

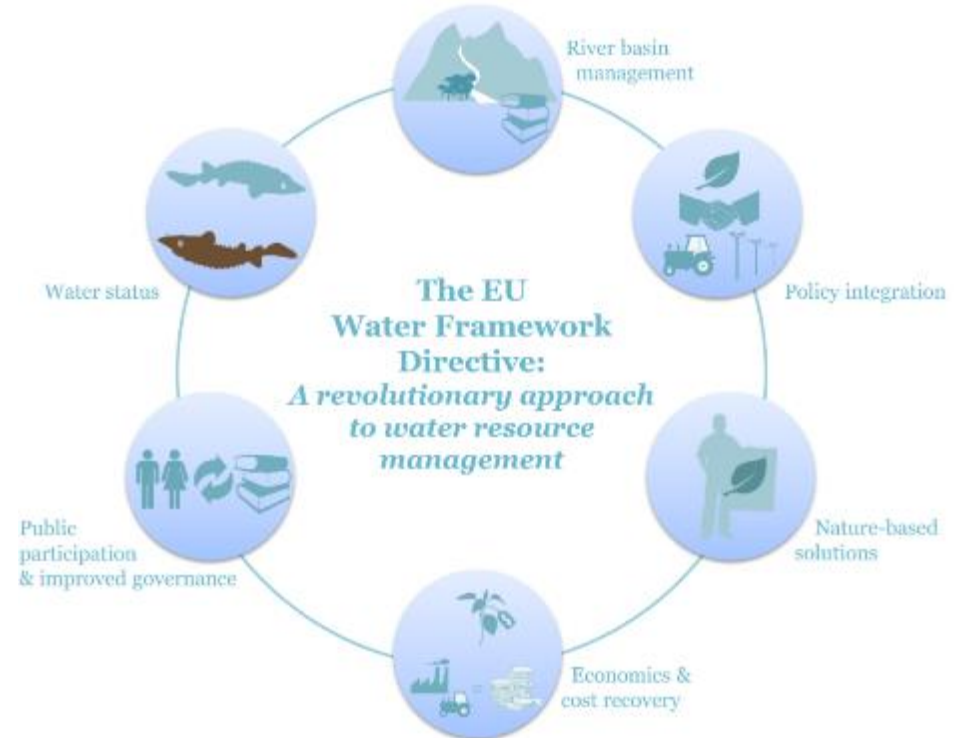
*Fran Igoe, Local Authority Waters Programme*

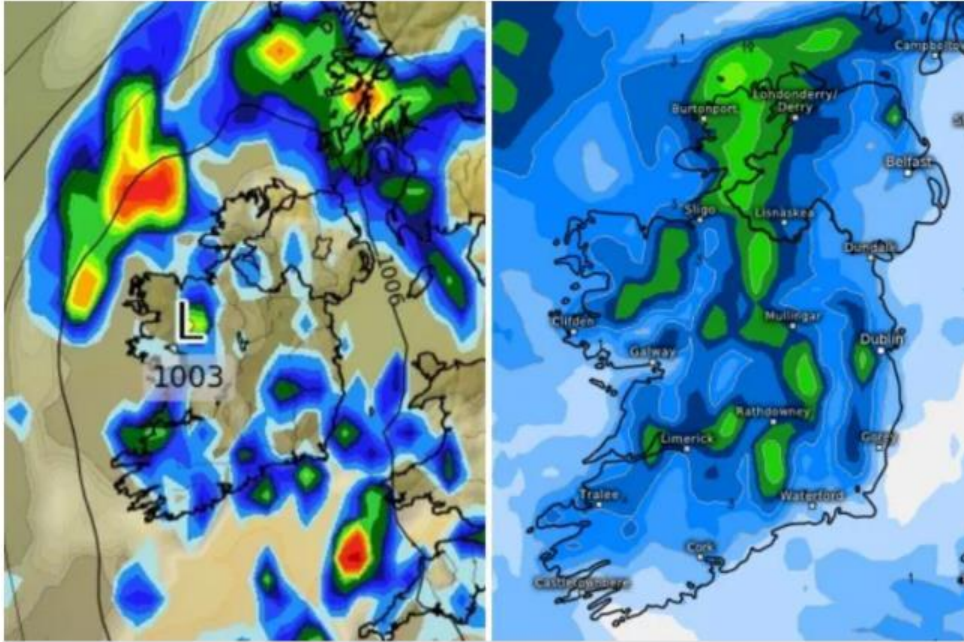
## Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas



# Overview

- **Urbanisation and Water quality impacts**
- **Rainwater management**
- **Some Nature-based SuDS techniques**
- **Inland Fisheries Ireland guidelines**
- **Top tips and Implementation strategy for next River Basin Management Plan**





News > Irish News

## THUNDER TIME Ireland weather – Met Eireann issue urgent alert for rain and thunderstorm in 22 counties as localised flooding likely

Riona Maguire

16:36, 9 Sep 2021 | Updated: 16:36, 9 Sep 2021

## New Ross Flooding, County Wexford Chamber calls on Government to support affected business in New Ross

19/08/2022 County Wexford Chamber



**County Wexford Chamber**  
Advancing business together

Over 40 businesses in New Ross deal with the impact of heavy downpours and flooding from Monday 15th August where 30-40mm of rain fell over a short period of time.

Deputy CEO Emma Dunphy said "On behalf of the entire business community affected in New Ross, we called on Government for supports for those whose livelihoods have been impacted by this flooding." County Wexford Chamber urged the Department of Enterprise to immediately activate the Business Support Scheme for those affected by flooding. Today Tuesday 16th of August Housing Minister Darragh O'Brien met with some of the business community in New Ross and assured them that supports are in place to help minimise the lasting damage of the flooding on the local community.



# Water Sensitive Urban Planning & Design

- New approach not just for new projects but also **applicable to all urban interventions**
- New or upgraded public realm, cycleways, greenways, open spaces, parks, sports and amenity areas, car parks etc.
- Principle of multiple use spaces – opportunities to slow, store and treat runoff.
- Protection and restoration of water bodies.

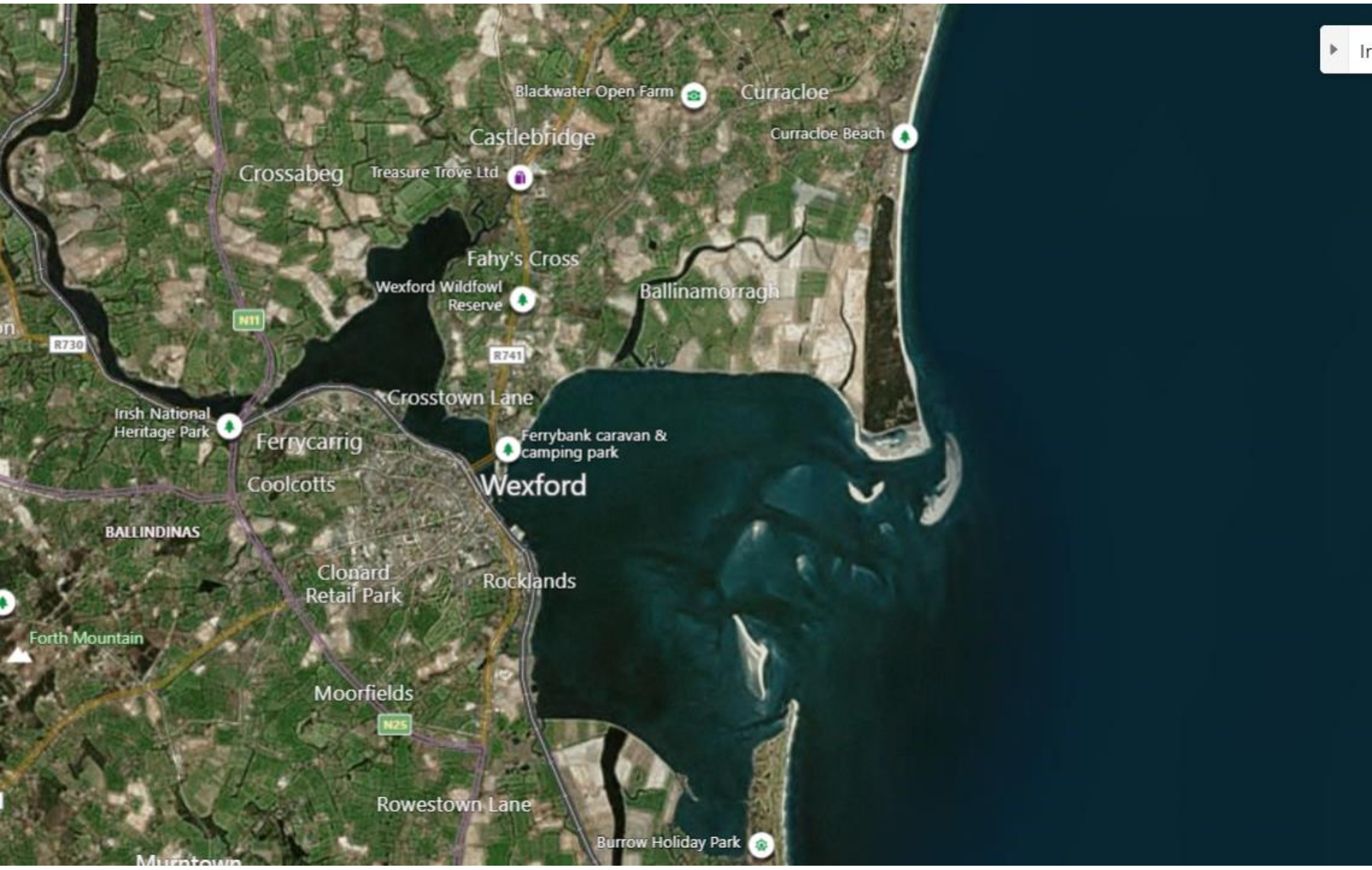
# Nature-based surface water management in urban areas

- River Basin Management Plan – draft 2022-2027
- Climate Action Plan 2021
- National Biodiversity Action Plan 2017-2021
- National Planning Framework (Ireland 2040)
- *Request for support from engineers and planners*

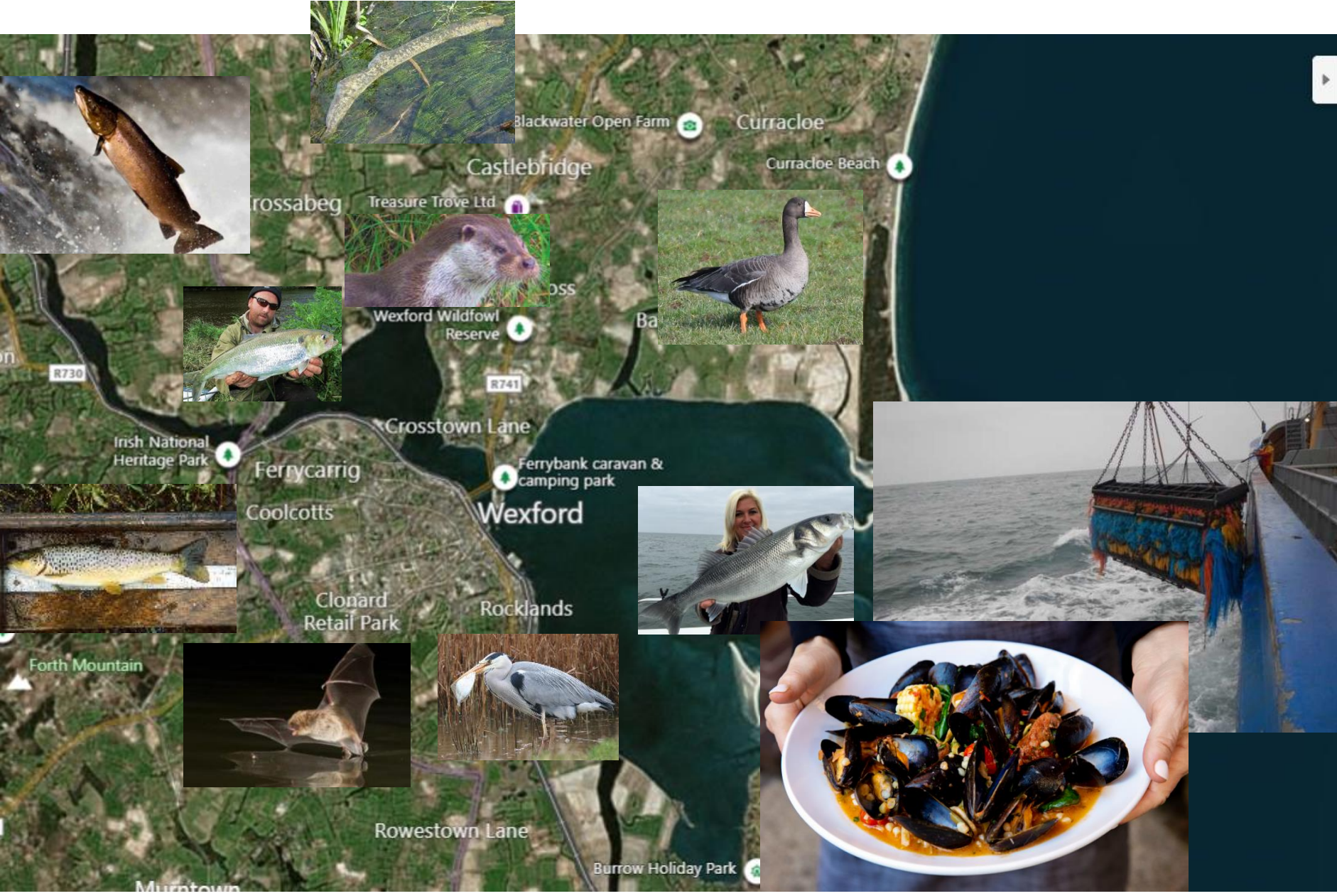


National Policy Objective 57
Enhance water quality and resource management by:
<ul style="list-style-type: none"> <li>o Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities.</li> </ul>
<ul style="list-style-type: none"> <li>o Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.</li> </ul>
<ul style="list-style-type: none"> <li>o Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places.</li> </ul>

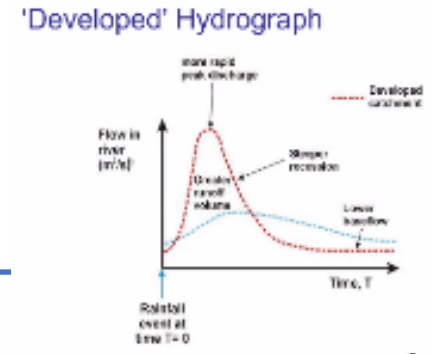
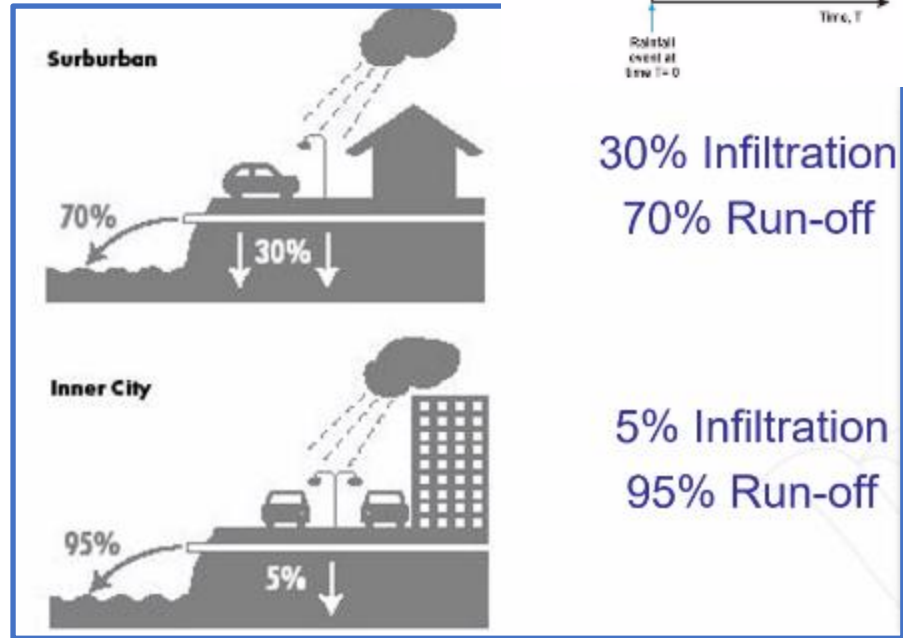
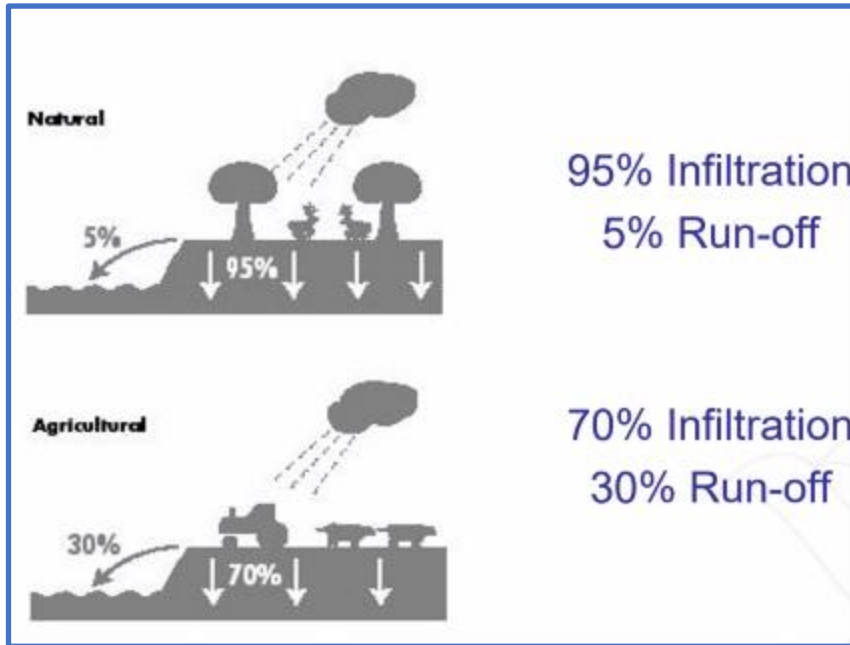
# Biodiversity and water



# Biodiversity and water



# Rainwater infiltration rates decrease with increasing hard surfaces (urbanisation)

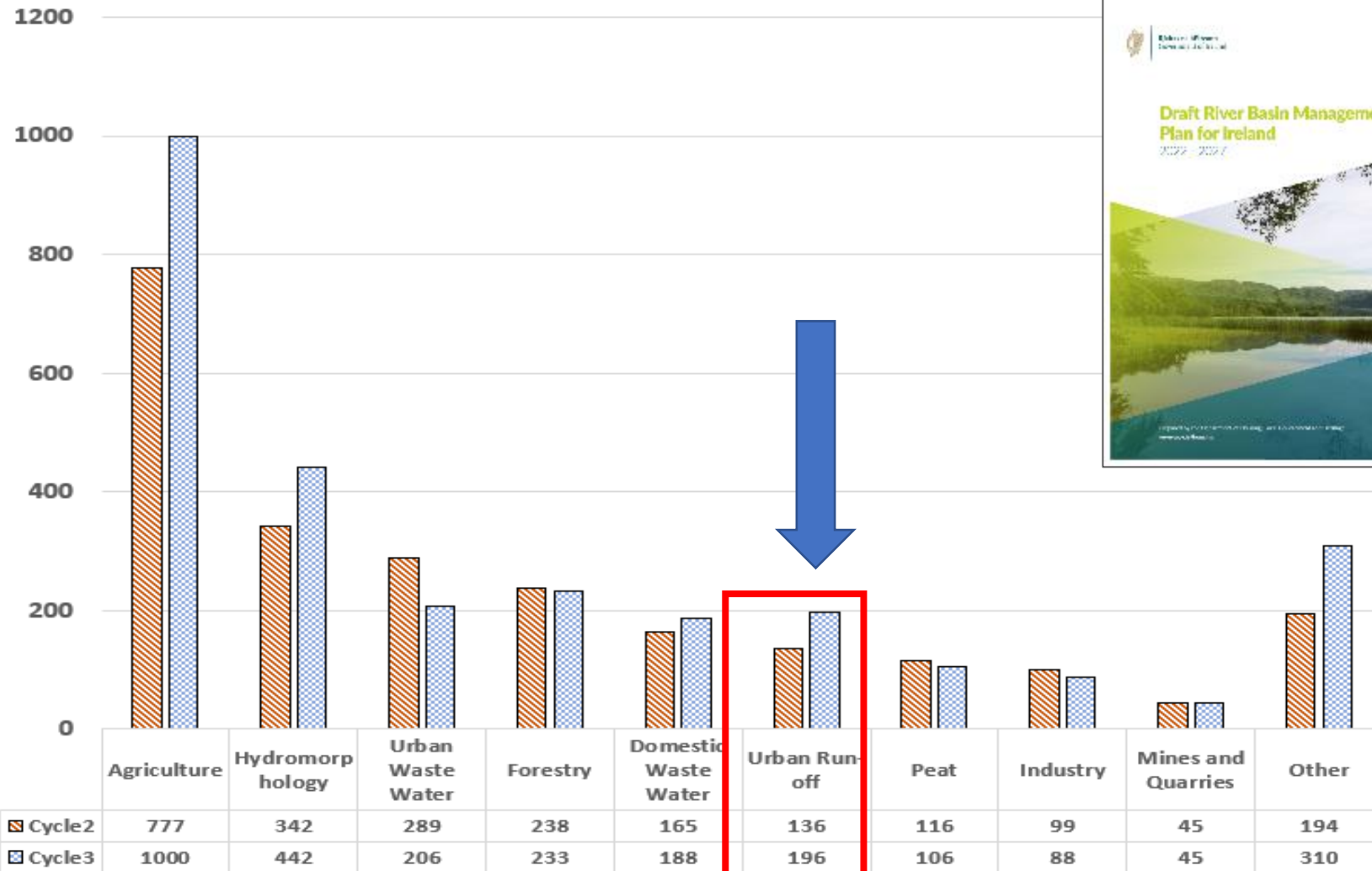


Content courtesy J. Stack, DCC & US EPA

The precipitation climate” will become more variable, with substantial projected increases in occurrence of both dry periods and heavy rain events. ICHEC, Irish Times, Sept 18 2020)



# Key pressures impacting waters



# Challenges to protecting Water quality in Urban Areas

## Combined sewer networks

- Historically – get water off site as quickly as possible
- Combined sewers designed for small populations & more permeable surfaces
- Many combined sewers have inadequate capacity to take increased rainfall ingress
- Sewage treatment plants dealing with lightly contaminated water unnecessarily
- Discharge directly into water course via Storm overflows

= **significant pollution risk**

## Contaminated surface water

- Abraded tyres from vehicles, brake pads, batteries
- Hydrocarbon compounds (some carcinogens)
- Car window washer and cleaner
- Coolant, de-icer and other chemicals
- Abraded road surface and other materials
- Dog faeces

= **significant pollution risk**



# Road runoff is extremely toxic

*After a storm, water often runs off of impervious urban surfaces directly into aquatic ecosystems. **This stormwater runoff is a cocktail of toxicants that have serious effects on the ecological integrity of aquatic habitats.** Young et al 2018. Nature Scientific Reports*

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## Toxic road runoff kills adult coho salmon in hours, study finds

orepudle published October 8, 2018 at 11:00 am | Details | Follow us on social media



A 5-year-old coho salmon is shown in a stream in the Pacific Northwest. Credit: David H. Secor / The Seattle Times / AP

**A new study shows that stormwater runoff from urban roadways is as poisonous to coho salmon that it can kill adult fish in as little as 2 1/2 hours.**

nature > scientific reports > articles > article

## SCIENTIFIC REPORTS

Article | [Open Access](#) | Published: 12 February 2018

## Urban stormwater runoff negatively impacts lateral line development in larval zebrafish and salmon embryos

Alexander Young, Valentin Kochenkov, Jenifer K. McIntyre, John D. Stark & Allison B. Coffin [✉](#)

# Surface water runoff management in ROI

## SuDS – Sustainable urban Drainage Systems



Often....



- Contaminated water not treated
- Often block up / not maintained
- Underground so cannot be adapted for Climate resilience

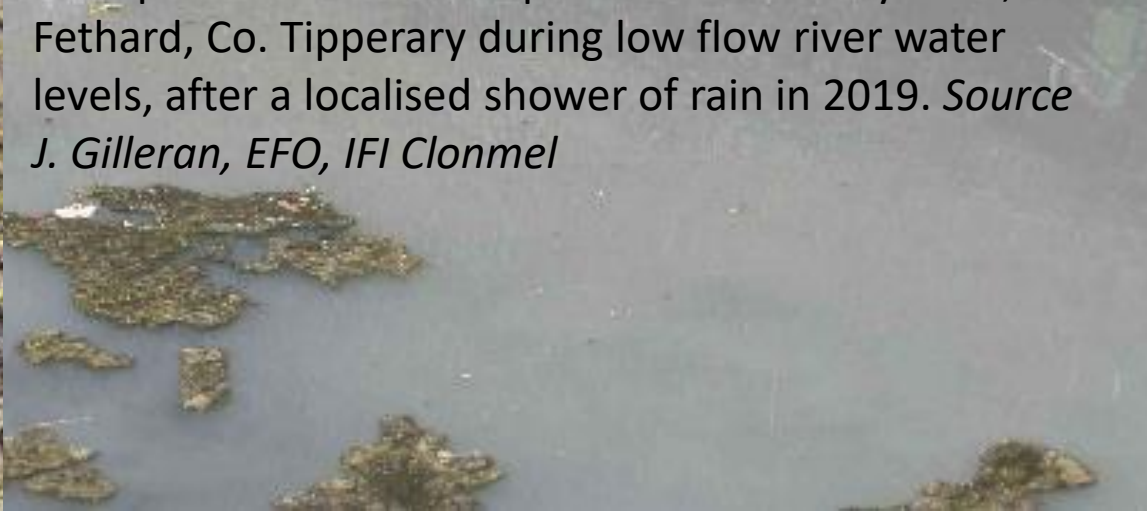
# Practical example



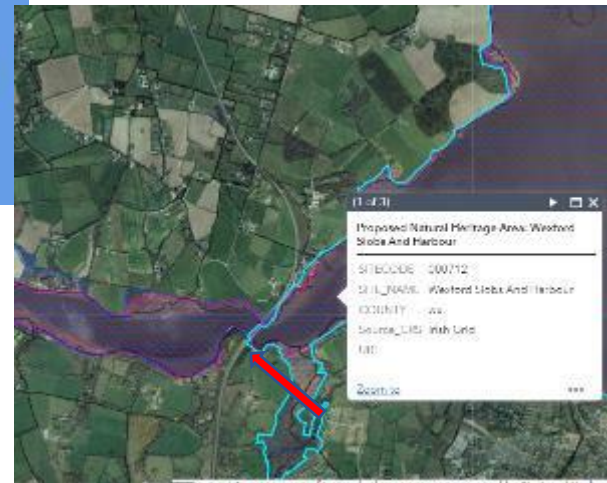
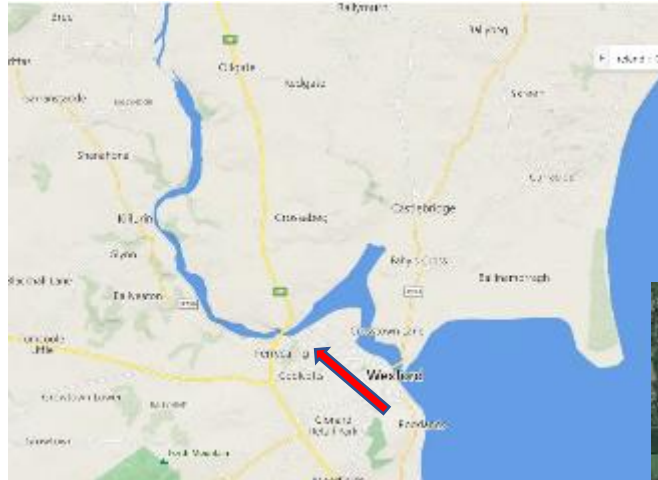
Clashawley River, a tributary of River Suir in Fethard Village, Co Tipperary. Important habitat for white-clawed crayfish. Crayfish plague has wipe out most of the population, but eDNA and visual confirmation of crayfish in this tributary Sept 2022.



Example of Stormflow impact on Clashawley River, Fethard, Co. Tipperary during low flow river water levels, after a localised shower of rain in 2019. *Source J. Gilleran, EFO, IFI Clonmel*



# Example of no treatment from road hard surface – into SPA



We need to be thinking about primary, secondary and tertiary routes also. 11/09/22

# (True)Nature-based Surface water Management

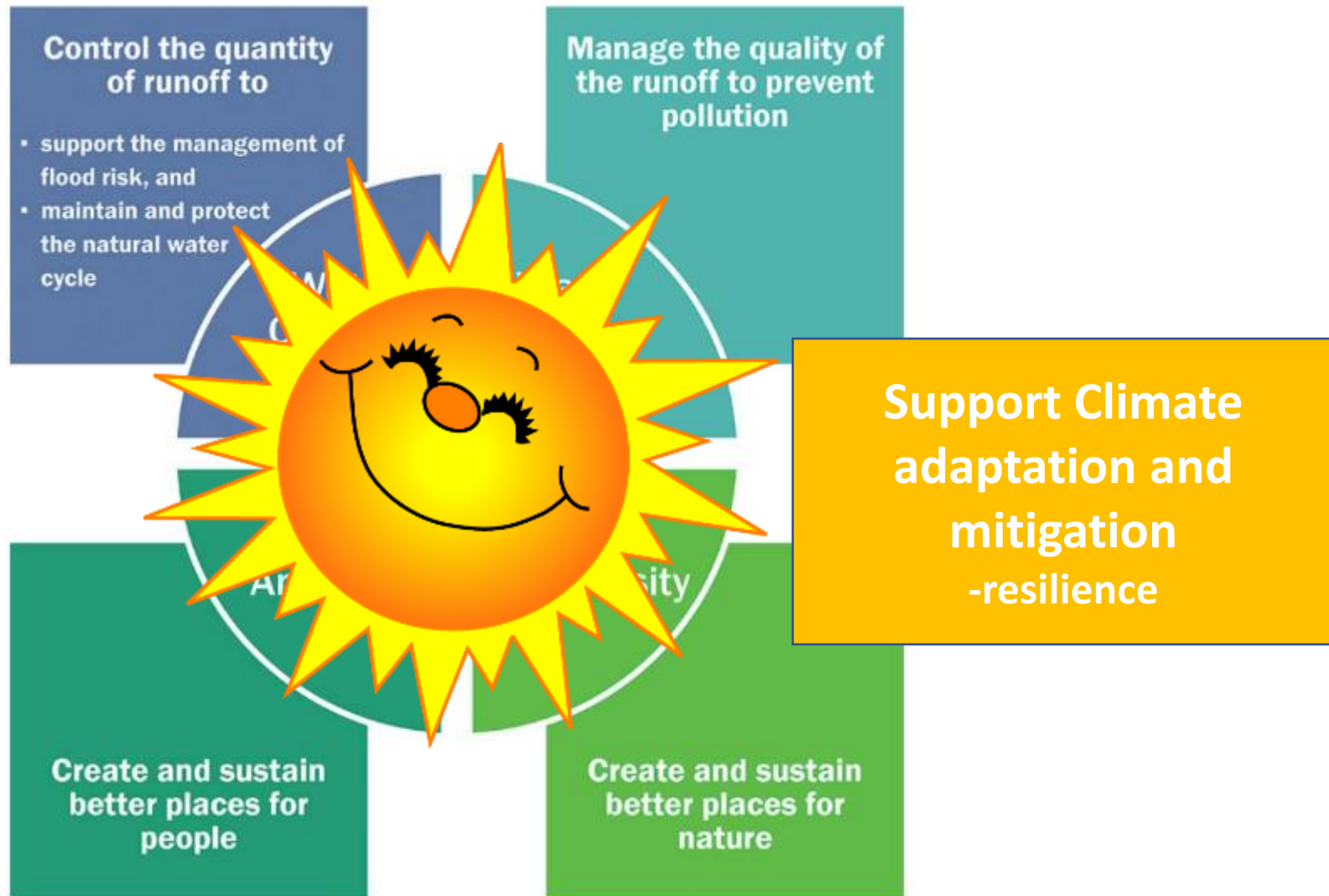
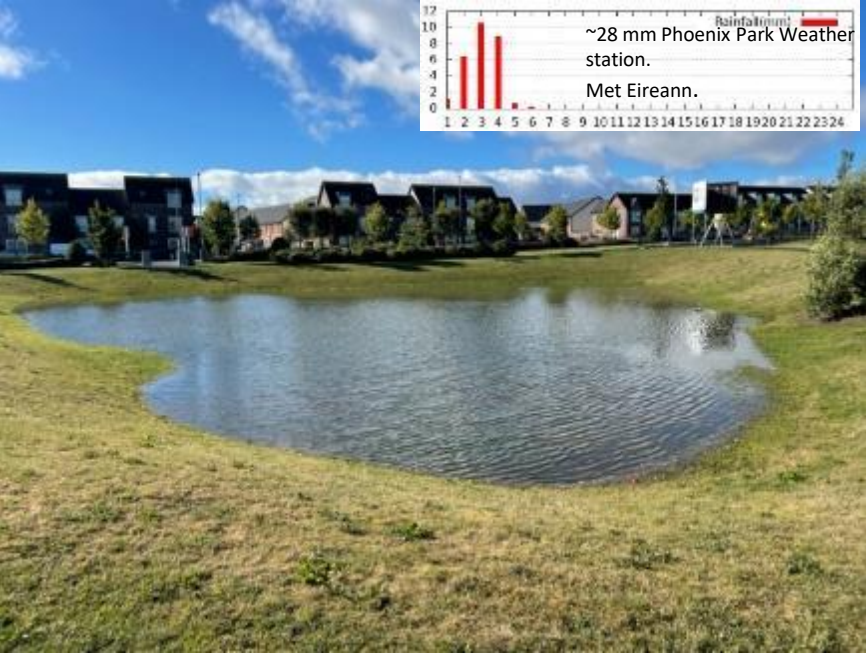


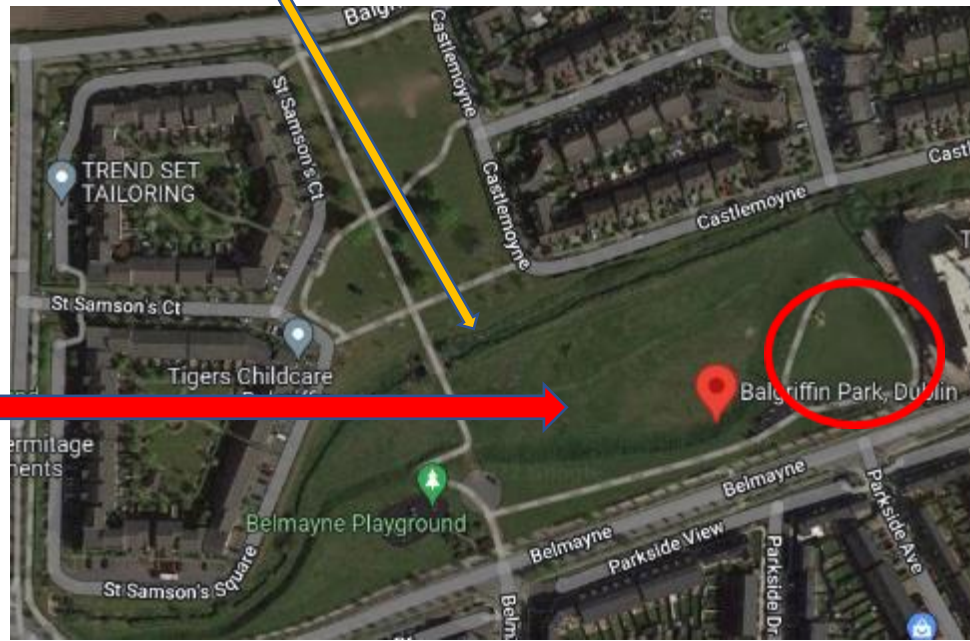
Figure 3: The four pillars of SuDS design



# Basic SUDS example in action – North Dublin



- This area is normally dry. It is fed from the housing estate you can see in the background and discharges to a small stream. 04/09/22. C Galvin



- Drained one day later. 05/09/22. C Galvin

Next day

# Ok what do Nature-based SuDS look like?



Courtesy D  
Joyce Cork CoCo

# Honeycomb, grass permeable paving: Wexford Min Ryan Park



Vegetated filter strip, N24 Clonmel



## Planted roundabout, N24 Clonmel



N24 Roundabout Clonmel. Planted with wildflowers, the roundabout not only provides for increased surface water filtration but also provides for pollinators. A flock of goldfinch took up residence here

Retention basin, City West (IFI Offices)





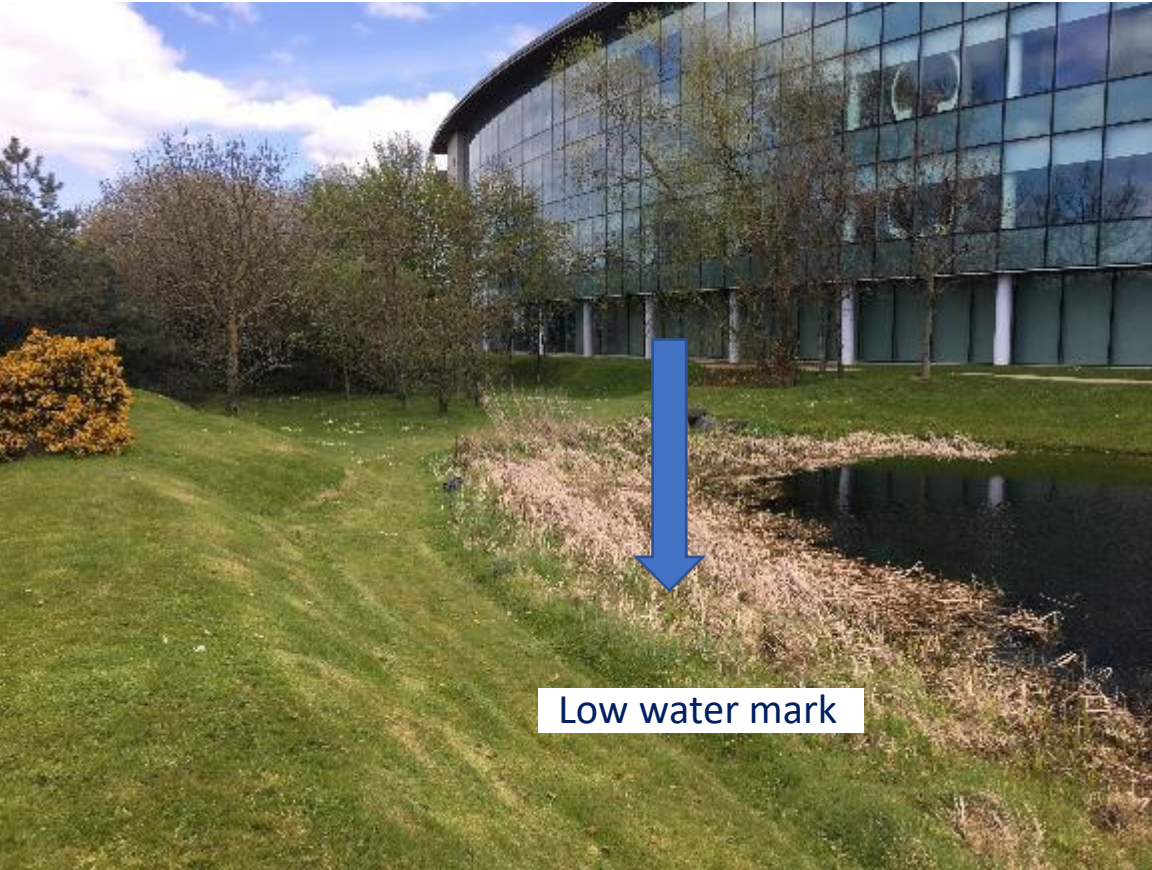




# Detention ponds, City west







High water retention



# Swale, Cork



## Wet swale, City West



Swales, Forth Mountain, Wexford 11/09/22



## Swales and wildflower meadows: Wexford Min Ryan Park



Greening – with the multiple benefits

Biodiversity rich swales take water rather than gullies, pipes or drains. Less trafficked areas covered with “grasscrete” rather than tarmac.

*Water, biodiversity and Climate risk benefits*





Wildflower meadow  
built into entire project





Making space for water. Dennis Burke park in Clonmel floods in February 2021. By working with Nature the park serves multiple functions including supporting amenity, biodiversity, alleviating flood risk and providing essential services in Clonmel with greater Climate resilience.



More food in the floodplain (e.g. worms) = bigger fish

# *Plan and optimise for nature:*

## Green roofs

- Effective 1<sup>st</sup> point of interception of rainwater
- Technology has moved on
- But still uneven distribution across the country
- Why?
  - Not considered important
  - Too costly – increase costs on developers and owners
  - Limit architectural design
- But can have significant nature benefits



# Off street raingarden, Clonmel





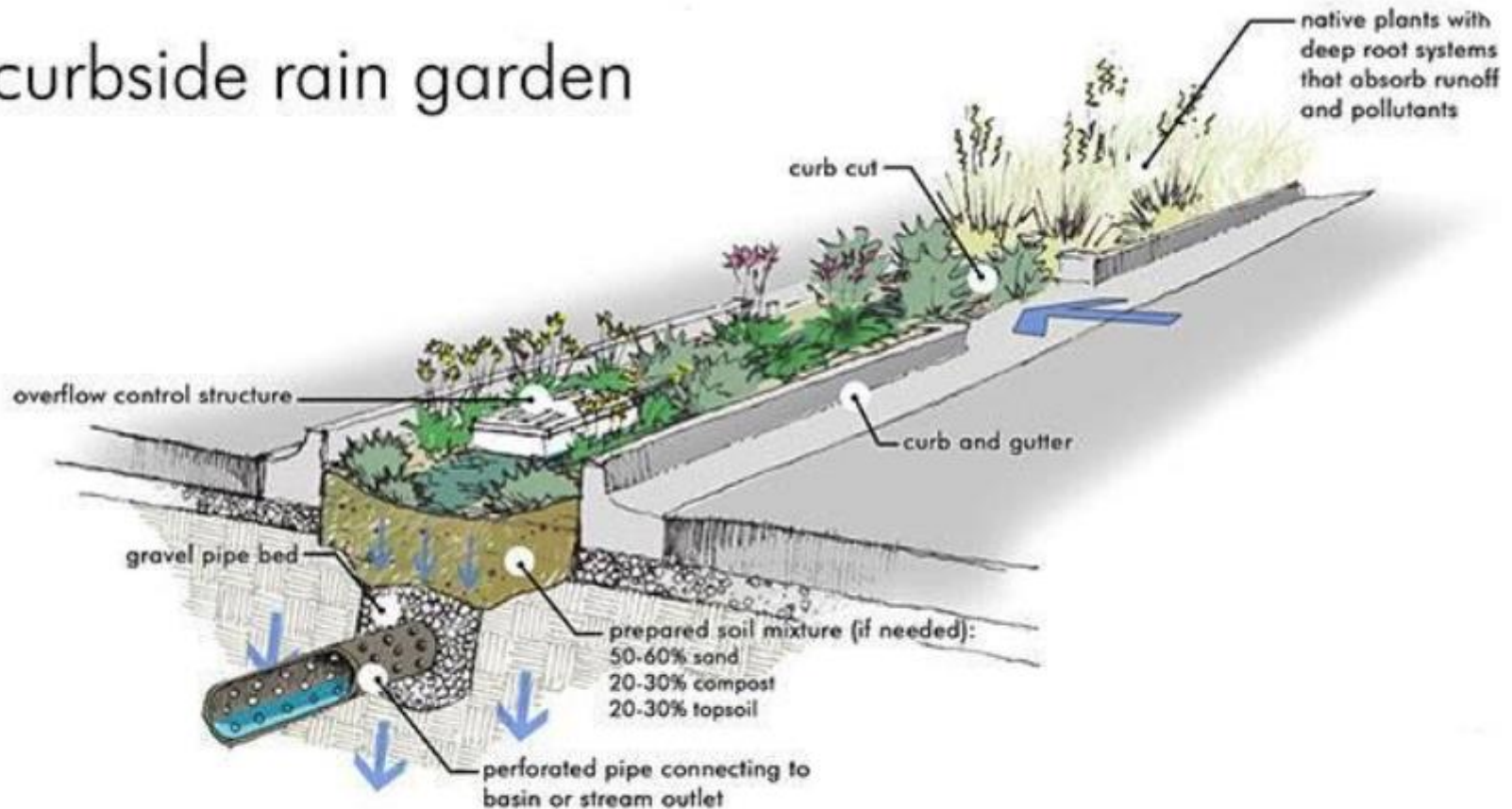


Courtesy Ian Titherington, Cardiff Council, Wales



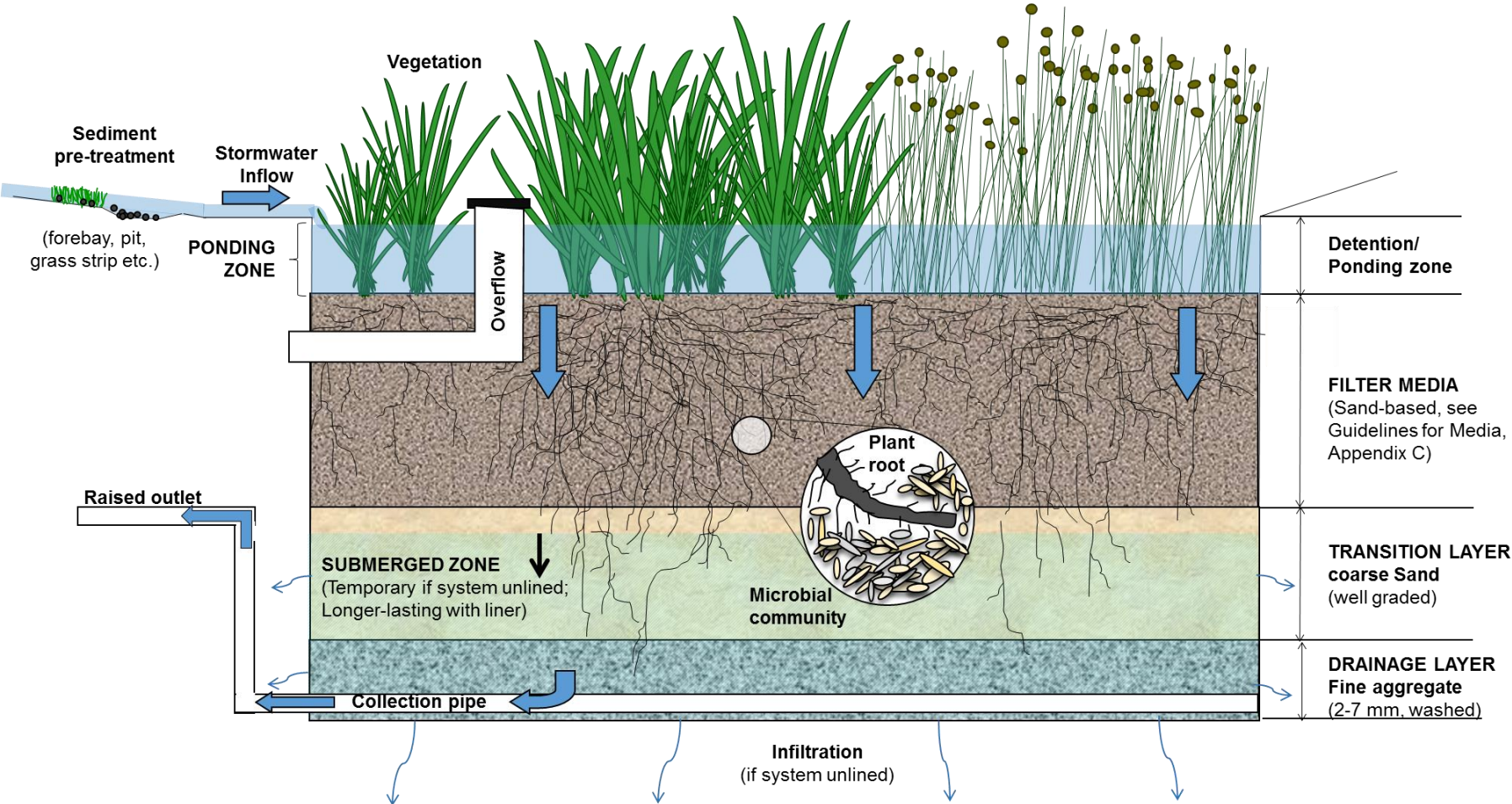
# Using vegetation to retain and treat contaminated water

## curbside rain garden



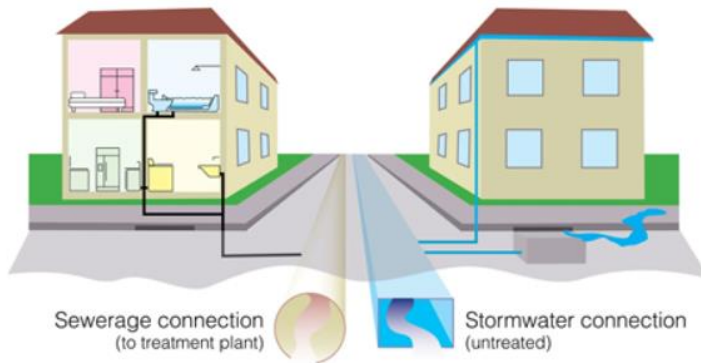
Raingardens utilise a combination of clean stone aggregate and proprietary units to create void space beneath a planted topsoil layer. They are self-watering flower beds but engineers to filter and surface water runoff. These techniques are a cross between Bioretention basins and swales.

# How a raingarden or bioswale filters out pollutants!

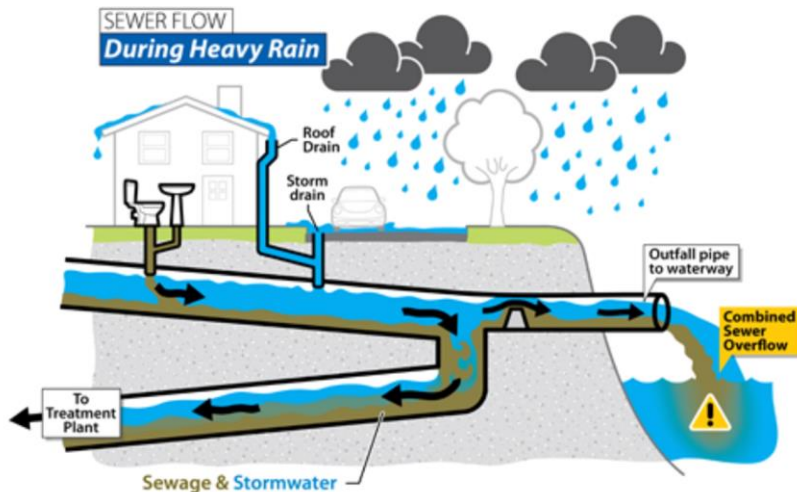


# When sewers and stormwater use a shared network – slow & reduce the flow

The difference between stormwater & sewage connections



Sewers and stormwater networks should be separate



However often older parts of settlements have combined networks  
Integrating Nature-Based solutions in street upgrades offers a chance to reduce the volume of stormwater entering shared networks to protect the urban environment

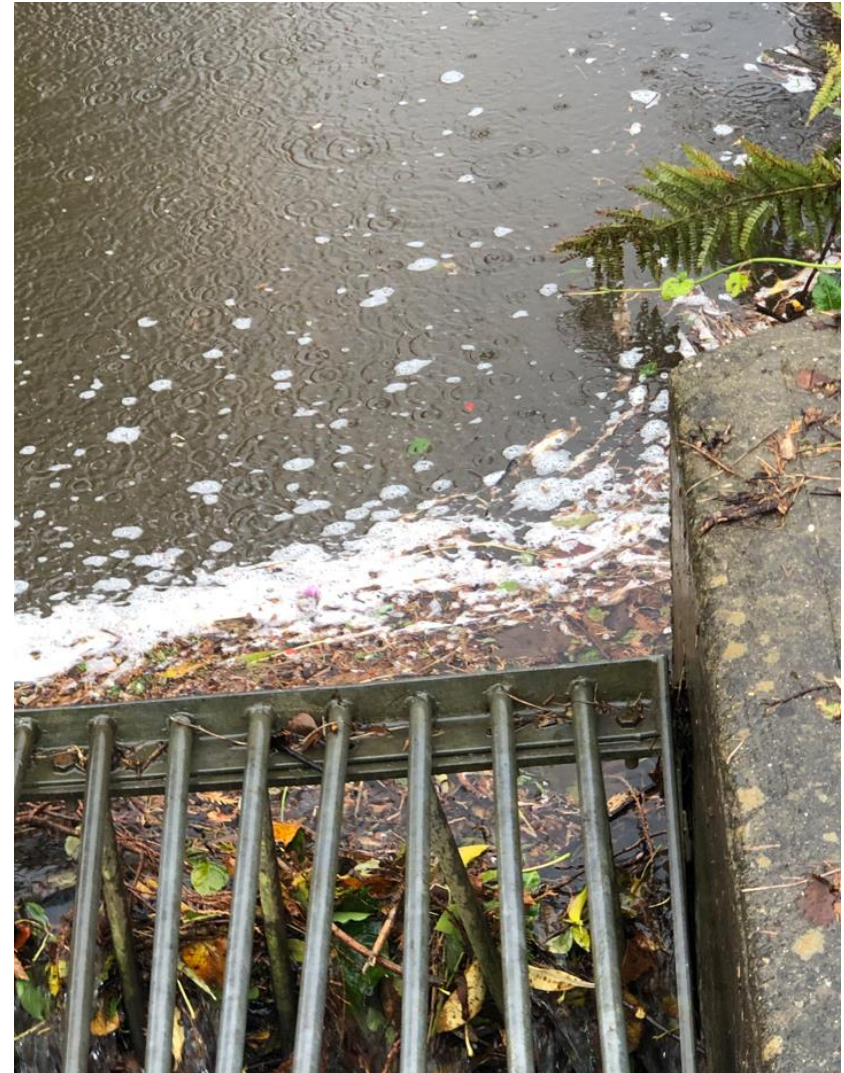
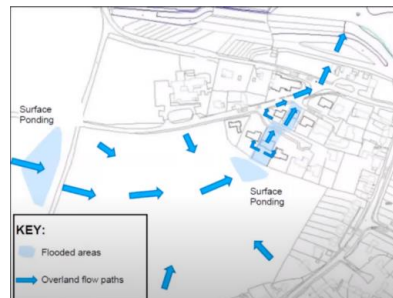


Example of rain garden under construction. But there are lots of designs out there and it is important to design with place making in mind (and biodiversity!)



# First flush (e.g., 1<sup>st</sup> 20% of rainfall) can be highly contaminated

First flush is the **initial surface runoff of a rainstorm**. During this phase, water pollution entering storm drains in areas with high proportions of impervious surfaces is typically more concentrated compared to the remainder of the storm.





- [Landscape | Central Coast Low Impact Development Initiative \(centralcoastlidi.org\)](http://centralcoastlidi.org)

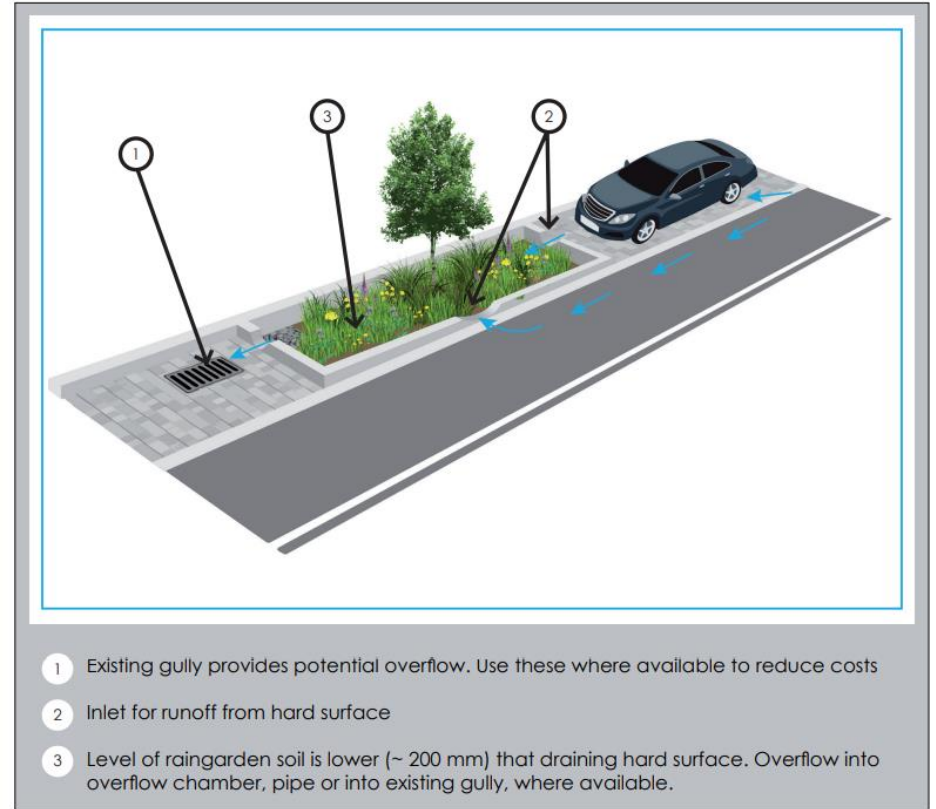


Figure 4.4 Rain garden schematic –3 D

Still possible to construct rain gardens and connect overflow to gullies!



DATE: NOVEMBER 9TH 2020 TIME: 10:00 - 13:00  
 LOCATION: WEBINAR (Please register at [info@ipi.ie](mailto:info@ipi.ie))

**URBAN PLANNING AND NATURE BASED SURFACE WATER MANAGEMENT FROM THEORY TO PRACTICE**



Purpose: to assist planners, engineers, architects, landscape architects in their respective roles in planning and implementing SuDS in a wider Green and Blue Infrastructure context for Ireland.

Sustainable Urban Drainage Systems (SuDS) are referred to in planning policy and County Development Plans as means to address hard surface runoff associated with development. Overground SuDS or 'Nature Based' options provide multiple benefits (water quality, biodiversity, amenity, use, health, climate change adaptation/mitigation) and can be incorporated more easily into wider Green and Blue Infrastructure strategies. In practice, however, their use and implementation on the ground varies across the country.

This short webinar will look at the experiences of various authorities with SuDS and Green and Blue Infrastructure in Ireland. Approaching the challenges from planning, urban and engineering perspectives, the aim is to provide a better understanding of what can be achieved and planned for and stimulate a discussion on how SuDS and related Green and Blue Infrastructure can be better incorporated into current Authority work practices and County Development Plans and implementation.

SOURCE: The Planning System and Flood Risk Management - Guidelines for Local Authorities, OPW 2009



**WHO SHOULD ATTEND?**

Planners, engineers (including roads and housing), architects including landscape architects, environment and parks sections professionals within local authorities and anyone involved in the planning or design of developments or the general area of surface water management.

In reality successful SuDS and Green and Blue Infrastructure implementation requires a multi-disciplinary approach within Local Authorities and therefore we encourage the participation of all relevant sections.

**THIS A FREE AND CDP RECKONABLE EVENT**

Many Local Authorities are in the middle of their County Development Plan making processes and so we encourage as many of the broad relevant disciplines to attend.

**WEBINAR PROGRAMME** Chair: IPI President / Vice President

WELCOME, MINISTER MALCOLM NOONAN TD - Minister of State at the Department of Housing, Local Government and Heritage

"Background to Seminar & Scene Setting" Fran Igoe, Local Authority Waters Programme.

"Policy and Incorporation of Green & Blue (G&B) Infrastructure" Stewart Logan & Colin Byrne, Department of Housing, Local Government and Heritage.

"Sustainable Urban Drainage Systems (SuDS) Techniques: What They Are And The Multiple Benefits They Deliver" John Stack, Dublin City Council.

"SuDS: From the ground up experience - rural context" A Planners Perspective - from Co. Waterford - Hugh O'Brien, Waterford City and County Council.

An Engineers Perspective - from Co. Tipperary - Eoin Powell, Tipperary County Council.

Raising the Ambition via G&B Infrastructure and Potential for all Local Authority Areas - Brian Finlay, Southern Regional Assembly.

SuDS/G&B Infrastructure: Practical Incorporation into Planning (Urban/Conurbation Perspective)

Planning for Riparian Corridors in Dún Laoghaire and Rathdown - Anne Murray, Dún Laoghaire Rathdown County Council.

Implementing a SuDS Strategy: the example of the Dún Laoghaire and Rathdown County Council Green Roof Strategy - Elaine Carroll, Dún Laoghaire Rathdown County Council.

IFI Guidelines for planning in the urban environment & launch - Brian Beckett, Inland Fisheries Ireland

Open Floor Discussion and Q & A: Getting Us All On The Same Page - Pulling It All Together

Panel chair: Adrian Conway, Chartered Engineer

Panel members: Stewart Logan and Colin Byrne, DHD, with input from Conor Galvin, OPW

THIS EVENT IS FREE TO ATTEND. PLEASE REGISTER AT [INFO@IPI.IE](mailto:info@ipi.ie)

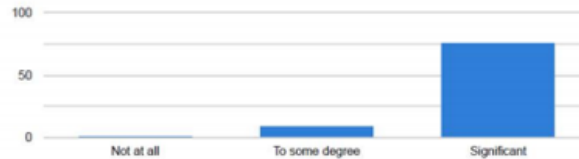


IRISH PLANNING INSTITUTE  
 Local Authority Waters Programme  
 An Rann Tithiacha  
 Department of Housing, Local Government and Heritage  
 ENGINE IRELAND

# Value of Nature-based Surface water management (SUDS)?

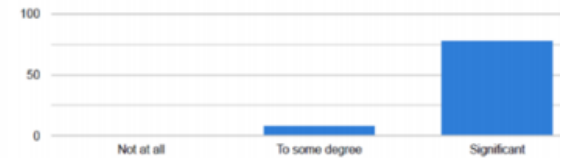
(National NBS Webinar 19/11/20; n=86 of 500)

**Water Quality**



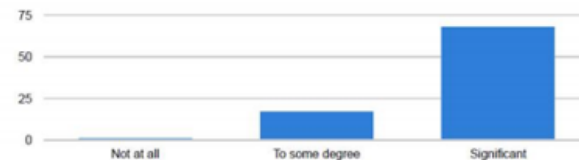
Number of responses: 86

**Biodiversity**

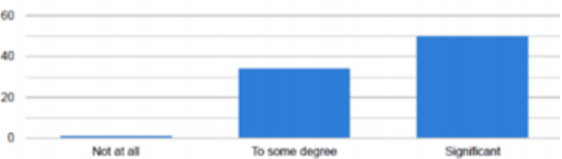


Number of responses: 86

**Climate Change Adaptation:**



**Human Wellbeing**



**Q. Are Nature based Sustainable Drainage Systems being adequately implemented in Ireland? 81% said no.**

**Q. Why? Policy, legislation, leadership, governance, technical guidance, training, local authority capacity, funding all need significant improvement ..(majority of respondents)**

**We are looking for opportunities to build in Nature-based SuDs at scale in (public realm) URDF, Active travel and other Rural Schemes (ORIS, CLÁR, LIS, TVRS etc) & The private sector have a role here too.**

- Best practice to manage rainwater in project areas and to minimise impact on sensitive areas
- Protecting water quality and flood risk
- Protecting and enhancing biodiversity
- Building in Climate change resilience and benefits
- Potential to increase amenity value of project (additionality)
- Looking for multiple benefits
- need to design them in at the earliest stage! Link in with Irish Water and seek opportunities to reduce surface water flow to combined sewer networks!



# Finally –NBS should ideally sit within a Rainwater management plan / (surface water management plan)



Green roof



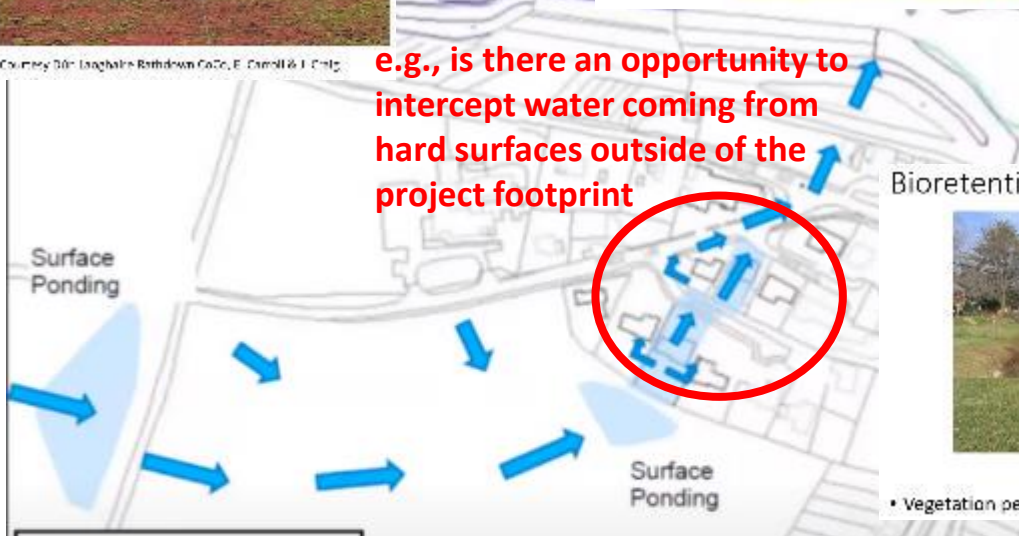
Courtesy B&B Loughbane Rathdown Co. Co., E. Carroll & J. Conig

Ponds/wetlands

Shallow side slopes  
Erosion protection  
Amenity and Biodiversity



**e.g., is there an opportunity to intercept water coming from hard surfaces outside of the project footprint**



Bioretention



• Vegetation percolation and/or drainage layers

- Work out preferential flows
- Look at topography – contours, hilly areas etc
- Link in proposed open, green spaces (public spaces)  
Plan for larger Nature based SuDS for these areas with amenity in mind  
Integrate then with development planning requirements (green roofs, SWALES, rain gardens etc)

**KEY:**

- Light blue shape: Flooded areas
- Blue arrow: Overland flow paths

SWALES



Effectively grassed drains – but wide and mostly dry

Rain gardens

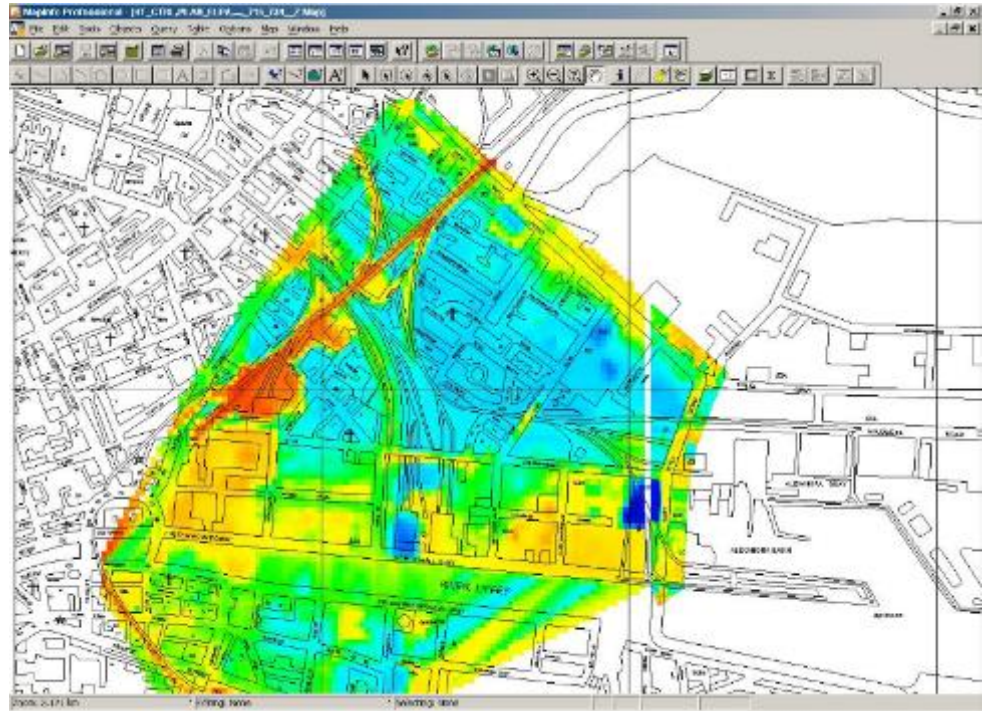


# Long term – build Nature-based SuDs (not just GBI) into

- a. county development plan (all settlement plans)
- b. develop Rainwater Management Plans

## 3D Spatial Planning The full picture

- Rainwater Management Plan prepared as part of an Urban Area Plan or other Spatial Plan.
- Requires an understanding of the contours of the plan area so that rainwater can be appropriately managed.
- Avoids reliance on enforcement of “SuDs Measures” on individual sites in favour of an overall plan led approach.
- Sees all urban areas as multifunctional and contributing to rainfall management
- OPW lidar datasets are now available as open data on the Open Topographic Data Viewer managed by GSI.
- Rainwater Management Plan can form part of overall stormwater management and flood risk plan as per 2009 OPW Planning Guidelines.



Red highest-blue lowest. LiDar gives each point a height value and this can be used to create a map showing the high to low areas

# Sustainable urban Drainage Systems (SuDS)



Green roof



Courtesy Dún Laoghaire Rathdown Co.Cc, F. Carroll & J. Craig

Bioretention



SWALES



Effectively grassed drains – but wide and mostly dry

• Vegetation percolation and/or drainage layers

Ponds/wetlands

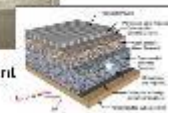
Shallow side slopes  
Erosion protection  
Amenity and Biodiversity



Permeable pavements



• Attenuation/storage and treatment  
• Structural design required



## HOW HIGH POINT DRAINAGE WORKS TO RECHARGE OUR GROUNDWATER AND PROTECT THE CREEK

**HOUSES** use different strategies to collect, infiltrate, and cleanse rainwater.

- splashblocks
- rocks
- furrows or channels
- stormwater pop-ups
- planted depressions (raingardens)
- yard drains

**STREETS** slope to one side and cuts in curb direct rainwater into planted and grass swales.

**SWALES** collect, absorb, and filter rainwater from streets and houses into the ground before going into the city storm drain.

**CONVEYANCE FURROWS** direct water away from the house via a path of gravel and crushed rock.

**stormwater pop-ups** release water into the yard

**slotted pipes** enable water to seep into the ground while moving away from the house and into the rain garden

stormwater flows across sidewalks toward swales.

**swales** are designed with crossing points.

32nd Street north of Raymond Street is porous concrete to allow water to pass through into the ground before it goes to the swale.

**city storm drain** to carry bigger rainstorms to the large pond which slowly releases cleaner stormwater to Longfellow Creek.

porous concrete **sidewalks** allow water to pass through into the ground.

filter soil mix  
slotted pipe (underdrain)

**rocky soil** holds water until it seeps into the pipe.

**yard drains** direct rainwater to swales or a pipe.

**splash blocks** slow and direct water away from the house and should be kept clean of leaves.



# PLANNING FOR WATERCOURSES IN THE URBAN ENVIRONMENT

A Guide to the Protection of Watercourses through the use of Buffer Zones,  
Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning

*\*Including one-off developments*



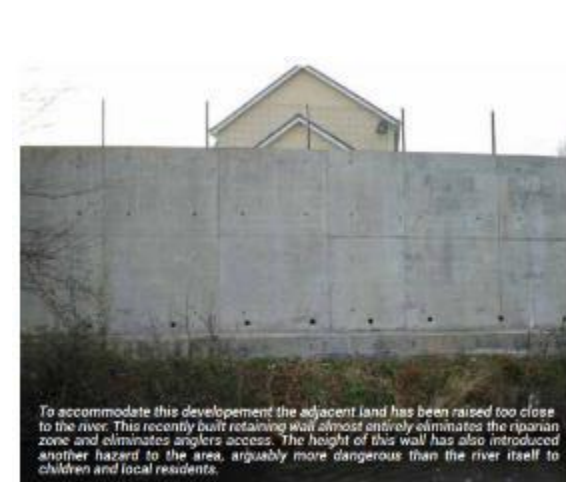
Iascach Iníre Éireann  
Inland Fisheries Ireland

A Guideline Developed by Inland Fisheries Ireland

# Extracts from document – impact on riparian zone



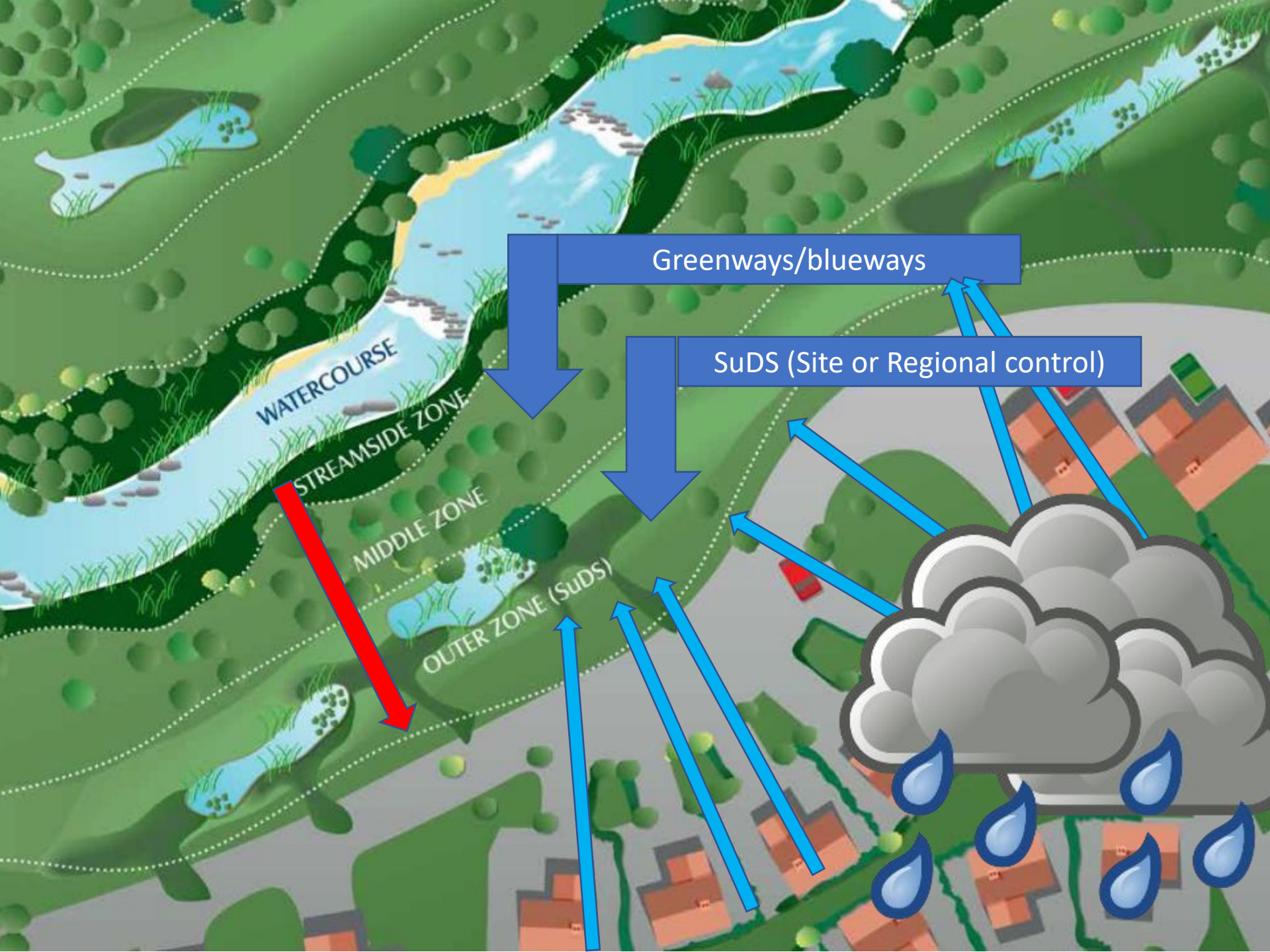
**Infilling of a high amenity glacial valley area.** In this example, the river is down to the right. Not only does this infilling of material (several meters high in places) introduce silt to the river during high rainfall events, but also degrades the riparian woodland and the area as an amenity for the wider community.



*To accommodate this development the adjacent land has been raised too close to the river. This recently built retaining wall almost entirely eliminated the riparian zone and eliminates anglers access. The height of this wall has also introduced another hazard to the area, arguably more dangerous than the river itself to children and local residents.*

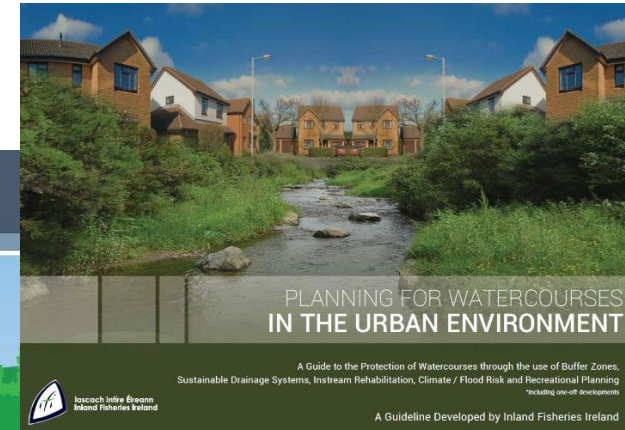
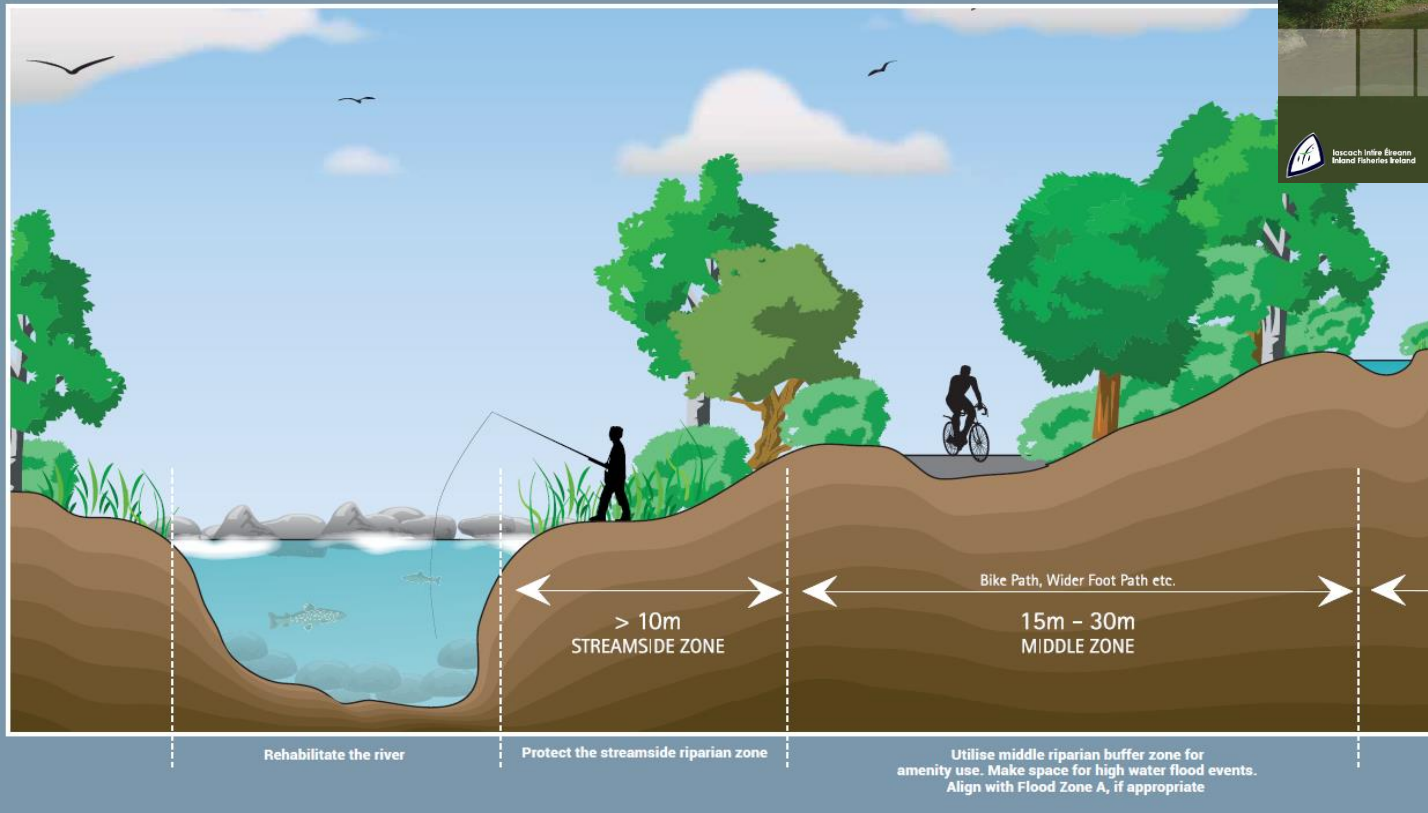
**Builders' rubble on the rivers edge.** Infilling of riparian zone with builders' rubble, which is unsightly and hazardous. The valley, a high amenity area, has also been infilled and degraded.





# NBS bring multiple benefits

## Three Buffer Subzones



# Culverts:

## *Deculverting or Daylighting*

- Culverts severely impact on river function and biodiversity
- Often impediments to fish passage
- Historic developments including carparks
- Encourage active identification and promotion of opportunities to restore urban watercourses, no matter how small, to realise benefits for the local community and environment – “daylighting”
- Culverting of existing waterways should not be facilitated unless e.g., for transport routes (then should be oversized or bridges – consult Inland Fisheries Ireland for guidance).



**NATURE-BASED SURFACE WATER MANAGEMENT & URBAN PLANNING**

**CLICK HERE TO JOIN**  
Zoom link information at footer

**NOVEMBER WEBINAR INVITE**  
Tuesday Nov 30th '21 Time: 11:00 - 13:00



**Overview** – The importance of managing urban rainfall and surface water is increasingly being recognised in terms of environmental impact. This and the increased risk of flooding due to climate change, means that we need to adopt our approach to urban planning and design in Ireland and plan for greater resilience, environmental protection and sustainable living.

This Webinar is focusing on how we move to a nature-based approach to urban rainwater management. Following the **URBAN PLANNING AND NATURE-BASED SURFACE WATER MANAGEMENT** Webinar in November 2020 which was attended by approx 500 people, and the **Significant Water Management Issues Report**, the Department of Housing, Local Government and Heritage (DHLGH) engaged in an intensive round of consultations across Local Authorities, Government Departments and Agencies, professional bodies and other stakeholders during 2021 to produce:

1. A Scoping Report with it a roadmap of proposed steps towards the implementation of nature-based solutions.
2. Produce an Interim Guidance Document.

The Webinar will outline the progress made since November 2020 and, as well as launching the outputs of this scoping stage, the webinar will hear from a number of speakers from Ireland and from Wales who will outline their experiences in this area (see programme below).

The presentations will be followed by a panel discussion and Q&A session. As part of this Webinar, we will:

1. Launch the interim guidance document to local planners, architects, urban and transport designers, landscape architects and engineers in their respective roles in planning and implementing a nature-based approach to the management of rainwater in urban areas.
2. Provide an overview of the outputs from the scoping stage consultation including the roadmap of proposed steps that would facilitate the widespread integration of nature-based solutions into future urban planning, design and all urban projects.

**WHO SHOULD ATTEND?**  
Planners, urban and transport designers / engineers, architects and landscape architects, environment, climate, biodiversity, heritage, parks and landscape professionals within local authorities and from the private sector. Successful implementation of a nature-based approach to urban rainwater management requires a multi-disciplinary and cross sectoral approach. Therefore we encourage the participation of anyone whose work directly or indirectly impacts on the planning, design, construction, maintenance or enjoyment of our urban spaces and our urban environment.

**Many Local Authorities are in the middle of their County Development Plan making processes and so we encourage as many of the broad range of relevant disciplines to attend.**

**THIS IS A FREE EVENT AND MAY BE 2 HOURS CDP RECKONABLE**  
CHECK WITH YOUR PROFESSIONAL BODY

**WEBCINAR PROGRAMME**

**WELCOME: MINISTER MALCOLM NOONAN TD**  
Minister of State at the Department of Housing, Local Government and Heritage

**Chaired by Dr. Marcus J. Collier**  
Department of Botany, School of Natural Sciences, Trinity College Dublin

**Background to Seminar & Scene Setting** – Fran Joyce, Southern Regional Coordinator, Local Authority Waters Programme

**Policy - Nature-based Solutions as a Programme of Measure in the RBMP 2022-2027**  
– Lisa Egan, Department of Housing, Local Government and Heritage

**Key Note: Practical Retrofit of SuDS in High Density Residential Areas - The Welsh Experience**  
– Ian Tishawington, Lead Drainage Engineer of Cardiff City Council

**Nature-proofing Local Authority led projects in Ireland Incorporating Nature-based SuDS into a public realm URDF Funded Project** – Leonora O’Neil, Senior Project Officer, Clare County Council

**Raising the Ambition - Incorporating Nature-based SuDS into Large and Small LA Projects**  
– David Joyce, Director of Service, Cork City Council

**Nature-based Surface Water Management: National Guidance and Implementation Strategy Scoping Study Recommendations**

1. National Guidance
2. Implementation Strategy Scoping Study

– Adrian Conway, Project Lead and ex Dublin City Council

**OPEN FLOOR DISCUSSION: GETTING US ALL ON THE SAME PAGE PULLING IT ALL TOGETHER - PANEL MEMBERS: SPEAKERS WITH INVITE FROM CONOR CALVIN, OPW & BRIAN BECKETT, IFI**

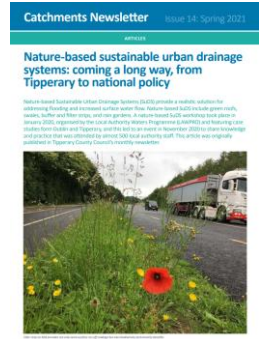
**Rain Garden** **Filter Strip** **Green Roof**



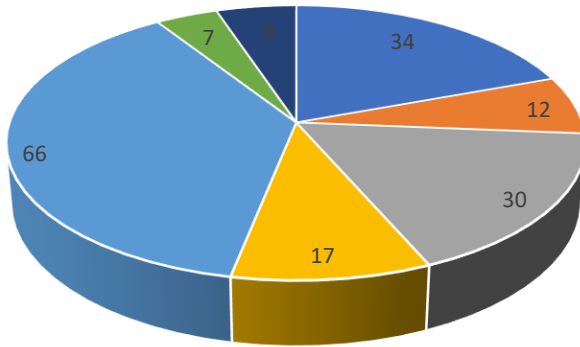
**REGISTER HERE:** [https://lawaters-ie.zoom.us/j/webinar/register/WN\\_6BYW86iQ3eiu3rpnA9iQ](https://lawaters-ie.zoom.us/j/webinar/register/WN_6BYW86iQ3eiu3rpnA9iQ)

# Nature based SuDS implementation strategy

- Significant consultation & animation post last years Webinar
- 1<sup>st</sup> time a multidisciplinary focus taken to look at Nature Based SuDS
- Extensive consultation – all relevant Govt Depts, TII, NTA, Professional bodies, NPWS, IFI, EPA, OPW, LAs, Heritage Officers/Heritage Council CAROs
- Improvements required from **policy, legislation, leadership, governance, technical guidance, training, local authority capacity, funding Institutional support**
- Mainstreaming into everything we do

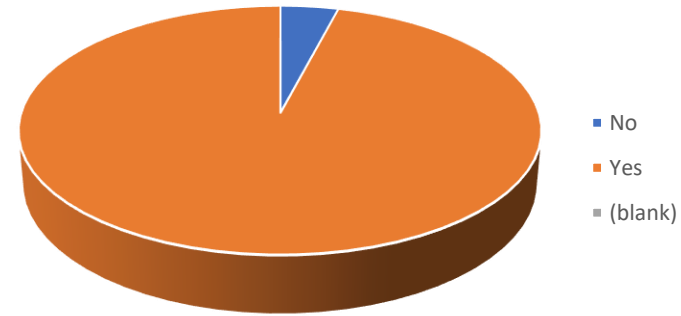


Total



- Advice from expert practitioner
- Advice from expert practitioner;Site visit from expert
- Direct technical support
- Direct technical support ;Advice from expert practitioner
- Direct technical support ;Advice from expert practitioner;Site visit from expert
- Direct technical support ;Site visit from expert
- Site visit from expert

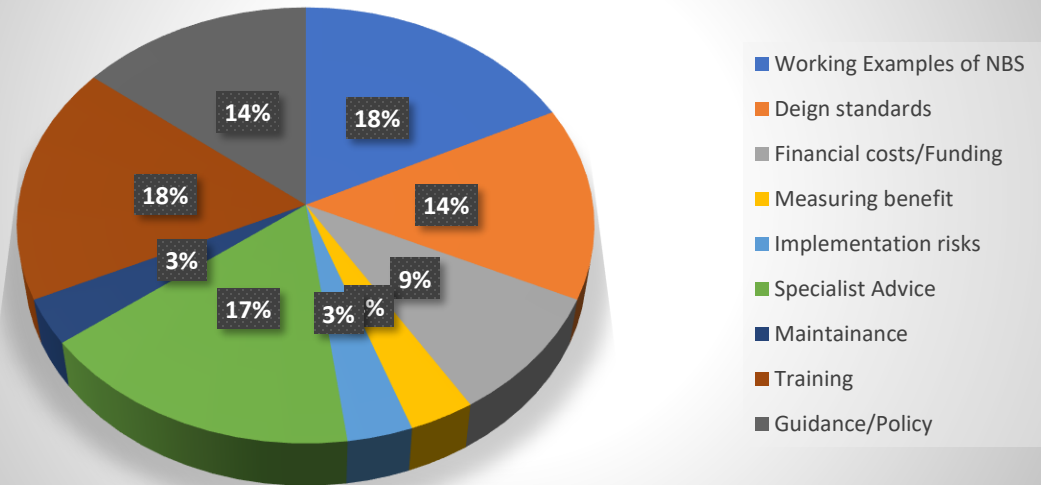
Total



DO you think your project could incorporate NBS could

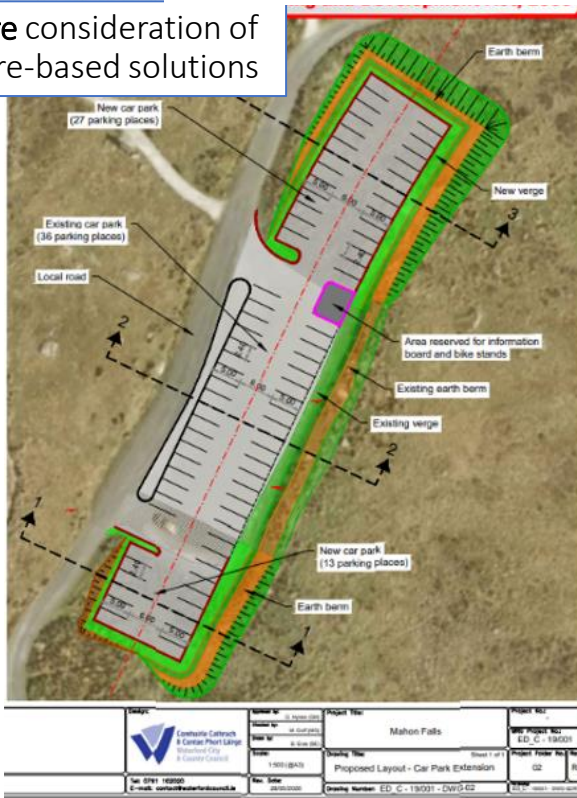
We are listening but this is a multidisciplinary approach – i.e., relevant to pretty much all LA sections

9. What support do you think you may need to help you to incorporate Nature Based solutions into your project

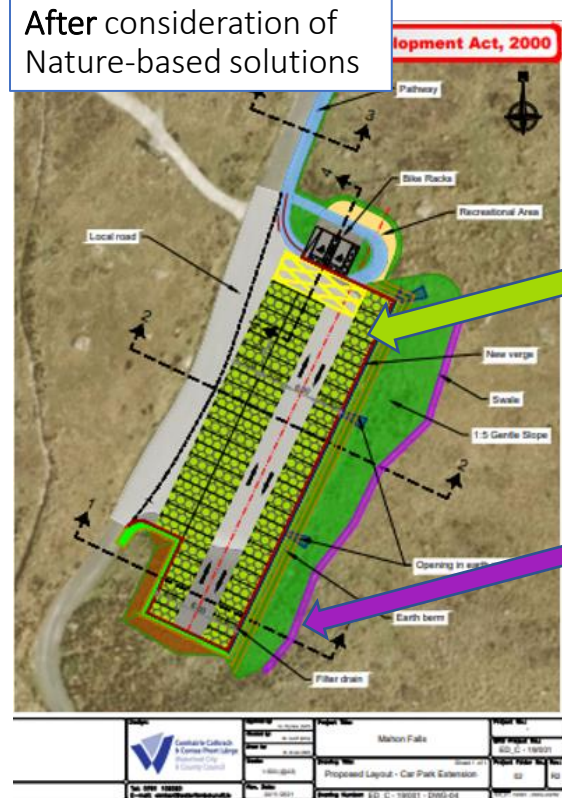


# Same carpark design with Nature-based SuDS.

Before consideration of Nature-based solutions



After consideration of Nature-based solutions



Reinforced grass

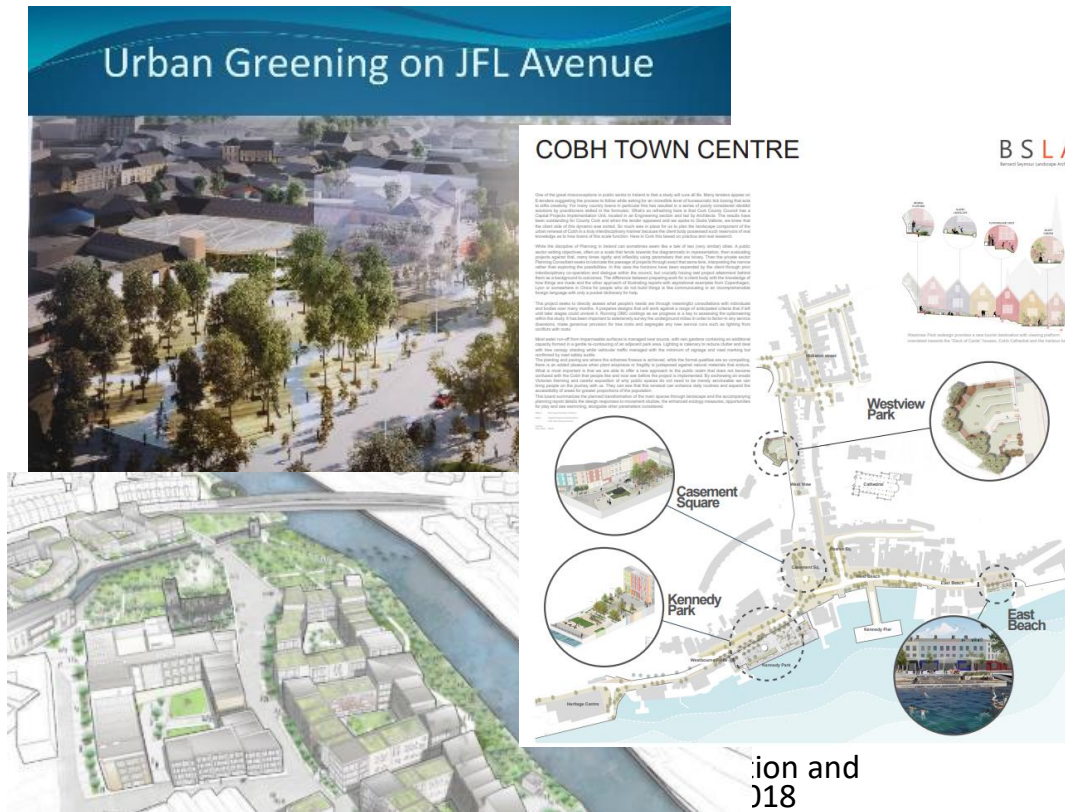


Swales



“b)To minimize impervious paved area WCCC propose to use pervious grass blocks as environmentally friendly surface materials for the car parking spaces. Grass block is a ground reinforcement grass paving system ideally suited to projects where a hard surface capable of supporting vehicle is required within in environmentally sensitive areas. It functions as a SuDS permeable pavement, controlling surface water at source by directing it to the sub-layers. As a part of detailed design process WCCC will explore feasibility to use some other environmentally friendly surface materials currently available at the market also. Details of Killeshal Grass Blocks attached.”

# Community participation in urban nature-based solutions in 2023



- Public realm and other large projects
- Planning applications
- Own projects
- Tidy Towns
- Lions Clubs
- Championing of nature-based approaches
- Maintenance?

# Location, design, construction and maintenance are key

- ...follow the water

## Rainwater management plan (surface water management plan)

Green roof



Courtesy of: Douglas Robinson Co., E. Carolina, USA

Ponds/wetlands

Shallow side slopes  
Erosion protection  
Amenity and Biodiversity



Bioretention



• Vegetation percolation and/or drainage layers



### KEY:

- Flooded areas
- Overland flow paths

SWALES



Effectively grassed drains – but wide and mostly dry

Rain gardens

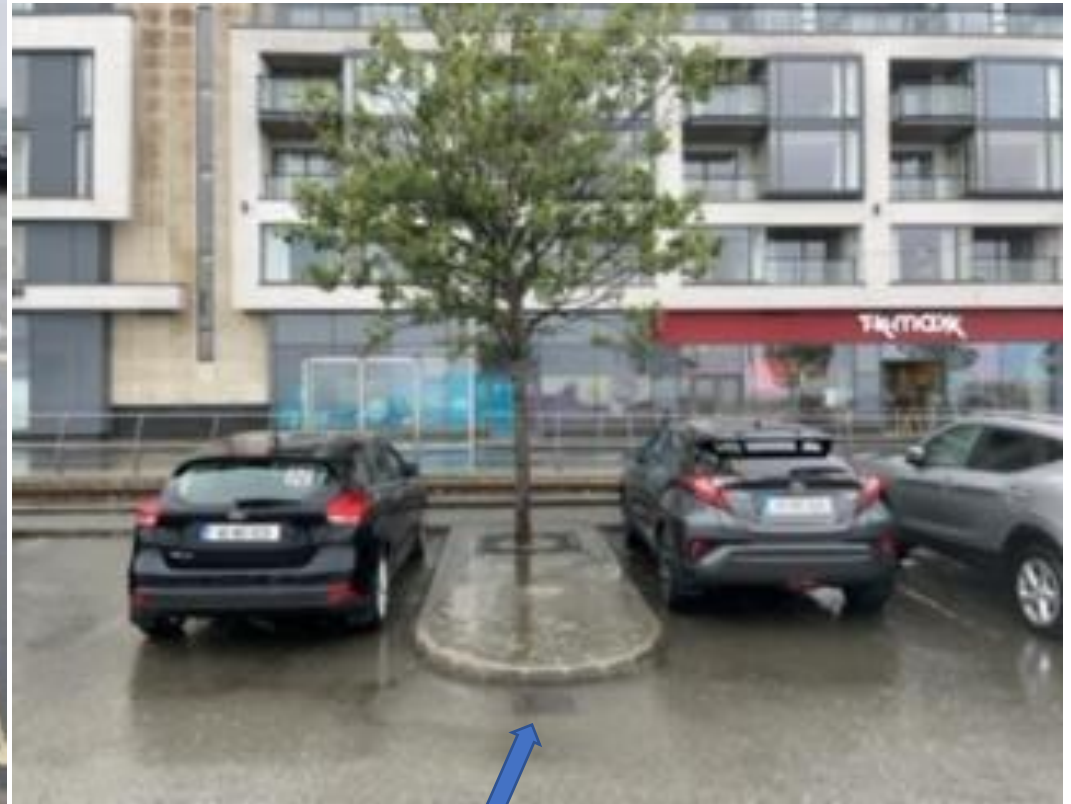


- Work out preferential flows
- Look at topography – contours, hilly areas etc
- Link in proposed open, green spaces (public spaces)  
Plan for larger Nature based SuDS for these areas with amenity in mind  
Integrate then with development planning requirements (green roofs, SWALES, rain gardens etc)



# Look for opportunities to address surface water

Carpark adjacent to SPA – during heavy rain  
11/09/22



No treatment – via gully



Even when constructed – make sure that they are constructed properly

E.g., a row of tree pits but most not functioning as they should during a heavy downpour  
Aug 2022

Working well. Tree pit base receiving surface water runoff from the left. Note road surface is drier on the right!



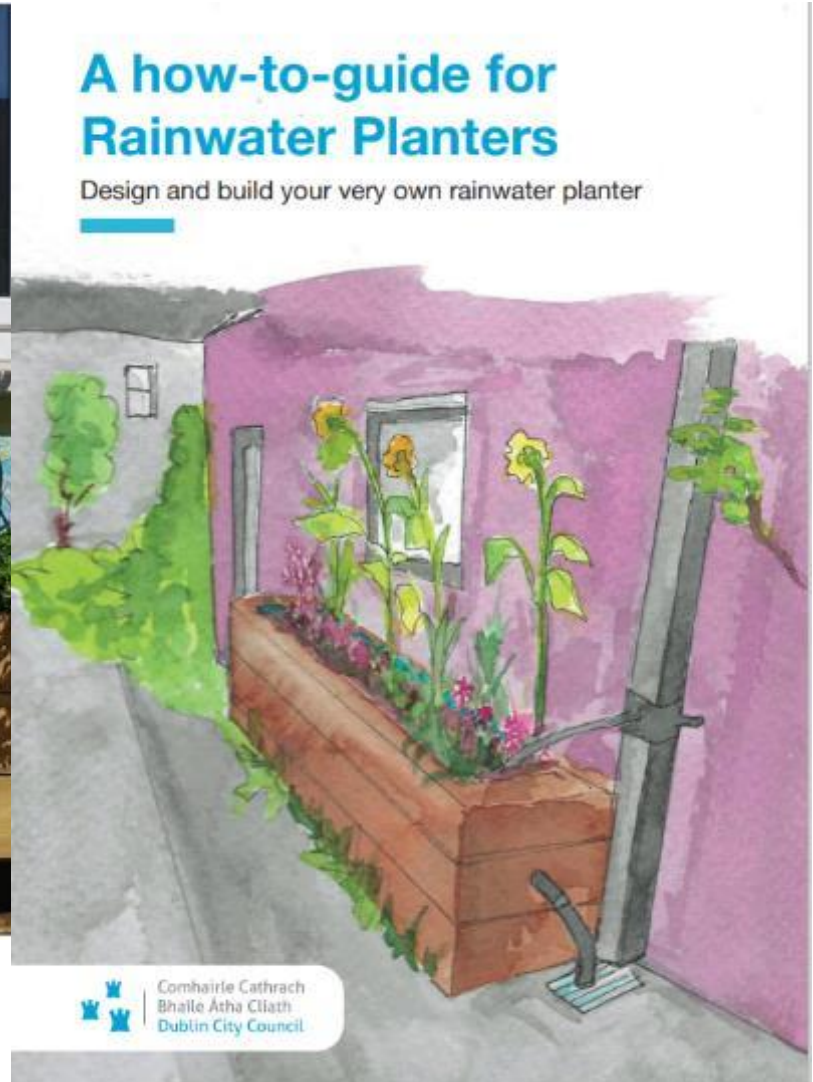
Not working well. Tree pit base clogged. Little or no freeboard, surface water is by passing.



Back to how it should work. Note the drop in the level within the pit itself drawing water off the road.



# What about communities!



# Tidy Towns



Geashill, Tidy Towns, Co Offaly. Funded via LAWPRO. World Water Day planting of wetland



# Designing for biodiversity



Example from North Cork – pond draining a pitch and putt course. Surface water treatment. Diversity of plant and invertebrate life. IRD Duhallow –constructed 2014.





2015



2016



24 March 2022

Home

Southern Regional Assembly



# Blue Green Infrastructure and Nature-based Solutions Framework

## Our Green Region



Blue Green Infrastructure & Nature Based Solutions Framework - View 

# Measure within the next RBMP (2022-2027)

- Feedback from public consultations on the RBMP – strong support from public
- Needs ongoing support
- Relatively new to most sectors – must be integrated and multidisciplinary
- Developing supports drawing from international and Irish experience
- Key learnings – design, construct and maintenance
- Pre-design discussions allow for place making and better Nature-based integration...follow the water.

Relevant to the Irish context

# The Do's

(adopted highways)



- Accurate service location is critical
- A trial hole at every potential G.I. feature is essential
- Line the G.I. features
- Make use of existing gullies as overflows
- Work with highway engineers for safe & maintainable designs
- Only use trees when there is adequate soil volume
- Use engineered soil only
- Have early discussions with stats companies (i.e., Wexford CoC, Irish water etc.)
- Choose the correct vegetation
- Supervise installation
- Consult residents & businesses relentlessly!
- Educate through signage

**G.I** = Green infrastructure = Nature-based SUDS



# The Dont's

(adopted highways)



- Do not rely on GPR surveys
- Don't plant trees over services
- Don't allow a Contractor to treat engineered G.I. as 'landscaping'
- Don't overfill a rain garden with soil
- Don't plant too densely
- Don't put bollards on the inside!
- Don't use a thick lining material
- Don't plant in the Spring
- Don't let inflow 'into' the soil; ensure it flows onto the soil
- Don't put G.I. over shallow service joints/junctions
- Don't choose fruit trees in a street
- Don't choose sapplings



# SuDS – top tips!



1. Keep water on the surface as long as possible
2. The hydraulic depth between the final surface level & the outlet invert level is THE most critical factor – all conveyance, quality treatment & storage happen between these levels – it's where the magic happens!
3. The deeper you go, the more its costs
4. Always design for low maintenance
5. Always get a SAB pre-application viability check before putting in for Planning
6. Always be reasonable with applicants but consistent – none of the 6 SuDS standards are optional
7. Think about 'buildability' when designing
8. Ensure the Contractor knows how to cost for SuDS





# SuDS – more top tips!

10. Treat every site on its merits
11. Consider 'compensatory SuDS' outside the red line boundary
12. Nail down blue-green corridors at the start
13. Tread carefully with soakaways
14. Permeable paving is an option, but not often the best one
15. Try to discourage internal downpipes for roof drainage
16. Have a good relationship with the water company
17. Ensure 'value engineering' does not remove SuDS
18. A good SuDS design is just better design
19. Good source control means less 'bomb crater' attenuation
20. A rain garden is a class 1 interceptor that looks good; it is civil engineering that's landscaped – not the other way around.

Ian Titherington



## Multiple benefits



## Conclusion: *take a nature based approach*

- **Climate** will impact on water management – *need to shift thinking away from water as a problem to being an opportunity*
- **Water Sensitive Urban Planning** key for urban areas but should apply to all built structures... “must consider”
- All the above require a **multidisciplinary** approach with appropriate support
- **Multiple benefits are obvious** and public support is growing for Nature based approaches
- Ideally set a **Water Sensitive Urban Planning** catchment **Vision**
- **Leave space for rivers (let them breath!)**-and incorporate amenity objectives.
- Consultation, design and construction are key!

# Thank you

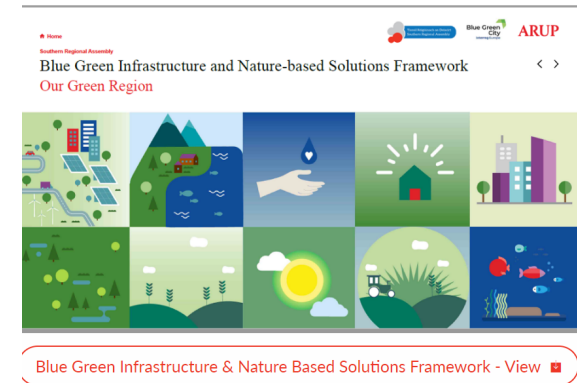
[Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas - Local Authority Water Programme \(lawaters.ie\)](#)

Lots of webinars at [Nature-based Solutions - Local Authority Water Programme \(lawaters.ie\)](#)

[Guidance for Urban watercourses | Inland Fisheries Ireland](#)

**Blue Green Infrastructure (BGI) and Nature-based Solutions (NbS) Framework** [Southern Regional Assembly](#) ([southernassembly.ie](#))

[Sustainable Drainage Systems – SDCC](#) (Dublin City Council also have a SUDS guidance)



**Engineers Ireland running NBS training – next training commences Jan 16<sup>th</sup> 2023**

Videos and presentations from all Webinars also available on the LAWPRO Website

**Practical experiences to the incorporation of Nature-based solutions (NB SUDS) to address surface water management in Ireland**

**THIS IS A FREE LUNCHTIME WEBINAR**

*Based on practical considerations when undertaking a nature-based approach in addressing surface water management from the engineers perspective.*

**Description** **October 13th 2022 Time 12.00**

Nature-based solutions is a growing area for engineers in Ireland and presents its own challenges. Two years ago, Engineers Ireland together with the Irish Planning Institute, the Local Authority Waters Programme and the Department of Housing Local Government (DHLGH) and Heritage ran a webinar on "Urban planning and nature-based surface water management: from theory to practice" on November 9th, 2020. Over 500 people attended. A key recommendation from that webinar was the development of training for practitioners. Subsequent to that meeting, webinars have been organised targeting URDF, RRDF and Active Travel projects and are available at Nature-based Solutions - Local Authority Water Programme (lawaters.ie).

Now, Engineers Ireland are working with partners on next steps, in support of water, climate and biodiversity objectives, to develop training which would be of direct relevance to engineers.

To kick this off, Engineers Ireland intends to hold a free lunch time webinar on Thursday 13 October, focusing on some of the practical considerations to taking a nature-based approach when addressing surface water management from the engineers perspective.



**JOIN HERE** **CLICK TO JOIN**

**WEBINAR PROGRAMME**

- PROCESS FROM PRELIMINARY DESIGN RIGHT THROUGH TO DETAILED DESIGN
- ENGAGEMENT WITH DESIGN TEAM AND CLIENT – WHO WANTED NBS AND WHY
- WHAT SPECIALISTS WERE ON THE DESIGN TEAM
- HOW NBS WAS INCORPORATED INTO THE DESIGN AND WHY
- THE CONSTRUCTION PROCESS - DETAILS, HOW EASY OR DIFFICULT WAS IT?
- LESSONS LEARNT DURING THE PROCESS
- HOW THE NBS IS PERFORMING NOW

**SCHEDULE OF EVENTS**

- INTRODUCTION BY AVERIL GANNON, *Water Policy Unit, DHLGH & FRAN IGOE, Regional Coordinator, LAWPRO*
- BUILDING NATURAL FLOOD MANAGEMENT & STORAGE SUDS INTO A LARGE PROJECT (CORK DOCKLANDS): *The multiple benefits from design to construction as well as the challenges faced and solutions identified.* 20 min  
*Noel Murtagh and Liam Casey, Cork City Council*
- N59 MAAM CROSS TO BUNNAKILL: *Nature Based SuDS Solutions on a large roads project through a sensitive landscape.* 15 min  
*Paddy De Fau, Project Engineer, Jacobs Engineering*
- TREE PIT DEVELOPMENT IN LUAS CROSS CITY TRAMWAY: *A Collaborative approach of engineering and landscape architecture to the development of root zones under streets.* 10 min  
*Tony Williams, Principal Landscape Architect Transport Infrastructure Ireland*
- A NBS SOLUTION FOR TRAFFIC CALMING, ACCESSIBILITY AND SAFE ROUTES TO SCHOOL, CLIMATE ACTION & CLIMATE MITIGATION IN ONE SIMPLE DESIGN: *A small case study from Greystones, Co Wicklow.* 10 min  
*Ruairi O'Hanlon, Greystones Municipal District Engineer, Wicklow County Council*
- DELIVERING SUCCESSFUL (NATURE-BASED) SUDS SOLUTIONS: *Design Practice and Lessons Learnt.* 20 min  
*Emma Oldroyd, Landscape Architect and Emer Kennedy, Senior Engineer, Anip*

**OPEN FLOOR DISCUSSION:**  
**STEPHEN O'MALLEY, CIVIC ENGINEERS WILL CHAIR THE Q&A**



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**Events**

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**Fundamentals of Nature Based Urban Infrastructure Design and Practical Steps for Delivery**

**Details**

Start Date & Time:  
**09:30 Thursday, 26 January 2023**

End Date & Time:  
**17:00 Thursday, 26 January 2023**

Location:  
**Engineers Ireland, 22 Clyde Road, Ballsbridge, Dublin, Ireland**

