in particular when considering the multiple additional benefits that nature-based solutions can provide in contrast to the traditional approach of installing new 'grey' infrastructure such as

large underground storage tanks and pipeline tunnels which provide little or no biodiversity, amenity or societal benefits.

6.2 Current Situation

6.2.1 Approach to Meet SWO and Flooding Challenges

SWO Approach

There are over 2,600 SWOs in operation nationally. Each one of these is assessed to understand and quantify the risk that they pose to human health and the environment. Uisce Éireann maintain a record of SWOs known to be non-compliant with their license terms and/or impact negatively on receiving waterbodies. These SWOs are currently being addressed on a prioritised basis through Uisce Éireann's capital investment plan. Addressing these will require high levels of sustained investment over multiple investment cycles. The priority areas for investment are listed below.

- **UWWTD non-compliant SWOs** – addressing SWOs located in agglomerations that are currently not compliant with the UWWTD, in particular a subset listed under a European Court of Justice Infringement case.
- **EPA Priority Area List non-compliant SWOs** – addressing SWOs located in agglomerations that are currently not compliant according to the EPA Priority Area List.
- **River Basin Management Plan high impacting SWOs** – addressing SWO discharges identified as an urban wastewater pressure preventing the receiving water body from achieving Good Status under the Water Framework Directive. These are identified in Cycle 3 of the River Basin Management Plan.
- **Wastewater Discharge Authorisation SWOs** – addressing SWOs identified as non-compliant with licences under the Wastewater Discharge Authorisation Regulations with priority given to specific protection of unique and valuable habitats, aquatic ecology and the protection of drinking water resources and the protection of bathing water.

Flooding Approach

Uisce Éireann applies a standard Drainage Area Plan process to assess wastewater network performance for current, short-term, and long-term scenarios using hydraulic sewer network models. This exercise identifies the root cause of flooding risk and solutions to manage the risk to an appropriate level of service. Due to the scale of investment required to reduce national sewer flood risk to appropriate service levels, it will require multiple investment cycles before this is realised. Priority is given to customers suffering sewer flooding inside their properties, with the highest frequency of repeat incidents.

In recognition of the time and scale of investment required to address sewer flooding nationally, a programme of local flood protection measures will continue to be needed in order to reduce the risk of property flooding using small scale interventions where feasible.

6.2.2 Data Systems

Uisce Éireann have a number of data systems and models that store survey, asset and performance related information on urban drainage sewer systems in Ireland. This helps Uisce Éireann to understand their assets, how they are performing and why issues occur. They also help to plan and design solutions to improve future performance. Uisce Éireann is dedicated to improving their data systems and the accuracy of their models to help make better decisions for customers.

Geographical Information System (GIS) and Sewer Records

Uisce Éireann, as part of an agreement with Local Authorities, currently manage national urban drainage sewer records, for both wastewater and surface water piped/culvert systems.

Urban Drainage Models

Uisce Éireann have undertaken a large-scale Drainage Area Plan programme over the last 8 years that has delivered verified wastewater network hydraulic models for approximately 40% of its customer population across the large urban catchments of Dublin (parts), Cork, Galway and Waterford cities. Further tranches of this programme are ongoing and it is anticipated that coverage will increase to 70% of customer population over the next 2 years including the remainder of Dublin, Limerick and other prioritised large towns. These models are used to understand existing sewer system performance and could be used as an evidence base to

estimate the benefits of replacing directly connected hardstanding areas by retrofitting nature-based SuDS.

Network Performance Monitoring

The importance of monitoring the networks including SWO performance and the increased need to forecast and provide warning of SWO activations to manage risk is reflected in the continued investment in the Drainage Area Plan programme and the roll out of the SWO monitors linked to telemetry systems.

6.3 Key Challenges

The operating environment for Uisce Éireann to deliver reliable water services to customers in the coming decades will bring enormous challenges. To better understand the nature and scale of these challenges Uisce Éireann undertook a foresight study (Vison 2050) in collaboration with key stakeholders from across the water services sector during 2020-2022.

This informed the development of WSSP 2050. A key focus of this study was to identify the challenges and opportunities that may have the greatest impact on delivering water services in Ireland between now and 2050. Some of the challenges and opportunities that it identified are described in more detail below.

6.3.1 Climate Change

The climate emergency presents an extreme challenge to the provision of water services between now and 2050. More intense rainfall and storms events will increase flooding risk and power interruptions affecting operational resilience. These events will impact sewer networks causing more frequent sewer flooding and pollution incidents, impacting on the public and the environment.

6.3.2 Population and Economic Growth

Ireland has the third fastest population growth rate in Europe and its population is expected to reach six million by 2050. This growth coupled with economic expansion will necessitate new and upgraded infrastructure to support development. Expanding and more densely populated urban centres will also generate more

stormwater runoff due to the expansion of impermeable surfaces, presenting challenges to the wastewater infrastructure and water environment.

6.3.3 Environment and biodiversity crises

In recent years, it has become increasingly apparent that many species are being lost at an unprecedented rate. Despite progress in some areas, the EPA believes that the scale and speed of improvements being made are insufficient to meet long-term EU and national objectives for water quality, air quality, nature protection and emissions reduction.

Biodiversity loss in Ireland is being driven by many factors, including intensive agricultural and forestry practices, invasive species, changes in land use, urban runoff and discharges of insufficiently treated wastewater to our rivers. As concentrations of pollutants increase and new contaminants emerge, the pressure on water and wastewater treatment processes will increase.

6.3.5 Legislation, regulation and policy

Changes in European and Irish legislation and regulation will significantly influence how Uisce Éireann deliver services. A recent example is the European Union recast Urban Wastewater Treatment Directive that is set to require increased modelling, monitoring, network, and treatment solutions. A key tenet of this new legislation will be a preference to develop green nature-based solutions to mitigate the environmental impact of urban runoff in combined sewer systems.

6.3.6 Multi-agency Drainage System Ownership and Maintenance Responsibility

The design and implementation of nature-based SuDS requires a multi-stakeholder integrated approach because the ownership and responsibility for drainage in the urban area is divided across a number of stakeholders including Uisce Éireann, Local Authorities, Transport Infrastructure Ireland, private entities and others. Multi-stakeholder endeavors can be difficult to progress in a timely and cost-efficient manner as it requires the alignment of interests and funding mechanisms of all parties involved.

6.3.7 Communication of Wastewater Sewer Performance to the Public and Stakeholders

To effectively manage the service risk associated with sewer flooding and SWO discharges it will be necessary to increase Uisce Éireann's capability in the communication of these risks and the timely sharing of operational performance data with the EPA and our other key stakeholders including the general public.

The future European Union recast Urban Wastewater Treatment Directive will require an increased level of reporting to the public included details of untreated wastewater discharged to the environment.

6.4 Objectives and Strategies

This section will outline Uisce Éireann's strategy and proposed actions that, taken together, should positively impact on the implementation of nature based urban rainwater management.

6.4.1 Uisce Éireann's Water Services Strategic Plan

Uisce Éireann published their first Water Services Strategic Plan in 2015 and are now undertaking the process of consulting on a new Water Service Strategic Plan 2050 (WSSP 2050) which will replace the current version. The WSSP, which aligns to requirements set out in the Water Services (No. 2) Act 2013, presents Uisce Éireann's objectives for the next 25 years and how they will achieve them.

Each Strategic Objective proposed in WSSP 2050 contains a number of Aims which in turn contain key Actions, the means proposed to achieve strategic objectives. *Strategic Objective 3: Protect and Restore the Environment* is designed to encourage nature-based solutions.

Uisce Éireann believe that to deliver on its strategic objectives, new approaches and ways of working are required that are centred around system-based thinking and collaboration with other stakeholders.

6.4.2 WSSP Strategic Objective 3: Protect and Restore the Environment

Strategic Objective 3 recognises that protecting and restoring the environment is critical to providing safe water services and safeguarding human health and

biodiversity. Four Actions contained within two Aims (Aim 7 and Aim 9) of Strategic Objective 3 have been identified to encourage nature-based drainage solutions.

- **Aim 7 - Protecting Our Water Environment**
  - Action 3.1 – Work with regulators and stakeholders to develop a Wastewater Strategy Framework.
  - Action 3.2 – Develop and implement Integrated Drainage Management Plans.
- **Aim 9 – Contributing to positive biodiversity**
  - Action 3.7 **–** Ensure 'net gain' of biodiversity when carrying out activities or delivering plans or new projects.
  - Action 3.8 – Champion nature-based solutions in the delivery of water and wastewater projects.

6.4.2.1 Aim 7 – Protecting Our Water Environment

Aim 7 states Uisce Éireann's dedication to play its part in protecting and restoring the water environment and contains Actions 3.1 and 3.2 which are described in more detail below.

Action 3.1 - Work with regulators and stakeholders to develop a Wastewater Strategy Framework

The development of a Wastewater Strategy Framework will provide a national understanding of the wastewater strategic needs and drivers, clear sight of current and future population needs, environmental priorities, asset risks and service resilience. It will enable a long term, catchment scale approach to solving sewer network issues and will prioritise the use of nature-based rainwater management solutions where possible.

Action 3.2 - Develop and implement Integrated Urban Drainage Management Plans

The development of integrated drainage management plans (to include the planning of both wastewater and surface water systems) is an action for Uisce Éireann for several pilot catchments in the latest draft River Basin Management Plan.

In addition, this integrated approach to urban drainage planning is also expected to become a requirement of the new recast Urban Wastewater Treatment Directive (as 'Integrated Urban Wastewater Management Plans'). This will apply to larger cities initially and subsequently for smaller agglomerations based on risk. Uisce Éireann sees this as a very positive opportunity for collaboration with local authorities, with shared aims of:

- reducing the pollution load from SWOs and from Urban Runoff,
- developing capacity for growth; and
- ultimately making our cities and towns climate resilient from a drainage perspective.

Rainwater Management Plans, where these have been developed by Local Authorities, will also inform the development of these plans. As such NBS will be prioritised over grey solutions wherever possible.

Uisce Éireann and Local Authorities will need to develop new approaches and new capabilities so that environmental benefits and climate resilience can be delivered without entailing excessive costs.

6.4.2.2 Aim 9 – Contributing to positive biodiversity.

Aim 9 states Uisce Éireann's dedication to manage their assets to have biodiversity net gain and contains Actions 3.7 and 3.8 which are described in more detail below.

Action 3.7 – Ensure 'net gain' of biodiversity when carrying out activities or delivering plans or new projects

Uisce Éireann is committed to ensuring that biodiversity "net gain" is achieved across their infrastructure projects by 2030 and the adoption of nature-based solutions to urban drainage will form part of that policy approach.

Action 3.8 Champion nature-based solutions in the delivery of water and wastewater projects.

Employing nature-based solutions helps protect, restore and enhance water quality; improves climate resilience; increases biodiversity and has significant potential to deliver more sustainable water and wastewater solutions for Uisce Éireann.

Uisce Éireann will encourage and promote the identification of opportunities for the incorporation of nature-based solutions that have many additional benefits, including a reduction in energy usage, carbon sequestration, biodiversity benefits, and amenity use for local communities, which aligns to a RBMP goal to deliver integrated, multiple co-benefits for water, biodiversity and climate, wherever possible.

6.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Completion of a nature-based SuDS policy for Uisce Éireann	A policy that outlines how Uisce Éireann plans to embed nature-based SuDS into its wastewater management practices.	Uisce Éireann does not currently have a single overarching nature-based SuDS policy	Completion of a nature-based SuDS policy for Uisce Éireann	Periodic update of UÉ SuDS policy	Periodic update of UÉ SuDS policy

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Wider under-standing of enhanced performance of urban drainage systems as a consequence of retrofitting SuDS into areas draining to wastewater networks	Process for developing and sharing asset and performance data relating to urban drainage networks. Using UÉ urban drainage hydraulic models to model urban runoff reduction to understand reduction in SWO spills, reduction in flooding risk and reduction in pump run times.	Memorandum of Under-standing between Uisce Éireann and Local Authorities to share data relating to urban drainage related flooding and storm water management.	Share urban drainage asset and performance data with Local Authorities	The benefits of retrofitting SuDS is widely understood within Uisce Éireann and Local Authorities through sharing the outputs of hydraulic model simulations	
Delivery of Integrated Urban Drainage Pilots	Uisce Éireann in partnership with Local Authorities will deliver Integrated Urban Drainage Pilots as required by the draft 3rd cycle RBMP.	None	6nr. pilot projects underway with Service Provider appointed	Pilots completed and lessons used to help define scope of IUWwMP below	N/A

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Delivery of Integrated Urban Wastewater Management Plans (IUWwMPs)	Uisce Éireann in partnership with Local Authorities will deliver Integrated Urban Wastewater Management Plans for agglomerations required by the recast UWWTD.	None.	Scope development advanced. Lessons from the IUDP pilot studies above in addition to methodology content from the National Wastewater Strategy Framework and Rainwater Management Plans will help define scope of IUWwMP.	Scope of IUWwMP agreed across stakeholders. IUWwMPs developed for all agglomerations >100,000 Population Equivalent (PE)	Scope of IUWwMP agreed across stakeholders. IUWwMPs developed for all agglomerations >100,000 Population Equivalent (PE)
Development of a Wastewater Strategy Framework	The framework will provide an understanding of strategic needs and drivers, allowing UÉ clear sight of current and future population needs, environmental priorities, asset risks and service resilience	Uisce Éireann does not currently have a Wastewater Strategy Framework	Development of Wastewater Strategy Framework underway	Uisce Éireann Wastewater Strategy Framework developed	Framework periodically updated

Chapter 7 Proposed Strategy Number 4 – Roads, Streets and Transportation

Working with the DoT and appropriate agencies to ensure that nature based urban rainwater management is incorporated into the planning, design, construction and upgrading of all urban road, street and transportation projects.

7.1 Introduction

The development of towns and cities thousands of years ago and the use of wheeled transport led to the paving of urban roads and streets with stone material. The general trend in urban pavements over the centuries was to make urban surfaces independent of seasonal and weather factors and this led to their constituents being more bound together and, thus, less permeable.

This, ultimately, developed into the entirely sealed surfaces we are familiar with today, such as asphalt and concrete.

Urban rainwater management has developed over many years in response to the need to dispose of rain falling on these impermeable urban surfaces. This has driven the design of urban roads and streets with such features as cambers to direct rainwater into channels, kerbs to retain the runoff in these channels and gullies and pipes to carry the runoff away.

While other urban surfaces such as roofs and paved private areas add further to the percentage of urban surfaces that are impermeable, a significant proportion of the overall area of urban impermeable surfaces is composed of urban roads, streets, footpaths, car parks and other transport related areas.

The successful implementation of a nature-based approach to urban rainwater management is, therefore, largely dependent on an entirely new approach to the design and construction of all urban roads, streets, car parks and other transport related areas.

7.2 The Current Situation

As mentioned earlier, the predominant method of urban rainwater management is to direct rainwater off the urban roads, streets and footpaths into underground piped networks as efficiently as possible.

As pointed out in earlier chapters, this has led to a number of problems including pollution of watercourses and increased pluvial flood risk.

Climate change has exacerbated these problems due to the increased frequency and intensity of rainfall events.

This increased intensity caused by climate change has resulted in the traditional road drainage system being overwhelmed with resultant urban flooding and pollution from combined sewer overflows.

It is neither economically feasible nor environmentally desirable to try and deal with this problem by traditional engineering methods of increasing pipe sizes or building additional pipe networks.

The only sustainable method of dealing with this problem of urban rainwater management is to overlay a new nature-based system whereby runoff is collected, treated and stored in specifically designed nature-based features before, eventually, being discharged back into the existing urban drainage system.

This has been recognized by the publication in 2023 of a new Advice Note 5 for the Design Manual for Urban Roads and Streets (DMURS) on “Road and Street Drainage using Nature Based Solutions”. This joint publication by the DHLGH and the Department of Transport means that, in line with the mandatory use of DMURS in all urban areas, future transport related urban projects should incorporate the new approach to rainwater management.

Similarly, the National Transport Authority has published an Advice Note on “Greening and Nature-based SuDS for Active Travel Schemes”.

7.3 Key Challenges

The publication of the above referenced Advice Notes and the widespread and long-standing adoption by Local Authorities of policies favoring nature based sustainable urban drainage systems (nature-based SuDS), taken together, should result in an almost universal move towards sustainable nature-based drainage systems for new developments and for all capital projects within existing urban areas.

However, many urban projects that directly affect urban roads, streets and areas of public realm continue to be designed, approved for funding, and constructed using the traditional “kerb, gully and pipes” approach to rainwater management.

In order to deliver on implementation under this strategy, there is a need to explore some of the barriers to the more widespread acceptance and use of nature-based systems. Some of these challenges are set out below. The next section will set out objectives and strategies to address these and other issues.

7.3.1. Road Design and Pavement Integrity

Apart from the rapid discharge of rainwater runoff, one of the key functions of the traditional piped urban drainage system was to ensure that the road pavement foundation or formation level was not waterlogged as this would weaken the overall road structure.

Furthermore, the traditional road kerbing and channel provide an engineered edge support to the road structure.

Some road designers remain concerned that the use of nature-based systems, which allow rainwater run directly from the road surface into a soft landscaped area

beside the road edge, would result in the weakening of the road structure, both in terms of edge protection and formation drainage.

7.3.2 Road Space Allocation

Kerbs, channels and gullies do not take up much space. There is a perception that the use of nature-based features such as rain gardens, swales etc. will take up significantly larger space in urban areas that are already in demand for a wide range of uses.

This concern is not only in relation to space on the surface, but also vertical space under the surface where nature-based features may conflict with the large range of underground services common to all urban areas.

7.3.3 Specialist Design and Construction

The traditional approach to the design of roads and streets is familiar to all designers, urban planners, engineers, construction practitioners and material suppliers. The proposed new approach will require a new set of design skills, new materials and new methods of construction.

Those using urban roads and streets are also familiar with the traditional approach and will not be familiar with the proposed nature-based features. There is concern that this may impact on mobility and the legibility of urban areas.

7.3.4 Taking in Charge and Maintenance

Because traditional road and street design is based on relatively few material types (concrete, asphalt, gullies and pipes) the care and maintenance of these systems is familiar to all roads authorities and practitioners.

Nature based rainwater management features are more complex and do not fit readily into the structure of Local Authority maintenance units and capabilities.

There are concerns, also, about the durability and longevity of nature-based features compared to traditional urban designs.

Concerns are sometimes expressed in relation to health and safety risks that may arise from the retention or storage of flood water in public open spaces.

7.4 Objectives and Strategies

The following section will propose strategies to address the four key challenges listed earlier. The section will also propose further strategies and objectives that, taken together, should positively impact on the implementation of nature based urban rainwater management.

One overarching objective is to have prepared a detailed technical specification covering all aspects of the design, construction and maintenance of urban roads and streets using a nature based approach to urban rainwater management.

7.4.1 Road Design and Pavement Integrity

As outlined earlier, there are two aspects to this concern, and each is addressed as follows:

- Protection of road formation from waterlogging.

This concern is based on a misunderstanding of the proposed approach to nature based urban road drainage. It is not proposed that rainwater runoff be allowed infiltrate into the substrate or ground underneath the urban road or street. The nature-based features into which urban runoff will be directed will, themselves, be designed and engineered retain the runoff within the feature for as long as possible before allowing it to percolate into perforated pipes that discharge into the existing drainage network. Where deemed necessary, the nature-based features will be surrounded by impermeable material to protect the adjacent road structures as well as to prevent uncontrolled ingress of runoff into groundwater or into adjacent properties such as basements etc.

In order to deal with more intense flows, the nature-based features will have a raised gully or inlet which is connected directly to the existing drainage system. The level of this inlet will be below the adjacent pavement surface level but slightly above the level of the rain garden or similar nature-based feature. This will provide a higher level of protection from road flooding than the existing system as the nature-based feature will store a volume of rainwater and also slow the onward flow into the piped network.

- Structural Integrity of the pavement edge in the absence of a kerb.

When nature-based features such as a raingarden are incorporated into the design of urban areas, it is essential that surface water runs directly from an urban surface into the nature-based feature.

This does not prevent the incorporation into the design of adequate edge protection to the adjacent road or pavement structure. Instead of the traditional raised kerb, the design will incorporate a flat channel or edge strip of appropriate design and construction over which the rainwater can flow into the nature-based feature.

7.4.2 Road Space Allocation

This issue can be divided into two separate areas:

- Road space in plan area.

Because nature-based features, by definition, form part of the overall urban space it is essential that they are considered and incorporated into the design from the earliest concept stage.

The issue of space allocation in urban areas is one where nature-based features can have multiple functions. As well as taking in surface water runoff, these features can also provide clear definition and delineation of urban spaces and provide separation between different categories of road users.

Nature based rainwater management features could, therefore, form part of an overall demand management regime, such as the National Demand Management Strategy currently being prepared by the Department of Transport.

The role of nature based urban rainwater management features as part of an integrated approach to urban space allocation is recognized in DMURS Advice Note No. 5 “Road and Street Drainage using Nature Based Solutions” but is also potentially relevant to the approach set out on DMURS Advice Note No. 6 “Priority Junction Tightening Measures.”

Nature based features should also be integrated into other aspects of public realm design such as areas of seating and planting.

In more suburban contexts, nature-based rainwater management should form an essential element of all roadside verges and planted areas.

- Vertical space.

Nature based rainwater management features are engineered structures whose primary function is to take in, store, treat and then discharge surface runoff. The depth and volume of each feature can vary but it is important that they have adequate volume for storage and treatment. This usually means that they take up a significant amount of vertical space.

This can lead to perceived conflicts with underground services.

The design of nature-based features and the selection of the type of nature-based feature that is appropriate for a particular urban space must take account of existing underground services.

In many cases, existing underground services such as communication cables and low voltage electrical services can remain in place and rain gardens, or similar features designed to accommodate these services. As would be the case for traditional designs, the designer must ascertain the types and locations of all services within the project footprint at the earliest stage of the design process.

The location of larger scale planting such as trees or shrubs should be decided based on the location of underground services as many of these, in particular tree pits, will occupy a considerable underground volume. Tree pits that form part of a nature-based approach to urban rainwater management must be designed accordingly with appropriate engineered soils, suitable tree selection and also positive drainage to allow excess runoff to be routed back into the existing urban drainage network.

7.4.3 Specialist Design and Construction

If nature-based rainwater management features are to be successfully used in urban designs, then it is essential that their primary engineering and drainage functions are understood and prioritized.

These are not just areas of urban landscaping. It is critical that design teams follow appropriate technical guidance and specification in terms of materials used, construction method etc. and onsite construction monitored to ensure that these designs and specifications are rigorously followed.

As these features become more common, the capacity of professional urban designers and contractors to deliver them will improve.

However, in the earlier stages of development of this approach, project teams must ensure that the requirements of nature based urban rainwater management features are correctly included in project estimates, project briefs and tendering documents. Project teams should also satisfy themselves that all those tendering at design or construction stage have shown an understanding of the primary function of these features. One method of procurement that could be considered is a form of design build and maintain that requires the successful tenderer to design and construct the nature-based rainwater management features and also to maintain them for a stated period, typically around five years. This allows the planting to mature and to demonstrate its effectiveness over a number of growing seasons (see also next section).

7.4.4 Taking in Charge and Maintenance

In general, urban spaces within the public realm are maintained by the Local Authority, acting as Roads Authority.

Where new urban spaces which incorporate nature-based rainwater management are being developed that will, ultimately, become the responsibility of the Local Authority, it is important that the Local Authority has appropriate internal mechanisms to approve the design in the first instance, based on an agreed technical specification and construction methodology.

The Local Authority should also monitor the construction stage and carry out appropriate testing (e.g. of flow rates through the engineered soil) and monitoring (e.g. to ensure the top level within a raingarden or similar NbS feature is at an appropriate level relative to the pavement level to ensure adequate freeboard allowing runoff to access the NbS feature).

These onsite checks are necessary in order to to ensure the new nature-based features deliver the functionality in terms of rainwater disposal from urban surfaces, storage, treatment and discharge, including appropriate overflows connecting back into the existing drainage networks.

It is recognized that nature-based rainwater management features are not traditional and do not easily fit into the existing areas of responsibility within the Local Authority structure. These features are not traditional engineering features found within urban

roads and streets and have aspects that could be defined as the responsibility of the Roads Department, the Drainage Department, or the Parks Department.

Every Local Authority should take account of the new design approach and agree internally on appropriate approval and handover procedures for new urban areas and retrofitting of nature-based features into existing urban areas.

These internally agreed procedures should include the long-term maintenance of nature-based features. In some cases, the Local Authority may decide to include a maintenance period in the contract documents, and this can be helpful in building confidence and ensuring that the contractor is incentivized to deliver the best possible completed nature-based features.

The general experience of nature based urban rainwater management features, where introduced, is that they require less maintenance than traditional features and, unlike those traditional features, the nature-based areas actually perform their rainwater management functions better over time as the plants and roots develop.

In relation to concerns related to nature-based features designed to store excess rainwater volumes in open spaces where this may result in standing water during storm events, it is important that the design and maintenance of such features follows best practice including graduated slopes, appropriate planting to prevent or discourage access during times of flooding and appropriate drainage to remove any stored flood water as quickly as possible after the flood event.

7.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
DMURS Advice Note 5	Mandatory for all urban roads and streets	Advice Note introduced in 2023 (NGS Circular 1 of 2023, DoT)	All urban project teams to be aware of requirement.	All urban projects to implement Advice Note 5 to the fullest extent possible.	Advice Note 5 to be reviewed and updated in light of experience to date.
Approved Technical Specifications for Nature Based Urban Rainwater Management Features	Necessary to enable design and construction teams to deliver nature-based features.	Reliant on UK / CIRIA specifications	Brief prepared to procure consultants to draft national specifications	Specification to be adopted and in use.	Following a five yearly review, specifications, and codes of practice etc. to be updated and in use.
Preliminary Design Stage	Funding / Approval Agency Review at Preliminary Design Stage	Review process and Peer review carried out but not necessarily including NBS / Advice Note 5	Funding Agency to review to ensure compliance with Advice Note 5 and agency's own standards.	All urban projects to be compliant with Advice Note 5 at Preliminary Design stage	All urban projects to be compliant with Advice Note 5 at Preliminary Design stage
Planning Stage	Part 8 Documentation	SRDCSGs recommends surface water management plan (including nature-based Solutions to drainage) where public realm improvements are proposed	integration of NBS into public realm projects, where appropriate	integration of NBS into public realm projects, where appropriate	integration of NBS into public realm projects, where appropriate
Construction Stage	Tender Documents	Greater application of NBS recommended	Ensure tender documents incorporate NBS.	Develop appropriate tender rates for NbS to improve estimation.	Encourage the incorporation of NBS.
Taking in Charge	LA Taking in Charge Procedures	Greater application of NBS recommended	Discussions underway across all relevant LA Departments.	Agreed TIC and Maintenance procedures covering NbS in use	TIC and maintenance procedures updated and effective.

Chapter 8 Proposed Strategy Number 5 – Funding and Capital Appraisal

To ensure that capital appraisal, value-for money and other economic approval mechanisms would support and promote the integration of nature-based rainwater management into the concept, design and delivery of all urban projects.

8.1 Introduction

In 2019, the EU launched the European Green Deal.

Since then, several initiatives and action plans have been initiated, including the Biodiversity Strategy for 2030 and its urban greening plans, and the proposed Nature Restoration law, among others. NbS is embedded in all these initiatives. This means NbS contributes to these objectives.

The EU Sustainable Finance Action Plan is driving a sustainable capital markets transformation. It aims to reorient capital flows towards sustainable investment,

mainstream sustainability in risk management and foster transparency and long-termism in financial and economic activity.

The EU Taxonomy creates a classification of sustainable economic market activities (see section 8.4).

The Sustainable Finance Disclosure Regulation (SFDR) launched in March 2021 is driving financial market participants towards making sustainable investments and disclosing progress.

The concept of working with nature rather than against has been around for quite some time. Terms have also been used to denote this such as green and blue infrastructure, ecosystem-based adaptation and disaster-risk reduction, natural water retention measures, ecological infrastructure, among others.

These share the same rationale that healthy ecosystems deliver the crucial ecosystem services on which our societies and economies depend. The implementation of urban NbS is an important element of this approach.

8.2 Current Situation

As can be seen from the Introduction, there is a clear focus within EU policy on the use of economic and financial instruments to promote the use of nature-based solutions.

While the use of nature-based solutions to urban rainwater management is in line with a range of public policies in Ireland, the experience of those proposing their use in publicly funded capital projects is that many public expenditure appraisal systems and cost benefit analyses are not currently capable of measuring, in economic terms, the benefits of such solutions.

As a result, it is reported that many projects containing nature-based solutions have had to be re-designed with such solutions removed or reduced in order to achieve the necessary funding approval.

It would, therefore, appear, that current systems of project appraisal used in Ireland, including cost-benefit analysis, value engineering and others are not, as yet fully aligned with those EU policies promoting the adoption of nature-based solutions as set out in section 8.1

Having said that, there are some initiatives that may be of assistance in promoting the prioritising of projects that include climate adaptation and sustainability measures.

These include the “Action Plan 2023” published by the Department of Finance in March 2023 which includes measures such as the establishment of of an International Sustainable Finance Centre of Excellence, as well as a revision of the Sustainable Finance Roadmap. While the focus is on climate mitigation, rather than adaptation, it is hoped that adaptation measures would also be supported financially.

The Government’s “Green Procurement Policy” would appear to focus exclusively on criteria to be used in purchasing goods and services and, where construction is referenced, it is only in the context of buildings.

The Climate Ireland information on financing adaptation refers only to EU initiatives such as the “Life” programme.

8.3 Key Challenges

The main challenge of financing the increased uptake of nature-based solutions is that the majority of nature’s benefits currently have no financial market value, despite the fact that nature underpins our collective survival and prosperity.

In the policy discourse on nature-based solutions, there is little discussion about the key structural challenge stemming from the “public good” dimension of such investments.

Implementation needs investment. The current models are often driven by financial return on investment, which does not take account of “softer” benefits that aren’t costed or are difficult to value.

Current methods of economic appraisal and assigning values to the benefits accruing from capital investment should be amended to align with national and European environmental and climate related policies seeking to promote nature-based urban rainwater management solutions.

8.4 Objectives and Strategies

- In order to support Government policy, there should be a general presumption in favour of a nature-based approach to urban projects. The perception that incorporating what are seen as innovative NbS will add cost or time to a project is not supported by evidence. If NbS is included in the original

conceptual design from the outset, then it can often result in additional benefits accruing, with cost saving, and a significantly lower carbon footprint. If appropriately designed, NbS can also lead to reduced maintenance costs.

- The EU Taxonomy is a science-based classification system which provides a standard for determining whether an economic activity can be considered environmentally sustainable, using six criteria as set out below. If capital projects being funded in Ireland through public as well as private investments were to follow these requirements, this would contribute significantly to the delivery of urban NbS, as the use of nature based urban rainwater management contributes towards the first four listed of these six objectives.
    - Climate Change Adaptation
    - Sustainable use and protection of water and marine resources.
    - Pollution prevention and control.
    - Protect and restore biodiversity and ecosystems.
    - Climate Change Mitigation
    - Transition to a circular economy.

(Source Davy Horizons "Future Proofing Financial Reporting for Sustainability")

- The Local Authorities have identified a number of objectives in the policy document "Delivering Effective Climate Action 2030". Under Strategic Goal #3 "Deliver on Climate Adaptation and Climate Resilience" the document "recognises that local authorities will have a role to play in the implementation of other sectoral plans, e.g. flood risk management, water quality and infrastructure, heritage, transport infrastructure and biodiversity." And proposes several "Key Objectives" including "Prioritise nature-based solutions, where possible".
- It should, therefore, be a clear objective of this strategy that, insofar as is possible, all future urban projects should incorporate the management of urban rainwater using appropriate and integrated nature-based solutions. This, in turn, requires economic appraisal and tendering processes to reflect this objective.

  The lack of finance has been identified as a major constraint in delivering urban adaptation measures across the E.U. (See Chapter 6 of the EEA

Report “Urban Adaptation in Europe”)
https://www.eea.europa.eu/publications/urban-adaptation-in-europe

- This is mirrored in Ireland where the Climate Change Advisory Council Annual Report 2023 notes, under Chapter 3 Adaptation Progress in Ireland that “Inadequate human and financial resources for adaptation are key challenges reported by sectors and local authorities. Detailed information on the budget for, costs of and investment requirements for adaptation is lacking across central and local government”.
- The World Bank has produced a timely report assessing the benefits and costs of nature-based solutions for climate resilience. (B. van Zanten, G. Gutiérrez Goizueta, L. Brander et al., ‘Assessing the Benefits and Costs of Nature-Based Solutions for Climate Resilience: A Guideline for Project Developers’, World Bank Group, 2023.) The report targets project developers by providing guidelines that detail the benefits and costs of nature-based solutions at a project level.
- UK Agency CIRIA has produced a tool called “B£ST” that provides a structured approach to evaluating a wide range of benefits from blue-green infrastructure (particularly SuDS and natural flood management) often based upon the overall performance of the chosen intervention. https://www.ciria.org/CIRIA/Books/ciriabest.aspx

8.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Specific funding for adaptation is needed	An adaptation budget is set for 2030 and an assessment of what is required to make Ireland resilient by 2050 and beyond is undertaken, based on agreed consistent criteria. *	No specific adaptation budget in place.	National Adaptation Budget in place to 2030	National Adaptation Budget in place to 2050.	
Urban nature Based Rainwater Management to be supported in urban project funding, as part of climate adaptation policy.	Current public expenditure and project appraisal tools to be revised to support and promote urban NbS	Current capital budgetary and economic appraisal policies do not support or promote NbS over traditional "grey" solutions to urban rainwater management.	Clear methods developed to value benefits of NbS in economic terms – to be incorporated into project appraisal, cost / benefit analysis and value engineering. Methods to also measure true climate cost of "grey" options.	Audit completed of all urban projects (value in excess of €0.1m) completed to end 2030 to assess success of measures to support urban NbS and devise any further supports necessary.	Revised and updated adaptation budget and economic appraisal tools in place to ensure ongoing urban climate adaptation and resilience using NbS.
Examine available methods of calculating benefits of NbS	Examples such as CIRIA "B£ST"	No recognised methods in place to calculate benefits of urban NbS	Adoption of a national approach to valuing NbS	Incorporation of NbS into project appraisal and valuation mechanisms	Further development of NbS benefit calculations and incorporation.

* https://www.climatecouncil.ie/councilpublications/annualreviewandreport/CCAC-AR-2023-postfinal.pdf (Section 3.1)

In addition to links shown earlier, Chapter 8 includes extracts from the following:

https://www.genevaenvironmentnetwork.org/events/innovating-and-unlocking-finance-for-nature-based-solutions/

https://www.eib.org/en/publications/20230095-investing-in-nature-based-solutions

Chapter 9 Proposed Strategy Number 6 – Education and Training

To establish appropriate linkages and resources to ensure that current and future training delivered by third level colleges, professional bodies and by the Local Authority National Training Group incorporates best practice in the integration of nature based urban rainwater management into all urban plans and projects.

9.1 Introduction

The delivery of nature-based solutions (NbS) to urban rainwater management is dependent on a number of key factors. These include:

- Awareness of the benefits of urban NbS and its potential role in terms of reduced runoff pollution, flood risk, improved climate adaptation, urban greening, urban space allocation, sustainable transport etc.
- Knowledge of planning, environmental and policy frameworks supporting the delivery of urban NbS.

- Knowledge of how to design, construct and maintain appropriate urban NBS as part of urban plans and projects.
- Capacity to communicate and promote urban NbS through engagement with local communities, elected members, and a wide range of stakeholders.

All of the above are, in turn, dependent on a wide range of people working cooperatively within Government, Government Agencies, Local Government, professional bodies, and the planning, design and construction sectors.

It is recognized that, in order to deliver urban NbS, all of those working directly or indirectly in the area of urban plans or projects must have appropriate education and training covering this area and ongoing continuing professional development (CPD).

9.2 The Current Situation

No single Government Department, Agency, third level college or professional body can adequately impact on the delivery of urban NbS due to the cross sectoral and multi-disciplinary nature of nature-based urban rainwater management.

During the preparation of this strategy, there was engagement with some third level colleges as well as the Local Authority National Training Group and a wide range of professional bodies.

LAWPRO has also been delivering lectures and advice in relation to NbS to Local Authority staff in partnership with the CAROS, the LASTNG, private sector companies and to local communities.

Five professional bodies organized a workshop to discuss urban NBS in January 2024 and education and training were among the matters discussed.

The following issues were identified during these various engagements:

- In house Local Authority Training is divided into traditional sectors such as Roads, Environment, Housing, Planning and this does not facilitate the cross departmental and multi-disciplinary nature of urban NbS delivery.
- This problem also arises with existing third level training. There is a lack of integration of urban NbS into all relevant courses and inadequate recognition of the multiple benefits delivered by urban NbS in a wide range of areas such

as reduced runoff pollution, flood risk, improved climate adaptation, urban greening, urban space allocation, sustainable transport etc.

- The delivery of urban NbS requires a new approach to urban planning, design and delivery of projects as well as the use of new materials and methods. There is also a lack of confidence in the durability and effectiveness of the proposed nature-based approach. For these and other reasons, the area of urban NBS represents an ideal opportunity for new and ongoing third / fourth level research projects. There are also opportunities for on-site “citizen science” projects that can gather data and build confidence in terms of the benefits of the proposed approach.

9.3 Key Challenges

The key challenges in this area are, in many ways, similar to those identified across a range of strategy headings and reflect the complex, cross-sectoral and multi-disciplinary nature of urban NbS delivery.

Education and training, in common with many other areas, is divided by sector, discipline or funding source and reaching the broad range of people that are needed to deliver urban NbS with a coherent, unified education and training programme does not fit easily into existing education and training structures.

In relation to the Local Authorities National Training Group, it was made clear that over 80% of the training provided was by for outdoor Local Authority staff.

While outdoor staff would have a limited role in the delivery of urban NbS, there was a need for training of this cohort as they would require an understanding of the technical design and construction of nature-based features such as rain gardens if they were to be involved in subsequent care and maintenance of urban areas that included such features.

9.4 Objectives and Strategies

The objectives and strategies are divided into the various education and training strands as follows:

9.4.1 Local Authority In-House training.

- Training Material to be developed in relation to urban NbS and introduced into existing LANTG training modules covering Roads & Transport, Planning, Water, Parks and Environment.
- Training Material to be developed in relation to urban NbS and introduced into existing CARO training modules. Work is (February 2024) underway in relation to “Tranche 2” funding in this area and the incorporation of urban NbS into this programme would have to be agreed by the relevant steering group.
- Training Material to be developed in relation to urban NbS and introduced into existing outdoor staff training modules.
- Following the adoption of the 2024 SAP training needs will be identified across the thirteen sectors that will have to prepare sectoral adaptation plans. Incorporate appropriate urban NbS training materials into these.

9.4.2 Third Level Education of Relevant Professional Groups

- Third level colleges need to audit their performance in this area, looking to ensure a coherent approach across multiple modules and schools.
- Integration of nature-based rainwater management, climate adaptation and resilience into all urban planning and design modules.
- Integrate education in urban NbS into college policies in relation to sustainability and climate adaptation.

9.4.3 Third and Fourth (Ph.D.) Level Research and Development of Nature Based Solutions

- Research was required to establish optimal designs and specifications for urban NbS under Irish conditions.
- Research into how benefits of urban NbS can be included in project appraisal systems.
- Research to establish the most appropriate settlement level rainwater / surface water management plan formats for varying settlement sizes and steps to prepare such plans.

9.4.4 Government funded Training, Research and Development

- Office of the Planning Regulator Research, Training and Public Awareness team to work with LAWPRO, the DHLGH, CCMA and other relevant stakeholders to develop appropriate research and/or training materials in relation to urban NbS

9.4.5 Continuing Professional Development

- There is a need to mainstream NbS into professional practice. To do this there is a need to better communicate the multiple benefits of NbS and why and how NbS should be integrated with traditional engineered type solutions.
- the use of case studies and practical examples to demonstrate the tangible benefits of NbS, including reporting results and performance metrics, has been identified as a key methodology to help inform design and best practice implementation of NbS.
- Both communities and professionals need skills training and capacity building support to engage with each other. It is vital that community engagement processes are not seen merely as a consultation process but as a more meaningful form of engagement[2] to co-create NbS that bring visual change to the public realm (bringing drainage up to surface level) that address the issues of urban water management but are also acceptable to local communities in terms of aesthetics, functionality and providing social capital. Training around facilitation and skills development on listening, empathy and exploring design options with communities have been identified as important in this context.

[2] The Aarhus Convention and its Protocol on PRTRs empower people with the rights to access information, participate in decision-making in environmental matters and to seek justice. They are the only legally binding global instruments on environmental democracy.

9.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Training Material in relation to urban NbS introduced into existing LANTG training modules.	LANTG modules covering Roads & Transport, Planning, Water, Parks and Environment.	No such training material in place	Training Material in Place and Being rolled out across stated areas.	All relevant training across all stated areas includes urban NbS	Training Material updated and expanded.
Training Material to be developed in relation to urban NbS and introduced into existing CARO training modules	CARO Training Modules to include nature based urban rainwater management as part of urban adaptation.	No specific urban NbS material included in CARO programme.	"Tranche 2" funding approved by steering group incorporating urban NbS into this programme.	Key role of nature based urban rainwater management included in all urban adaptation training delivered by CAROs.	Training Material updated and expanded in light of most recent SAPs and LACAPs.
2024 SAP training needs will be identified across the thirteen sectors that will have to prepare SAPs.	CARO to Incorporate appropriate urban NbS training materials into these SAP training modules.	No specific urban NbS material included in CARO programme.	Ongoing integration of urban NbS into climate adaptation training.	Ongoing integration of urban NbS into climate adaptation training	Ongoing integration of urban NbS into climate adaptation training
OPR Strategic Planning Research Programme 2023 to 2025	Phase B Project on Biodiversity/Nature Based Solutions/Green Infrastructure in line with the National Biodiversity Action Programme 2024	New Programme	Examining best practice in integrating green infrastructure, nature based solutions and ecosystem services into the preparation of land use plans	n/a	n/a
Audit of Relevant Third Level Education to determine urban NbS content.	DHLGH / LAWPRO sponsored audit of main third level colleges.	No baseline in place	Report on Audit completed with proposed steps identified.	Measurable Progress made to improve urban NbS 3rd. level education	Further Progress made to improve urban NbS 3rd. level education

Third Level Sustain-ability and Climate Adaptation Policies	Incorporation of urban NbS	Baseline varies.	Consistency established across sector that urban NbS should form part of urban sustain-ability and climate adaptation.	Integration of urban NbS into multiple education areas such as “green cities”, biodiversity, climate adaptation and resilience	Integration of urban NbS into multiple education areas such as “green cities”, biodiversity, climate adaptation and resilience
Research to establish optimal designs and specifications for urban NBS under Irish conditions.	The need for a national set of standards and specifications is recognised. (see output of multi-disciplinary seminar January 24)	Apart from the 2021 Interim Guidelines (DHLGH) there are multiple international standards, including CIRIA.	The first set of national standards and specifications relating to urban NbS is in place within a regulatory framework.	Revised and updated national standards and specifications in place.	Standards and specifications under ongoing review in line with experience and international best practice.
Research into how benefits of urban NBS can be included in project appraisal systems.	See also Chapter 8 of this strategy.	No baseline on current methods of integrating NbS into project appraisal.	Report to be prepared by joint working group, including DPER, DHLGH, DoT, DECC and others on how to support NbS using amended economic appraisal tools.	New systems in place in line with EU policies on the promotion of NbS and in accordance with EU taxonomy (see Chapter 8)	Continuous review and upgrading of assessment systems to promote green and nature based urban solutions to rainwater management.
Research to establish most appropriate settlement level rainwater / surface water management plan formats for varying settlement sizes and steps to prepare such plans.	see also output of multi-disciplinary seminar January 2024 which recommended this.	National RMP template being finalised.	Based on experience to date, develop an updated and expanded RMP template with worked examples of completed RMPs.	Continue to research performance and urban decision making arising from the existence of RMPs and the updated template.	Continuous updating and improvement of RMP methodology, allowing flexibility given local context, urban scale and available data.
Office of the Planning Regulator Training Office – role	OPR to work with LAWPRO and the DHLGH to develop	No formal system of cooperation in place.	Initial training materials relating to NbS in place, in conjunction	Further development of NbS urban design training	Ongoing review and development of integrated training

in training planners to include urban NBS	appropriate training materials in relation to urban NBS.		with LAWPRO, OPR, DHLGH and LANTG.	material based on review of experience to date.	relating to NbS, Greener urban areas, Climate Adaptation and active travel.
CPD	There is a need to mainstream NBS into professional practice	Not currently the case	CPD courses to be developed to better communicate the multiple benefits of NBS and why and how NBS should be integrated with traditional engineered type solutions.	CPD Courses in place, including multi-disciplinary courses.	CPD Courses in place, including multi-disciplinary courses.
CPD	The use of case studies and practical examples to demonstrate the tangible benefits of NbS,	Not currently in place.	Develop CPD courses across all relevant disciplines to use case studies, reporting results and performance metrics, to support and develop NbS	Have appropriate multi-disciplinary CPD courses in place.	Have appropriate multi-disciplinary CPD courses in place.
CPD	Skills training and capacity building support community engagement and consultation.	No suitable training in place.	Develop CPD training around facilitation and skills development on listening, empathy and exploring design options with communities	Appropriate multi-disciplinary CPD training in place.	Appropriate multi-disciplinary CPD training in place

Chapter 10 Proposed Strategy Number 7 – Community Engagement and Communications

Working through LAWPRO's existing structures, to reach out to relevant voluntary and community groups, including the Tidy Towns Committees to promote the concept of nature-based solutions and to support the communities in delivering such solutions.

10.1 Introduction

Community participation is seen as a key step in the wider implementation of NbS in Ireland. Community development structures and participatory models are well developed in Ireland and local communities are viewed as key delivery partners on many government initiatives, including in the areas of Health, Social Policy, Transport and Environment.

Local communities can be champions of change on the ground. This, however, requires active, meaningful engagement and communications at an appropriate level.

Through LAWPRO's work on the delivery of the public participation aspects of the Water Framework Directive, significant progress has been made in building the capacity of local groups to deliver on technical and challenging projects. Therefore,

there is a good cohort of engaged communities who can be key partners in NbS Implementation at a local level.

It is vital that community engagement processes are not seen merely as a consultation process but as a more meaningful form of engagement [1] to co-create NbS that bring visual change to the public realm (bringing drainage up to surface level), that address the issues of urban water management but are also acceptable to local communities in terms of aesthetics, functionality and providing social capital.

10.2 The Current Situation

Similar to the National NbS picture, the knowledge base that exists on the ground at a community level of NbS is limited, but recent inclusions of NbS within Tidy Towns assessments and in various government funding schemes (ORIS/URDF/Town Centers First/Active Travel), has shifted the picture towards an increased awareness of NbS.

There remains, however, a significant knowledge gap on NbS at a community level. Therefore, the opportunity exists to roll out campaigns and funding schemes to improve local community knowledge of NbS. This would lead to an increase in their uptake at a local level and would assist with advocating for the implementation of NbS within communities.

LAWPRO will continue to work with communities to build support for the integration of NbS into community relevant urban projects (from housing and Active Travel projects to public parks) and, where appropriate, support and encourage the public can participation in the design and aftercare of NbS features.

The community/voluntary sector is becoming more meaningfully involved in the realm of environmental management and incorporating the connected themes of biodiversity/climate/water into their plans and projects. LAWPRO is at the frontline of this delivery through its community water officer (CWO) network. Other locally based staff are also working in this engagement space including areas such as Biodiversity/Heritage, Climate and Community Development.

Through the work of the CWOs and LAWPRO's interaction with other local actors an opportunity exists for communities to become key delivery partners in NbS implementation and support the national drive to deliver NbS.

Active public participation in water management is at the centre of WFD delivery, through Article 14 of the Directive.

Ireland has been progressing various strategies to deliver integrated catchment management methodologies and better public participation in water management, through the RBMP Cycles.

In the current draft RBMP, there is a call to investigate the resourcing and establishment of Catchment Community Fora and delivery of Local Catchment Management Plans in the 46 Hydrometric Areas in Ireland.

Aligned with the Local Catchment Management Plans, Sectoral Action Plans are also planned to be drafted in conjunction with the key sectors in Water Management. There is an opportunity to integrate NbS Delivery into the core of each of these proposed processes.

There exists an opportunity to implement community projects which seek to solve multiple issues as part of their scope of work. This is a key communication opportunity – we can deliver more resilient communities through the appropriate use of NbS at a local scale.

Local communities can be part of the solution, are keen to get involved in the implementation but require adequate support, guidance and communication, at a local level to become the agents for change.

10.3 Key Challenges

- Animation: Simplifying complex technical details and the benefits of NbS infrastructure to a community audience.
- Acceptance: Keeping communities onboard.
- Audience: Communication to a wide range of stakeholders.
- Support: NbS delivery requires support from a technical and financial perspective.
- Simplifying the topic: Targeted messaging on the different aspects of NbS.
- Obtaining community buy-in to NbS Projects in regards the community gain and maintenance aspects – Why are we using NbS rather than traditional engineering solutions?

- Accounting for multiple benefits.

10.4 Objectives and Strategies

- Animation of Community NbS: Through the production of targeted Guidance on NbS for community sector – akin to the National Biodiversity Data Centre Pollinator Plans. Guidance for: Local Communities; Local Authorities; Businesses; Parks etc.
- EU Research on Community Integration and NbS suggests that appropriate NbS implementation can deliver collaboration, social cohesion, partnerships between stakeholders, forms of co-design and co-production, which in turn contribute to sustainable/resilient communities. Further research (Wickenberg et al, 2021) suggests that NbS Implementation Frameworks can be seen as key tools for driving collaboration, identifying the multiple benefits, and empowering communities to play their part in the design & delivery of NbS projects. A holistic Urban NbS Delivery Framework should be developed for Ireland.
- Explore the Corporate Social Responsibility/Green Accountancy/SDG Delivery aspects of NBS at a community level – identify synergies between local NbS Delivery, accrual of multiple benefits (water quality/climate/biodiversity/ healthy urban spaces/place making) and the ability for the integration of NbS in Ireland to deliver on SDG Targets for Local/Regional/National Government and Corporate entities.
- Training of Local Authority (see Chapter 9) (Planning/URDF/Roads/Biodiversity/Climate/LAWPRO etc.) and Agency Staff (OPW/Inland Fisheries Ireland/National Parks and Wildlife Service/) in NbS to facilitate local animation/delivery of NbS projects and plans.
- Make Technical Support/Guidance on NbS easily accessible for Communities.
- Further integration of NbS into Local Planning Policy Documents (Local Area Plans/CDPs/Regional Plans)
- Integration of NbS Delivery into work of proposed Catchment Fora and Local Catchment Management Plans.

- Include NbS delivery into the proposed RBMP Sectoral Action Plans.
- Alignment of existing and upcoming community funding calls (LEADER/TCF/RDFs/CWDF/CAF etc.) with the Implementation Strategy and/or bespoke Funding calls for NbS projects at a community level.
- Integration of NbS into the local community development sector – working through the existing community agents (RDCs/PPNs etc.) provision of Funding/training/education to these sectors.

REFS:

European Commission, Directorate-General for Research and Innovation, Nature-based solutions towards sustainable communities – Analysis of EU-funded projects, Publications Office of the European Union, 2020, https://data.europa.eu/doi/10.2777/877034

dRBMP for Ireland 2022-2027

Joint Interdisciplinary Workshop Paper on Mainstreaming NbS, Dublin, Jan 2024

Wickenberg, Björn & McCormick, Kes & Olsson, Johanna. (2021). Advancing the implementation of nature-based solutions in cities: A review of frameworks. Environmental Science & Policy. 125. 44-53. 10.1016/j.envsci.2021.08.016.

10.5 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Animation: NbS Guidance for Communities	Production of audience centered Guidance on NbS for community sector e.g. Local Communities; Local Authorities; Businesses; Parks etc.	No Guidance exists	Production and delivery of guidance documents.	Delivery of training to communities on NbS - increasing community knowledge & awareness of NbS	Assimilation of NbS into communities
Training on NbS for Local Authorities and Agencies.	Training programmes for Local Authority (Planning/URDF/Roads/Biodiversity/Climate/LAWPRO etc.) and Agency Staff (OPW/Inland Fisheries	Piecemeal and inadequate not integrated.	Promote NbS within LA/Agency Training programmes – modules developed and animated to LAs/Agencies	Develop bespoke and stand-alone NbS Training Courses for use by LAs/Agencies	

	Ireland/National Parks and Wildlife Service/) in NbS to facilitate local animation/delivery of NbS projects and plans.				
Holistic Urban NbS Delivery Framework/Auditing System	In order to promote community integration, co design and multiple benefits around NbS and NbS Delivery Framework should be developed.	Blue Green Infrastructure Framework SRA. Others available in EU/UK but none for Ireland	Research most applicable framework for Ireland and adapt to Irish context.	Roll out of NbS Delivery Framework	NbS fully integrated into all forward planning docs/urban projects and upgrades.
Accounting for NbS: Corporate Social Responsibility /Green Accountancy/ SDG Delivery aspects of NBS at a community level.	Identify synergies between local NbS Delivery, Set Targets for Local/Regional/National Government and Corporate entities	SDG Goals and other accounting systems in place.	Promote and advocate for NbS Community CSR/Green Accounting and SDG Target Delivery – in particular Tech and Building Sectors	Relevant projects on Urban NbS delivered as part of Public/Private Partnerships on NbS	Full Recognition of the Nature Positive Aspects of NbS Delivery among Corporate and Public Sector
Integration of NbS Delivery into work of proposed Catchment Fora and Local Catchment Management Plans	Catchment Community Fora and delivery of Local Catchment Management Plans in the 46 Hydrometric. Sectoral Action Plans. Investigate the opportunity to integrate NbS Delivery into each of these proposed processes.	Referred processes included within dRBMP	Urban NbS included within applicable Pilot CMPs and CCFs. Research undertaken on establish-ment of Community sectoral Action Plan and potential to deliver Urban NbS as part of these.	Delivery of Urban NbS projects suggested by CCFs and in CMPs	Full integration of NbS into the Catchment Planning and Management Process.
Include NbS Measures in	Opportunity to align Sectoral	See above	Promote inclusion of	Inclusion of NbS in	NbS Elements of Sectoral

proposed dRBMP Sectoral Action Plans.	Action Plans with NbS delivery – Urban and Rural Measures		NbS Measures within proposed Sectoral Action Plans.	proposed Sectoral Action Plans.	Plans delivered and effective.
Community Funding for Urban NbS	Alignment of existing and upcoming community funding calls (LEADER/TCF/RDFs/CWDF/CAF etc.) with the Implementation Strategy and/or bespoke Funding calls for NbS projects at a community level	Some alignment has been undertaken. No bespoke funding available.	Full recognition of efficacy of Urban NbS to deliver on Multiple Benefits at Community Level by funding Depts. and others providing funding to Local Communities. Establish-ment of bespoke NbS Urban Funding Streams – augmented CWDF	More funded projects delivering Urban NbS	Multiple Publicly Funded NbS Projects
Integration of NbS into the local community development sector	Working through the existing community agents (RDCs/PPNs etc.) provision of Funding/ training/ education to these sectors.	Some alignment and knowledge.	Establish appropriate Funding/training/ education initiatives to animate and encourage Sectoral adoption and integration of NbS.	Communities more involved in implementing, delivering and maintaining NbS.	NbS fully part of solutions matrix for the community development sector.

Chapter 11 Proposed Strategy Number 8 – Public Health and Wellbeing

11.1 Introduction

The findings of the WHO 2017 Report "Urban Green Space Interventions and Health – A review of impacts and effectiveness" show that interventions to increase or improve urban green space can deliver positive health, social and environmental outcomes for all population groups, particularly among lower socioeconomic status groups.

Local experiences and urban practice suggest that multidisciplinary planning, cross-sectoral collaborations and community engagement in the planning process are essential to ensure that urban green space interventions deliver on multiple outcomes and provide a variety of functional opportunities that attract different population groups.

https://www.who.int/europe/publications/m/item/urban-green-space-interventions-and-health--a-review-of-impacts-and-effectiveness.-full-report

The HSE Climate Action Strategy 2023 to 2050 identifies a number of "Priority Areas of Focus" and under the heading "Sustainable Buildings and the Green Environment" the corresponding strategic objective S02 is to "develop a HSE green space

framework and supporting implementation plan to optimise the use of green space for the promotion of the health and wellbeing of patients, staff and the local communities".

Evidence of the impact of green and blue space provided by Nature-based Solutions (also referred to as NbS) play an important role influencing physical health outcomes such overall general health, obesity, birth weight, child behavioural development, but also the prevalence of mental health conditions across society (see Lovell et al., 2018; Dzhambov, et al. 2018; Dempsey et al, 2018; Vaeztavakoli, et al., 2019). Research suggests contact with nature may support a reduction in the prevalence of cardiovascular, musculoskeletal, respiratory and other diseases, especially among groups with greater access to greenspace and low socio-economic status (James et al., 2014; Sandifer et al., 2015).#

https://networknature.eu/nature-based-solutions-and-health-outcomes

The recently published E.U. Copernicus Report on Climate Action also highlights, in a section titled "Extreme Weather and Human Health", the negative effect of existing urban hard landscaping on human health through, in particular, urban heating or the "heat island effect". While this is being experienced in more extreme forms in cities across the European mainland, continuing climate change is likely to result in this phenomenon being experienced in the larger Irish urban areas.

https://climate.copernicus.eu/esotc/2023/extreme-weather-and-human-health

11.2 The Current Situation

Most of our urban areas will include some green / blue spaces. In many instances, these will consist of discrete areas, separated from the general urban streetscape, that are designated as public parks or playing fields.

In the general urban areas defined by the roads, streets and public realm, planting is confined to street trees. These are often augmented in more suburban areas with grass verges and flowerbeds.

There are initiatives in existence to promote the "greening" of our urban areas and such policies often exist within City and County Development Plans.

This strategy to implement a nature-based approach to urban rainwater management wishes to support such initiatives but with the added requirement that

such “urban greening” should incorporate the nature-based management of urban rainwater.

11.3 Key Challenges

In common with many other elements of this implementation strategy, the key challenges can be viewed under two headings:

- The need to move from an entirely impermeable hard surfaced approach to one that incorporates nature, planting and landscaping in order to promote better public health and wellbeing. This involves urban space re-allocation and must be considered in parallel with other policy areas such as those promoting active and sustainable transport modes.
- Having decided to add areas of nature, planting and landscaping, it is crucial that these provide the broadest possible range of benefits to the urban area and to those living, working and at leisure within this area. Accordingly, all urban greening projects should incorporate urban rainwater management functionality.

11.4 Objectives and Strategies

The main objective is to support the concept of improved public health and wellbeing through the widespread use of urban greening programmes while also integrating this with the strategy to deliver nature based urban rainwater management.

It should be noted, in this context, that the health and welfare benefits of the more widespread use of urban greening as an integral part of nature-based rainwater management are wide ranging and include the encouragement of active travel modes (walking and cycling), increased biodiversity, reduced “heat island effect”, and a more pleasant environment for all.

11.2 Indicators and Targets (Table)

Indicator	Definition	Current Baseline	End 2027 Target	End 2035 Target	End 2045 Target
Healthy Cities	Health Impact Assessment carried out for all CDPs	Piloted in Cork by Institute of Public Health	Outputs of Cork Pilot extended to rollout of HIAs nationally	All CDPs undergoing HIA including the greening of urban areas.	Health benefits of urban NBS form part of urban planning and projects.
Health Services Healthy Ireland Implementation Plan 2023 – 2027 (Table 2 Action No. 6)	Continue to support the implementation of the Healthy Cities and Counties programme, working in partnership with the Department of Health, the Department of Rural and Community Development, and Local Authorities.	Plan in Place	Targets of Plan achieved as they relate to NbS, Lessons learned input into next Healthy Ireland plan 2028 to 2032	Targets of Plan achieved as they relate to NbS, Lessons learned input into next Healthy Ireland plan 2028 to 2032	Continuous monitoring and Review ongoing.
LA based Health Coordinators	Place making for healthy urban living using a "co-design" approach with local communities.	No HIA process for urban projects	HIA process introduced for urban projects	HIA process to promote urban NBS	Health benefits of urban NBS form part of urban planning and projects.
Use of "Place Standard" tool developed by Public Health Scotland*	Examine benefits of using this or a similar urban place assessment tool.	No such standardised method in place	Draft urban place assessment tool under development with LAs	Urban place assessment tool in place, promoting healthy urban areas.	Review and update urban place assessment methods.
UCC Environmental Health Institute	Research into Climate Adaptation	Research underway	UCC Research team to report on progress to HSE and DHLGH Planning	Review outputs and development arising from ongoing research.	Continue to research and develop nature-based and similar urban policies.

https://www.healthscotland.scot/health-inequalities/impact-of-social-and-physical-environments/place/the-place-standard-tool

Chapter 12 Next Steps – Implementation of Urban Nature Based Rainwater Management.

The preceding chapters of this strategy set out a large number of actions across a broad range of functional areas that are required if there is to be a “step-change” in the implementation and delivery of urban nature-based rainwater management solutions. Many of the strategies and actions set out require much more cooperation’s across work areas and disciplines than has been achieved to date.

The drafting of this strategy was overseen by a Working Group (see acknowledgements) drawn from a wide range of work areas and disciplines.

Now that the National Implementation Strategy is in place, it is incumbent on those who wish to see delivery actually happen to put in place an enduring oversight structure that can monitor the performance of the various actors and sectors against the actions and objectives set out in this strategy.

To that end, a Steering Committee is being established, chaired by the Water Section of the Department of Housing, Local Government, and Heritage (DHLGH).

Members of the Steering Committee, will meet two to three times a year, starting in September 2024, and it is intended that members will be drawn from the following areas.

- DHLGH - Planning and Built Environment Sections.
- LAWPRO.
- Department of the Environment and Climate Change.
- Department of Transport.
- The National Transport Authority.
- Transport Infrastructure Ireland.
- Uisce Éireann.
- Health Service Executive – Public Health Section.
- OPW - Flood Risk Management Section.

It is envisaged that, from 2025, the Steering Committee will prepare an annual report by the end of Q3 each year, setting out progress across the strategy areas compared to the objectives set out in this National Strategy.

This report will be submitted to the DHLGH for review and any updates to the objectives or target dates required will be agreed by the Steering Committee in order to maintain the focus on delivering urban nature-based rainwater management solutions across as many urban areas as possible.

References and further reading materials

Many references and links are included within the body of this strategy, in the relevant chapters and these are not repeated here.

The following are documents and material that has been developed in relation to the implementation of nature-based urban rainwater management / nature-based SuDS and these may prove to be of assistance in delivering urban NbS, pending the development of further Irish guidance and standards in this area.

Water Sensitive Urban Design in the UK - Ideas for the built environment practitioners (C723F), CIRIA, 2013.

The SUDS Manual (C753), CIRIA, 2015.

Designing Rain Gardens – a Practical Guide, Urban Design London, 2018.

Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas - Water Sensitive Urban Design: Interim Guidance Document, Department of Housing, Local Government and Heritage, 2021.

Sustainable Drainage Explanatory Design and Evaluation Guide, South Dublin County Council, 2022.

Sustainable Drainage Explanatory Design and Evaluation Guide, Dublin City Council, 2021.

DMURS Advice Note 5 "Road and Street Drainage using Nature-Based solutions", DHLGH and DoT 2023.

NTA Guidance Note "Greening and Nature-based SuDS for Active Travel Schemes" 2023.

Template Rainwater Management Plan, DHLGH and Cork County Council, 2024

IMAGES USED

END.

gov.ie/housing

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage