

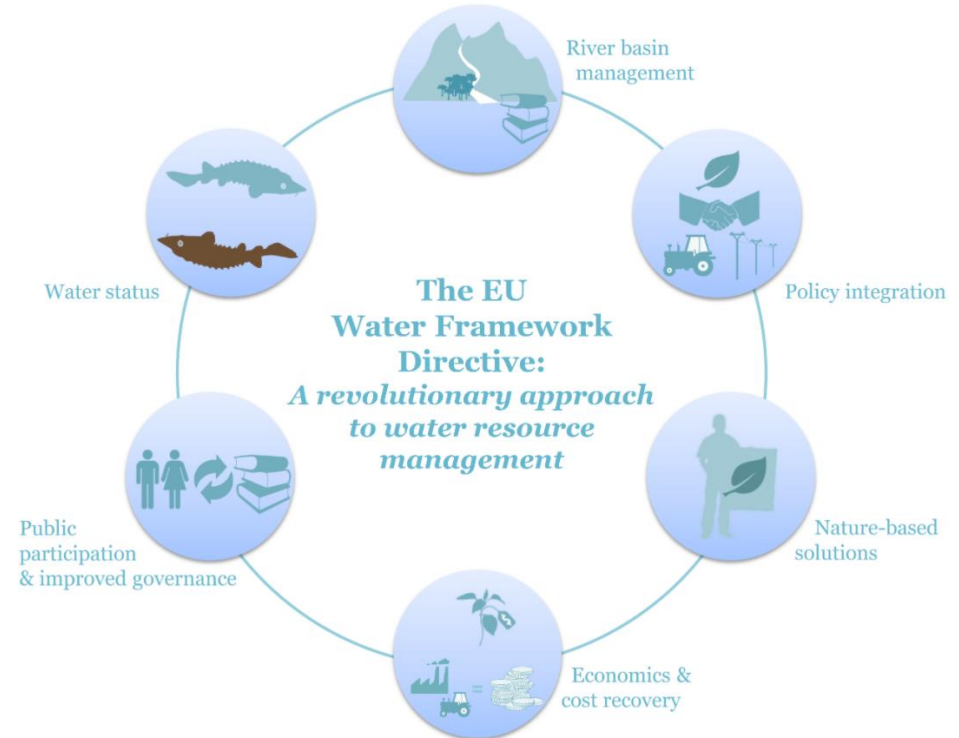
# Fran Igoe, Local Authority Waters Programme

## SuDS and Nature Based solutions for biodiversity



# Overview

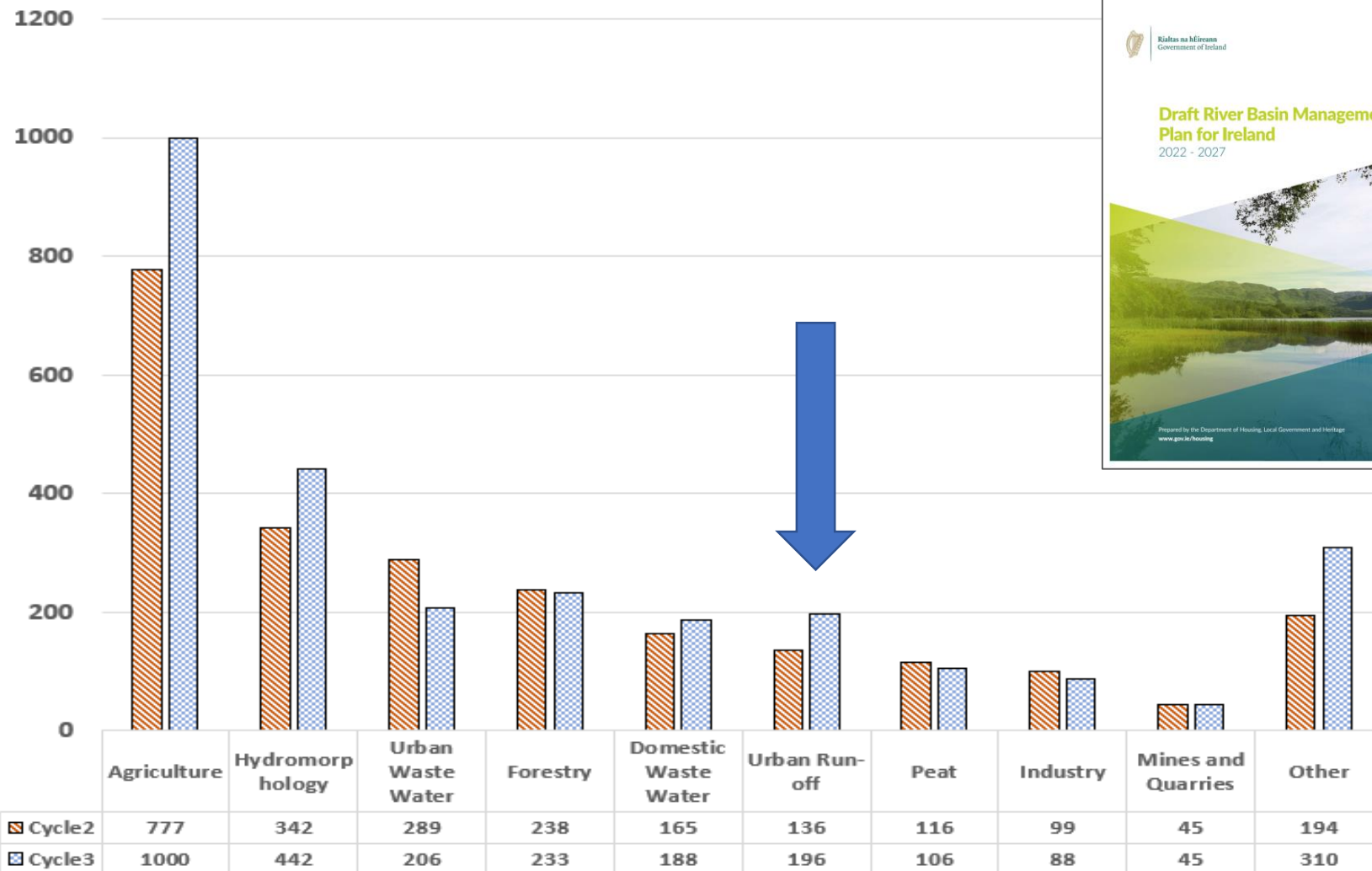
- Urbanisation and water
- Water quality impacts
- Some Nature-based SuDS techniques
- What Local Authorities (and us all) can do – opportunities and pitfalls
- Implementation strategy for next River Basin Management Plan



# Nature associated with water courses



# Key pressures impacting waters



# Surface water runoff management in ROI

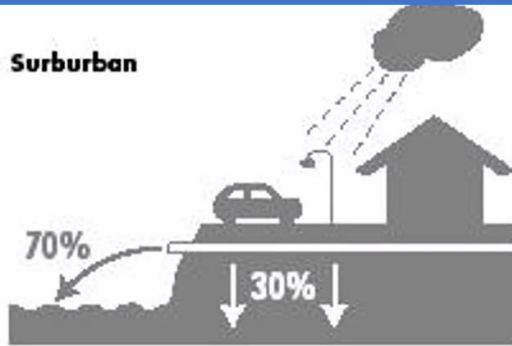
## SuDS – Sustainable urban Drainage Systems



Often....

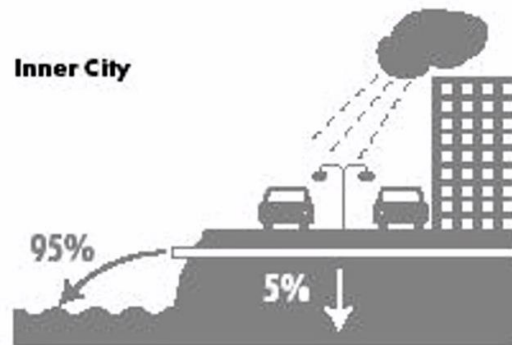


**Suburban**



30% Infiltration  
70% Run-off

**Inner City**



5% Infiltration  
95% Run-off



**Example of Water Quality in an urban setting**

Yellow = Moderate Water quality

Brown = Poor Water quality

## Conventional pollutants

TSS

Nutrients (N, P)

Metals associated with traffic (Ba, Cd, Co, Cr, Cu, Mn, Ni, Pb, Ti, V, W, Zn, Zr)

Trace organics (mostly priority pollutants)

PAHs

Pesticides

PFCs (perfluorinated compounds) or polyfluorinated chemicals

Xeno-estrogenic compounds

Table 2. Sources of pollutants released by vehicular traffic in urban areas.

Specific source	Pollutants released	References
Vehicle operation		
Exhaust gases and particles	Hydrocarbons, PAHs, NOx, Ni, BTEX	Markiewicz et al. (2017); Brinkmann (1985); Huber et al. (2016); Kayhanian (2012); Duong and Lee (2011); Liu et al. (2018b)
Catalytic converters	Rh, Pd, Pt	Rauch et al. (2005)
Vehicle wear		
Tires	TSS, Cd, Cu, Zn, PAHs, microplastics	Muschack (1990); Councell et al. (2004); McKenzie et al. (2009); Legret and Pagotto (1999); Kose et al. (2008); Horton et al. (2017a)
Tire studs	W	Huber et al. (2016)
Brakes	TSS, Cd, Cu, Ni, Pb, Sb, Zn, PAHs	McKenzie et al. (2009); Hjortenkranz et al. (2007); Markiewicz et al. (2017)
Engine and vehicle body wear	Cr, Ni	Gupta et al. (1981); Ward (1990)
Body paint	Pb	Kayhanian (2012)
Wheel balance weights	Pb, Fe (steel), Zn	Root (2000); Bleiwas (2006)
Vehicle washing		
Commercial car washing facilities	Pb, Cd, Cr, Zn Phthalates, NPs, NPEOs	Sörme et al. (2001) Björklund (2010)
Road abrasion		
Abrasion by tires (non-studded and studded)	TSS	Hvitved-Jacobson and Yousef (1991); Van Duin et al. (2008) Lindgren (1996)
	PAHs	Markiewicz et al. (2017)
	Microplastics	Magnusson et al. (2016); Horton et al. (2017b); Vijayan et al. (2019a)



Müller et al 2020. The pollution conveyed by urban runoff: A review of sources. Science of the total environment. Vol 709.

# 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

[Open Access](#) [October 5, 2018](#) [View all news articles](#) [Details](#) [Follow us on social media](#)



A 5-year-old coho salmon is shown in a laboratory setting, likely used in the study to test the toxicity of urban stormwater runoff.

**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 [✉](#)



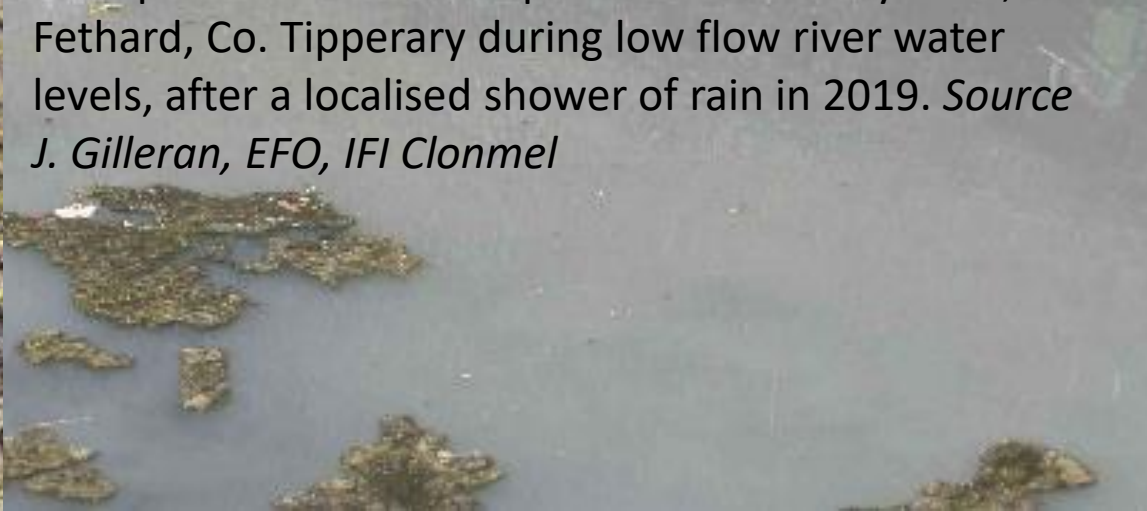
# Practical example



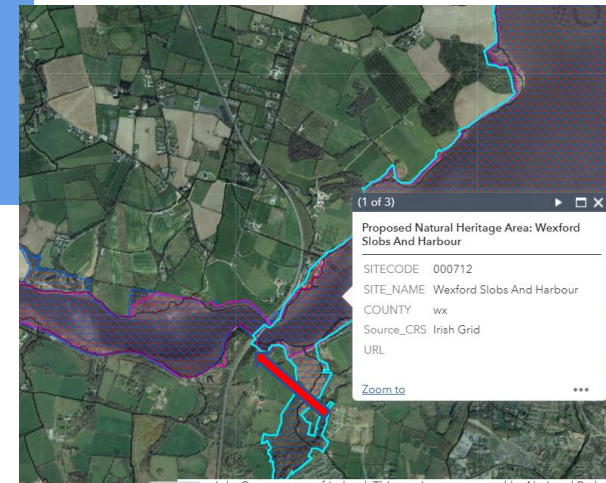
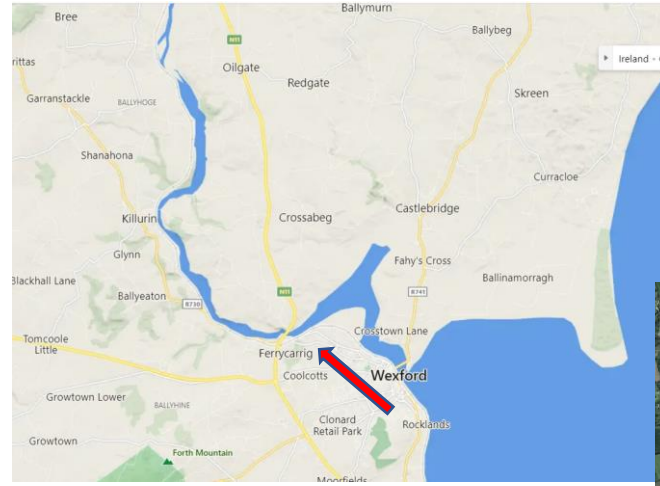
Clashawley River, a tributary of River Suir in Fethard Village, Co Tipperary. Important habitat for white-clawed crayfish. Crayfish plague has wipe out most of the population, but eDNA and visual confirmation of crayfish in this tributary Sept 2022.



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

# Nature based SuDS

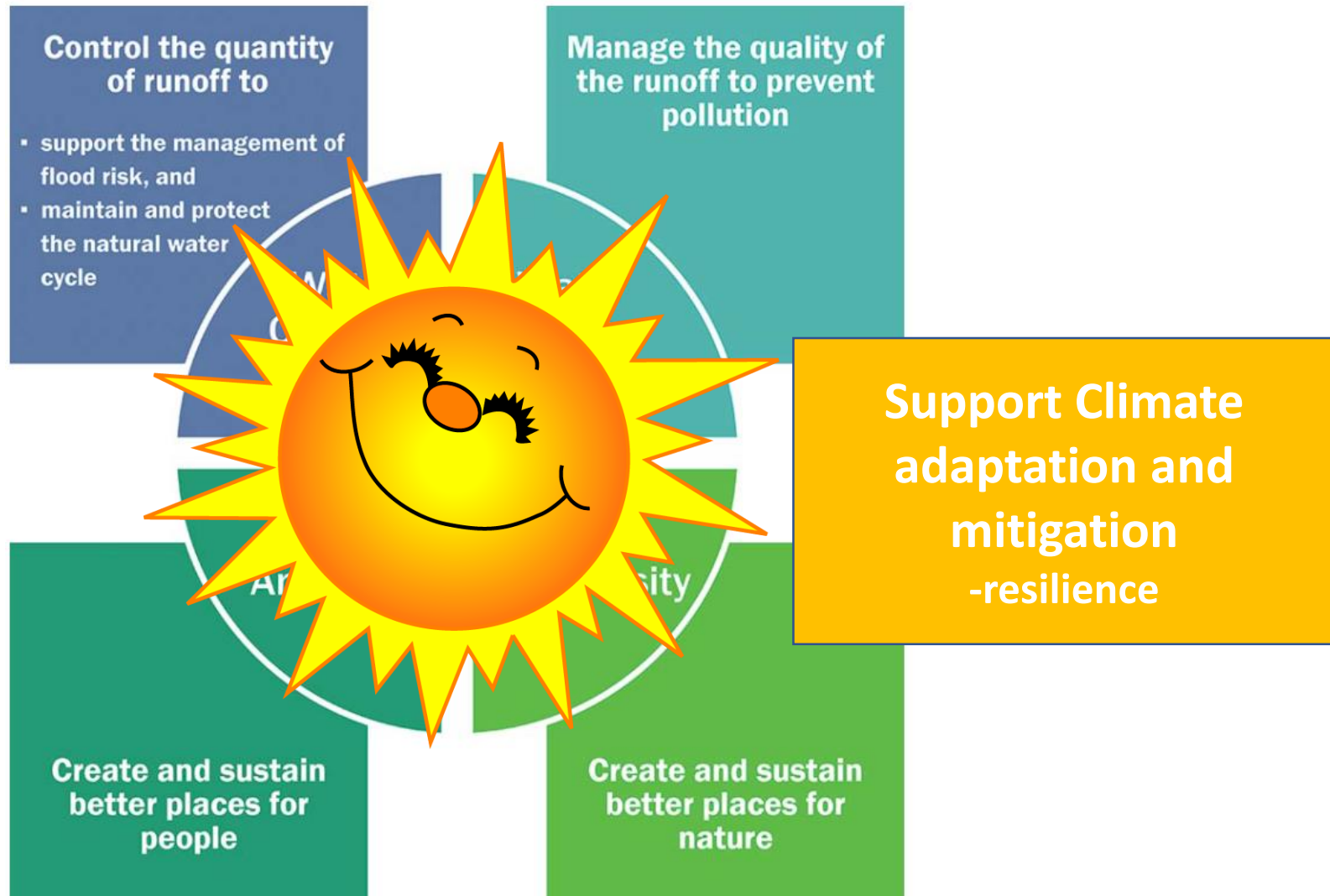


Figure 3: The four pillars of SuDS design

# Sustainable urban Drainage Systems (SuDS)



Green roof



Courtesy Dún Laoghaire Rathdown CoCo, E. Carroll & J. Craig

Bioretention



SWALES



Effectively grassed drains – but wide and mostly dry

- Vegetation percolation and/or drainage layers

Ponds/wetlands

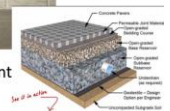
- Shallow side slopes
- Erosion protection
- Amenity and Biodiversity



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.

# Rainwater management plan (surface water management plan)



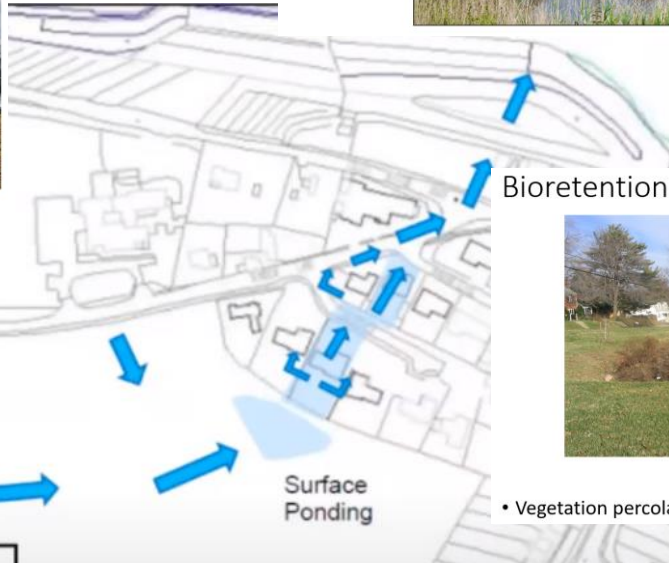
Green roof



Courtesy Dún Laoghaire Rathdown CoCo, E. Carroll & J. Craig

## Ponds/wetlands

- Shallow side slopes
- Erosion protection
- Amenity and Biodiversity





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:

-  Flooded areas
-  Overland flow paths

## SWALES

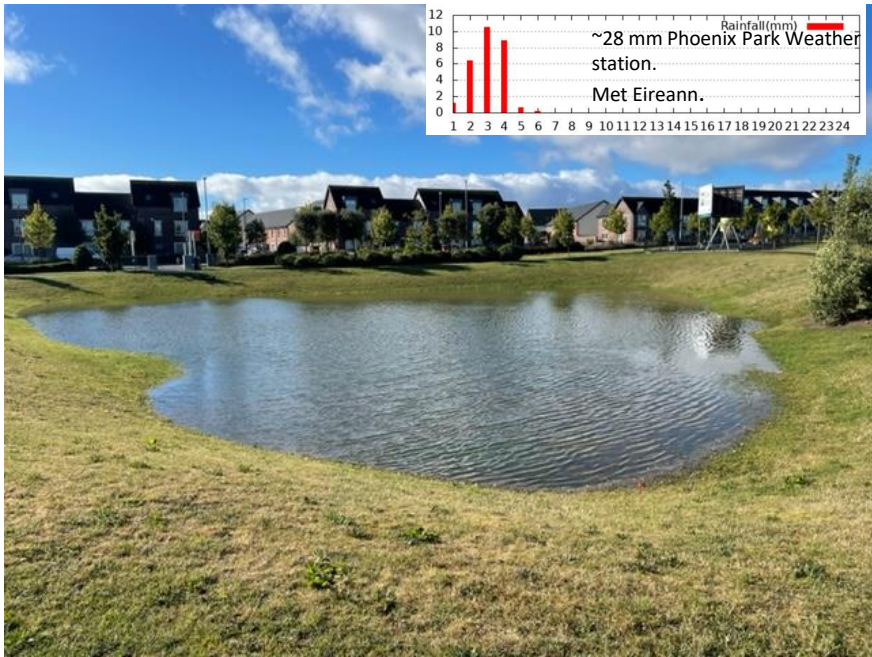


Effectively grassed drains – but wide and mostly dry

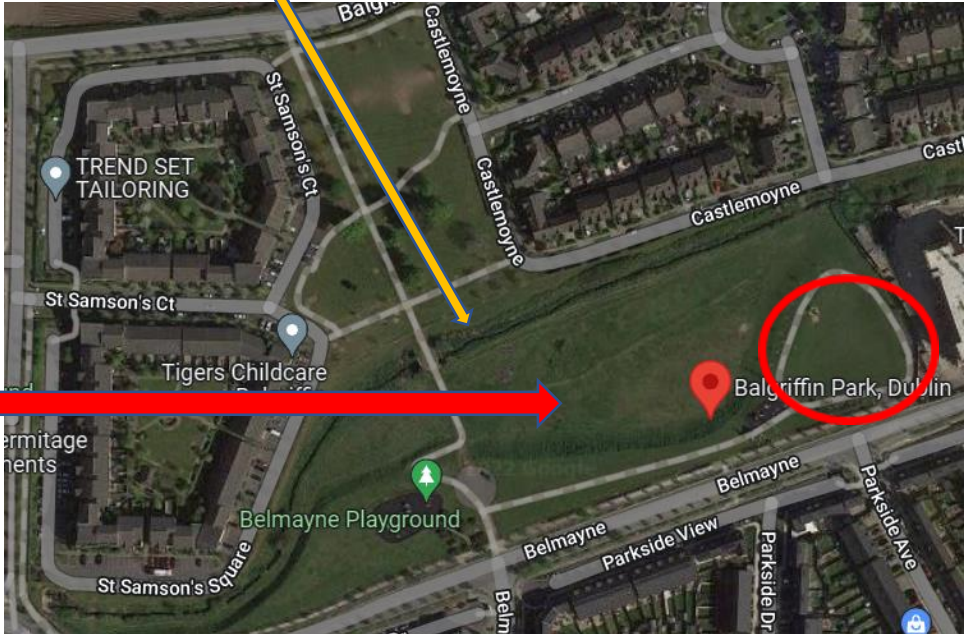
## Rain gardens



# 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



# Regional scale Nature-based SuDS



*Kilbogget Park - site of proposed Flood Storage Area*



# Site scale Nature-based SuDS

Not NBS but  
better than  
nothing..  
permeable  
parking surface.  
Tipp CoCo carpark  
Nenagh, Sept 2022

# 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

# Designing for greater water interception (e.g., rain garden)



# Not in Ireland 😊!









Courtesy Ian Titherington, Cardiff Council, Wales



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

# Off street raingarden, Clonmel



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



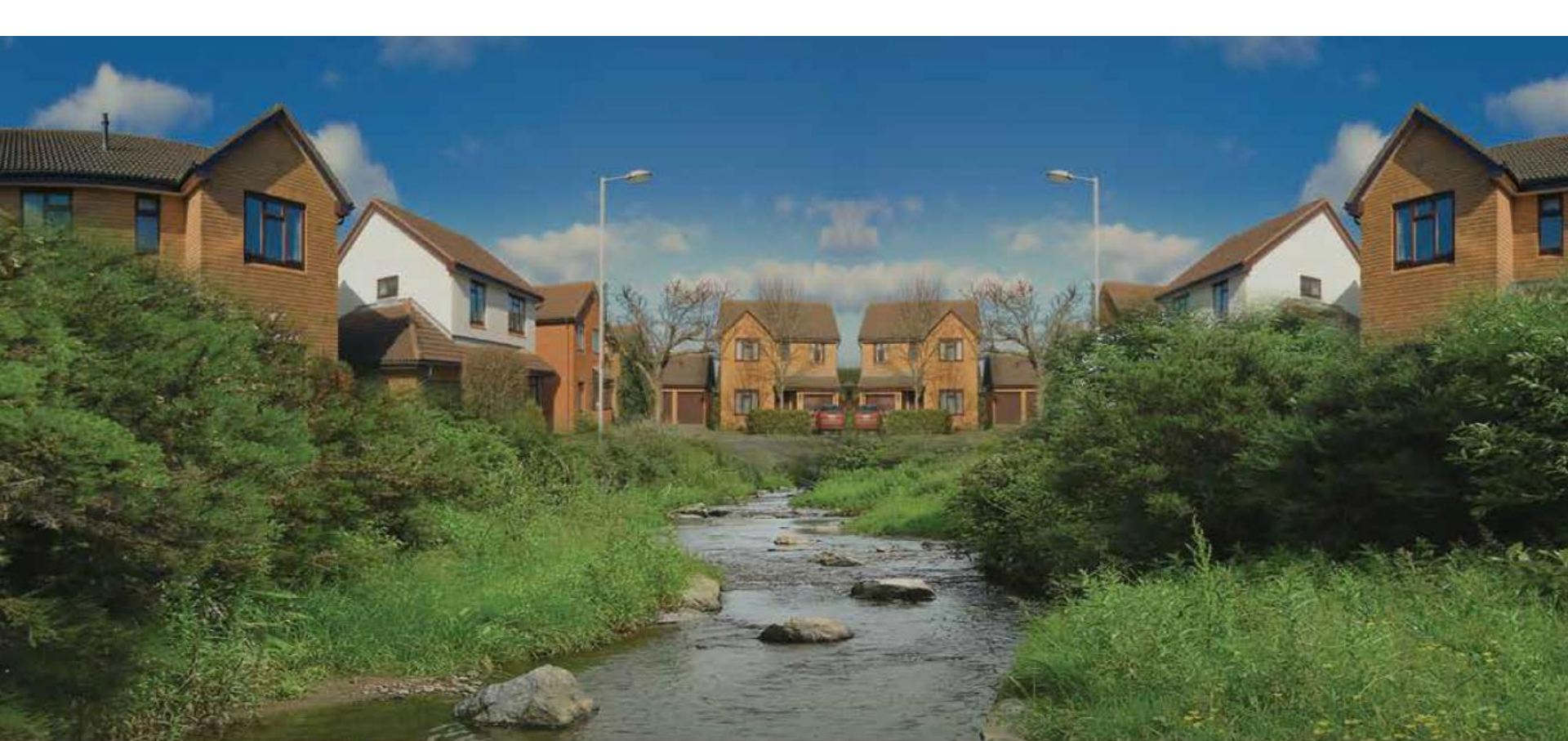




Making space for water. Dennis Burke park in Clonmel floods in February 2021. By working with Nature the park serves multiple functions including supporting amenity, biodiversity, alleviating flood risk and providing essential services in Clonmel with greater Climate resilience.



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



# PLANNING FOR WATERCOURSES IN THE URBAN ENVIRONMENT

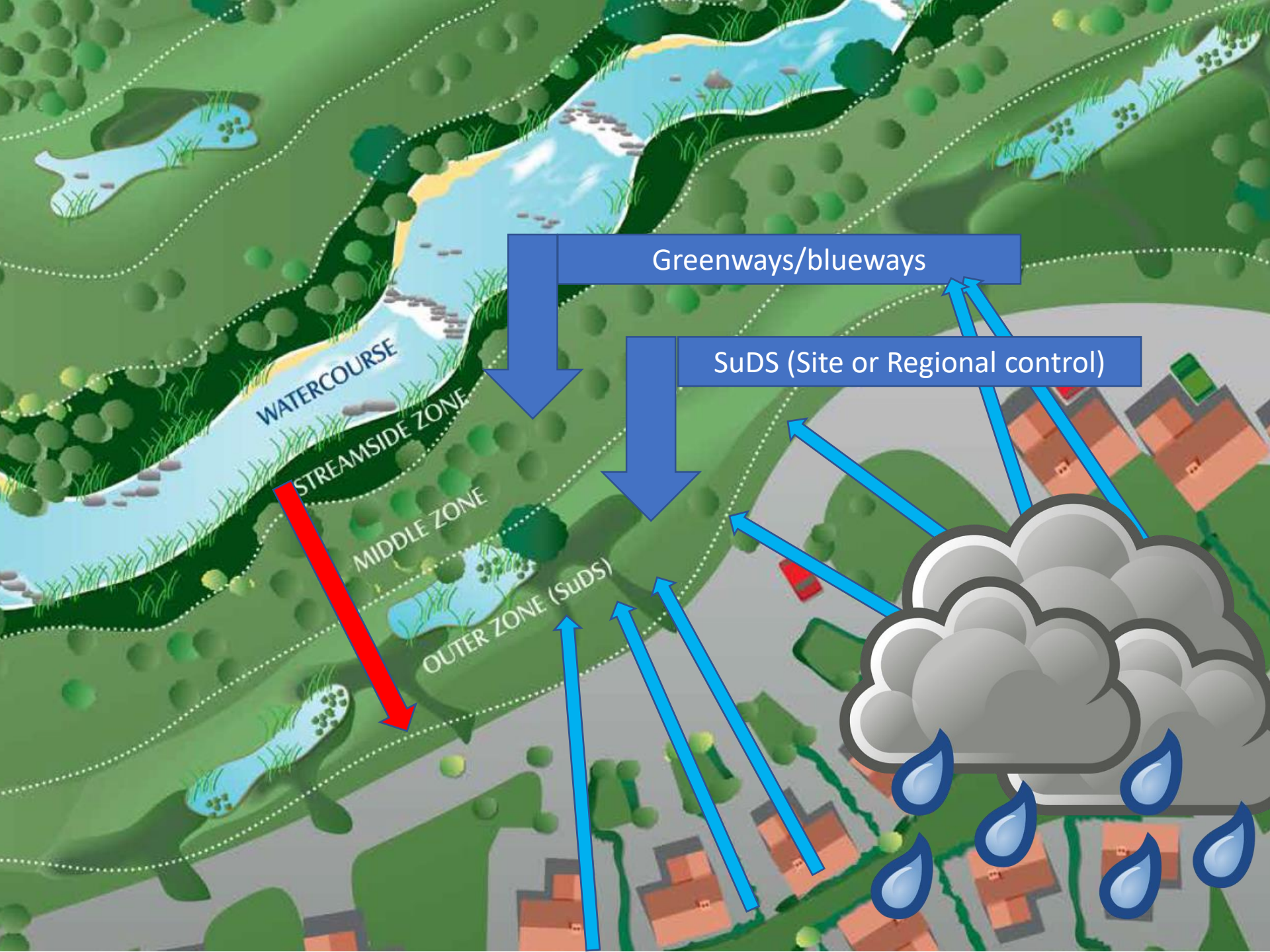
A Guide to the Protection of Watercourses through the use of Buffer Zones,  
Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning

*\*Including one-off developments*

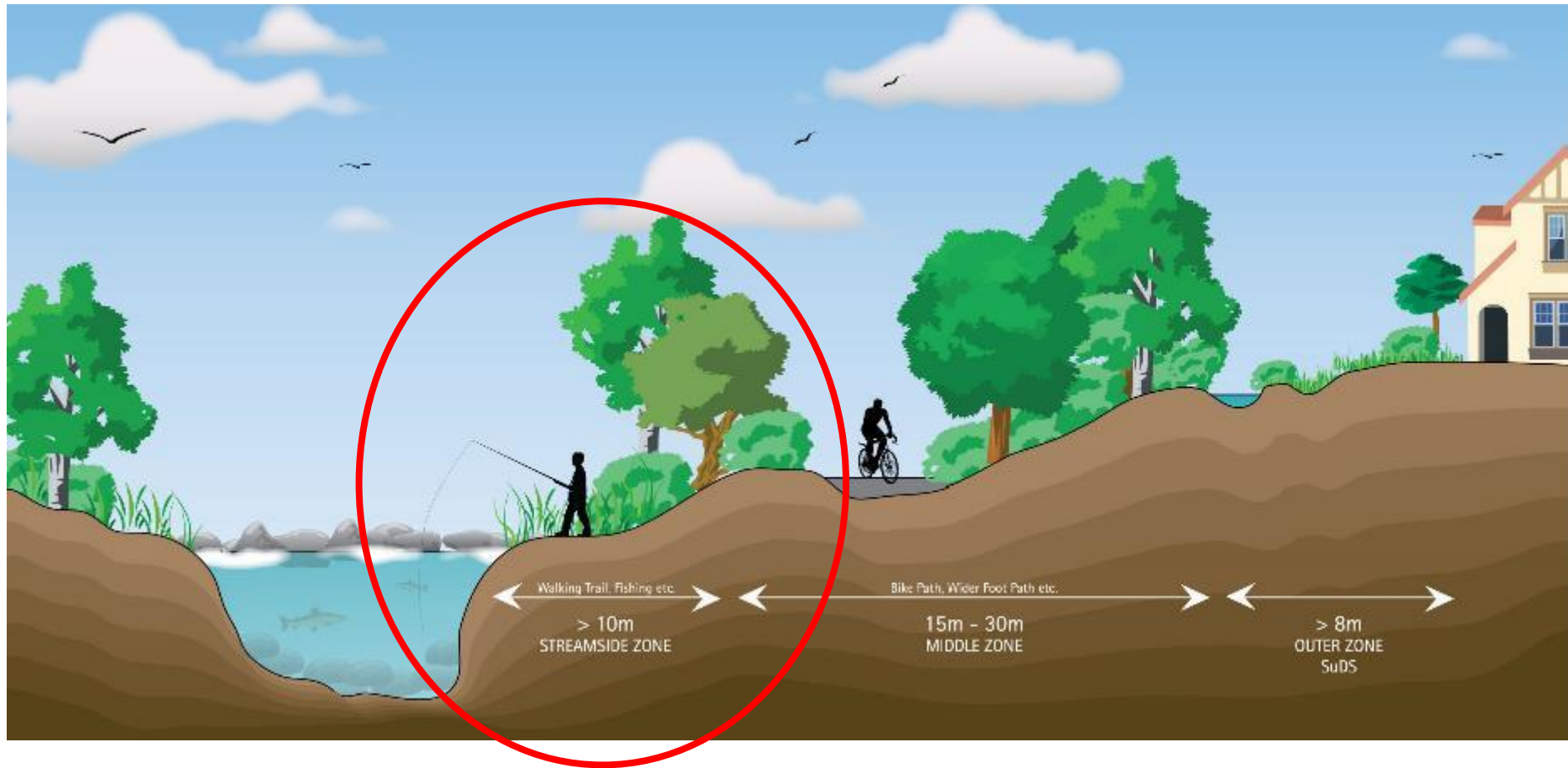


Iascach Iníre Éireann  
Inland Fisheries Ireland

A Guideline Developed by Inland Fisheries Ireland



# NBS bring multiple benefits



# How Local Authorities can address the Biodiversity Emergency



Through Nature-based (SuDS)  
surface water management

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



SOURCE: The Planning System and Flood Risk Management – Guidelines for Local Authorities. OPW 2009

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 measures to address hard surface runoff associated with developments. 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 local 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 local authority work practices and County Development Plan preparation and implementation.



Filter Strip

**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 - Bryan Riney, 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 & landscape

- 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, DHI, with input from Conor Galvin, OPW

THIS EVENT IS FREE TO ATTEND. PLEASE REGISTER AT INFO@IPIE



Rain Garden

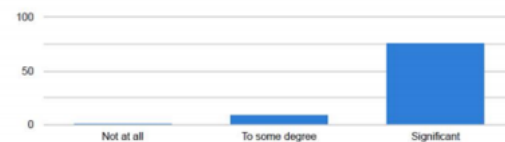


Green Roof

# Post 2020 NBS Webinar survey (19/11/20 n=86)

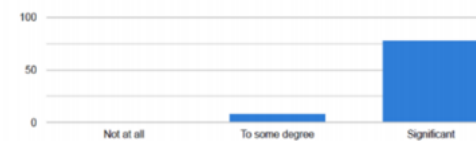
## Q. Value of Nature based SuDS

### Water Quality



Number of responses: 86

### Biodiversity

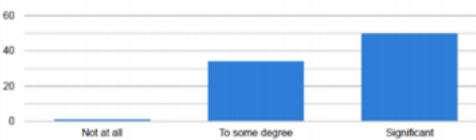


Number of responses: 86

### 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)



**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 adapt 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 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 assist 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.

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

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



SOURCE: The Planning System and Flood Risk Management – Guidelines for Local Authorities. DHLGH & OPW 2009

**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.

**WEBINAR PROGRAMME**

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

**Background to Seminar & Scene Setting** - Fran Igoe, 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 Titherington, 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** - Leonore O'Neill, 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.

**Q&A** OPEN FLOOR DISCUSSION  
**GETTING US ALL ON THE SAME PAGE**  
- PULLING IT ALL TOGETHER -  
PANEL MEMBERS: SPEAKERS WITH INPUT FROM  
COMOR GALVIN, OPW & BRIAN BECKETT, IFI



REGISTER HERE: [https://lawaters-ie.zoom.us/join/register/WN\\_6BYrhB6iQ3eiusrpnA9nQ](https://lawaters-ie.zoom.us/join/register/WN_6BYrhB6iQ3eiusrpnA9nQ)

# Nature based SuDS implementation strategy scoping study (DHLGH)

- 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

**Catchments Newsletter** Issue 14: Spring 2021

**Nature-based sustainable urban drainage systems: coming a long way, from Tipperary to national policy**

Nature-based Sustainable Urban Drainage Systems (SuDS) provide a realistic solution for addressing flooding and increased surface water flow. Nature-based SuDS include green roofs, lawns, buffer and filter strips, and wet gardens. A nature-based SuDS workshop took place in January 2020, organised by the Local Authority Waters Programme (LAWP) and featuring case studies from Galway and Tipperary, and this led to an event in November 2020 to share knowledge and practice that was attended by almost 500 local authority staff. This article was originally published in Tipperary County Council's monthly newsletter.







Zoom link information at footer

## Workshop: Urban Landscaping and Nature-Based Management of Rainwater for Active Travel Projects

May 10th 2022 Time 14.30



**Rain Garden**  
Component of overall urban green strategy

Rain Gardens also contribute to reinforcing the SAFE COMFORT ZONES and traffic-calming including biodiversity enhancement



Taking a multiple benefits approach to better place making, protect of water, biodiversity, climate resilience and amenity creation for sustainable living.

### Active Travel

In order to promote environmental sustainability and climate action as integral elements of urban projects, there is increasing recognition of the need to mitigate the negative environmental impacts of urban rainwater runoff, as required under the EU Water Framework Directive.

In order to deal with these environmental risks, the Department of Housing Local Government and Heritage and Department of Transport and the NTA are promoting the use of a nature-based approach to the management of urban rainwater runoff, or a 'nature-based SuDS' approach, as an integral part of the design of all future urban projects. This nature-based approach brings multiple benefits, in addition to dealing with environmental pollution. These include climate adaptation, better place-making and wellbeing & increased biodiversity

**WHO SHOULD JOIN**

Planners, urban architects and biodiversity, her local authorities, implementation rainwater mana sectoral appro of anyone whos planning, design our urban space

**JOIN** [CLICK HERE TO JOIN](#)

Special bridges through the rain gardens are provided in the main street between parking and footpaths to provide minimum pedestrian permeability (Example courtesy of Cork County Council)

Many Local Authority Development we encourage a disciplines to a

### PROGRAMME

Joe Seymour, Head of Active Travel Investment, NTA

Giulia Vallone - Senior Architect, Cork Co.Council  
MULTIFUNCTIONAL LANDSCAPE IN URBAN DESIGN.

Eimear Fox - Senior Landscape Architect, TI  
WHY NATURE BASED?

Fran Igoe - LAWPRO Nature Based SuDS and WFD

Adrian Conway - NB SuDS Project Lead  
NATURE-BASED SOLUTIONS AND DMURS

Stephen O'Malley - Civic Engineers  
NATURE LED URBAN INFRASTRUCTURE DESIGN

Zack Tudor - Arup, Landscape Architect  
FROM GREY TO GREEN: THE SHEFFIELD EXPERIENCE



### WEBINAR

#### WELCOME

Background to

Policy - Nature

Key Note: Practice

Nature-proofing

Raising the Awareness

Nature-based Recommendations

1. National Guidance

2. Implementation

Rain Garden

IP

RTPI

Local Authority of Waters

An Active Campaign

NTA

REGISTER HERE: <https://lawaters-ie.zoom.us/j/96114242142>

# Consultations/Training webinars

- All 31 LAs consulted – 2021 workshops
- Professional bodies, DOT etc
- CARO training & Regional Assemblies (SEA)
- Webinar on NBS Suds (n=500)
- Focused webinar; URDF/RDF, DRCD/ORIS/T&V/CLAR etc, Active Travel on NBS Suds (n >200 respectively)
- WFD regional structures

### Catchments Newsletter Issue 14: Spring 2021

#### Nature-based sustainable urban drainage systems: coming a long way, from Tipperary to national policy

Nature-based Sustainable Urban Drainage Systems (SuDS) provide a realistic solution for addressing flooding and increased surface water flow. Nature-based SuDS include green roofs, swales, buffer and filter strips, and rain gardens. A nature-based SuDS workshop took place in January 2021, organised by the Local Authority Systems Programme (LASP) and featuring guest speakers from Dublin and Tipperary, and this led to an event in November 2020 to share knowledge and practice that was attended by almost 200 local authority staff. This article was originally published in Tipperary County Council's monthly newsletter.



**LOCAL AUTHORITY TIMES** CELEBRATING 15 YEARS PROGRESS

**SUSTAINABLE URBAN DRAINAGE SYSTEMS**

**THE IMPORTANCE OF SUDS**

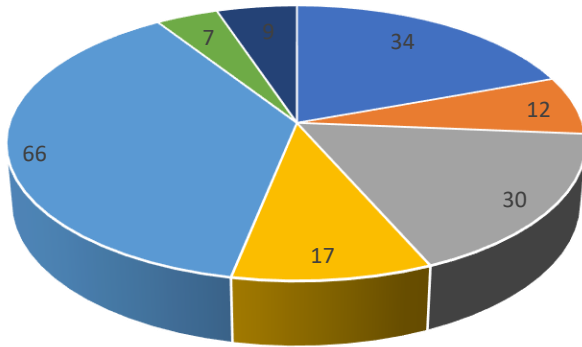
Inside: The Story of Ireland's Local Government Management System

• Cross-Border Co-operation • District Heating • PPPs

**Making space for water** Dennis Burke park in Corral Boes in February 2021. By working with Nature-based SuDS multiple benefits including supporting streams, biodiversity, absorbing flood risk and providing essential services in Derrin with greater climate resilience.

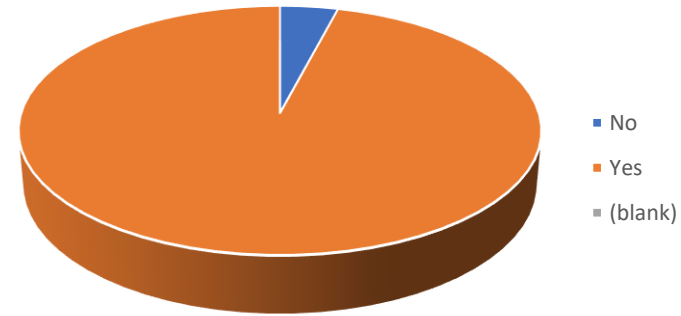
RTPI Dashboard Content: Shared with webinars the content will not only provide for increased surface water flow but also provides for pollinators. A book of good practice on resilience here

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

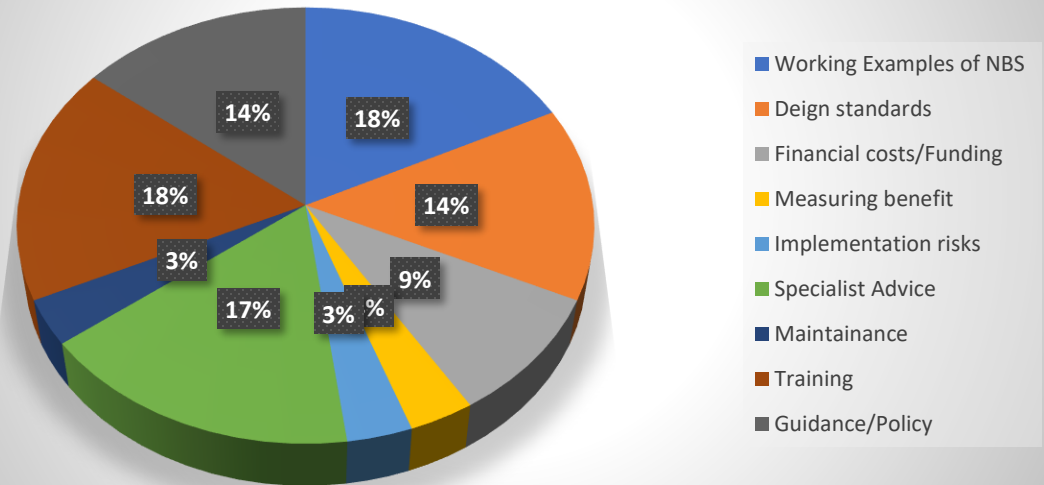
Total



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



# Blue Green Infrastructure and Nature-based Solutions Framework

## Our Green Region



Blue Green Infrastructure & Nature Based Solutions Framework - View 

# Opportunities to build in Nature-based SuDs at scale in URDF, Active travel and other Rural Schemes (ORIS, CLÁR, LIS, TVRS etc)



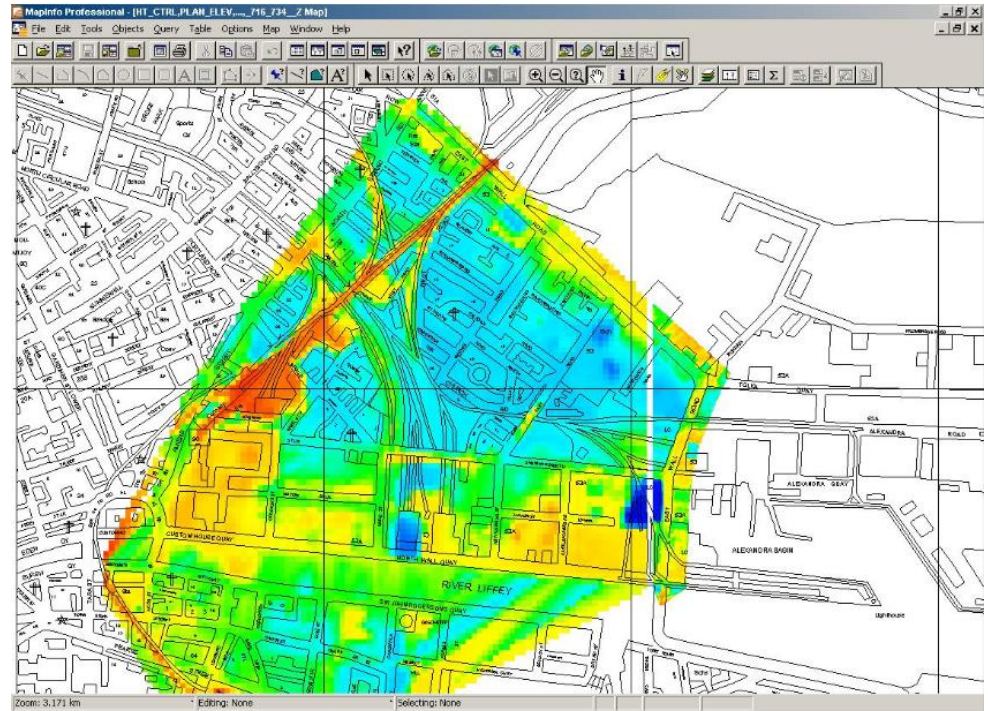
- Best practice to manage rainwater in project areas and to minimise impact on sensitive areas
- Protecting water quality and flood risk
- Protecting and enhancing biodiversity
- Building in Climate change resilience and benefits
- Potential to increase amenity value of project (additionality)
- Looking for multiple benefits
- But Local Authority project teams and colleagues 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!

# 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

# Some practical tips!

## Look for opportunities in all projects (LA & third parties)

- some examples of missed opportunities where water capture and filtration is not embedded.
- if done so, they would be self watering most of the time









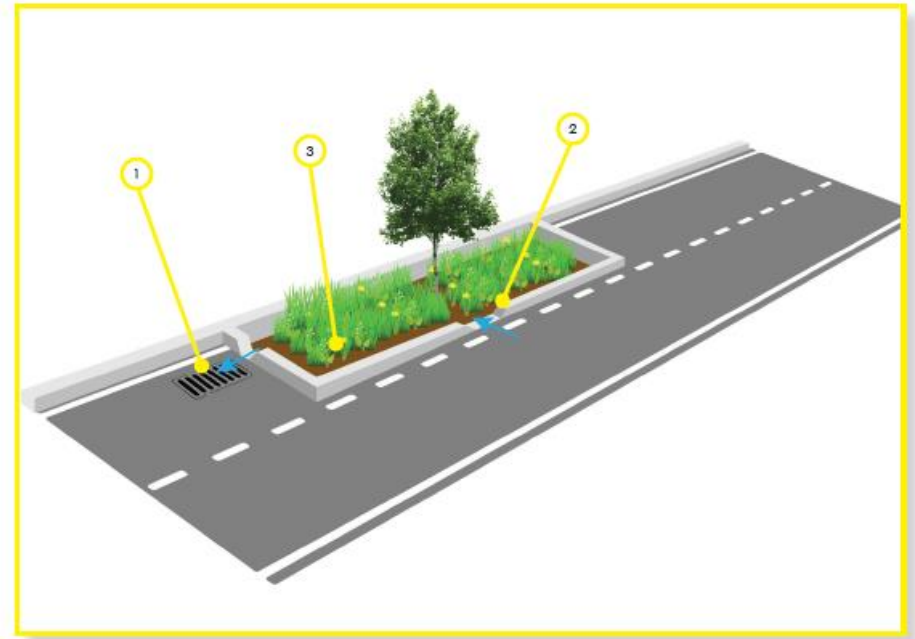


Figure 18. Rain garden schematic – Plan

- 1 existing gully can provide a potential overflow
- 2 runoff area
- 3 water to filter through the soil mix first, but if inundated then overflow into the existing gully

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

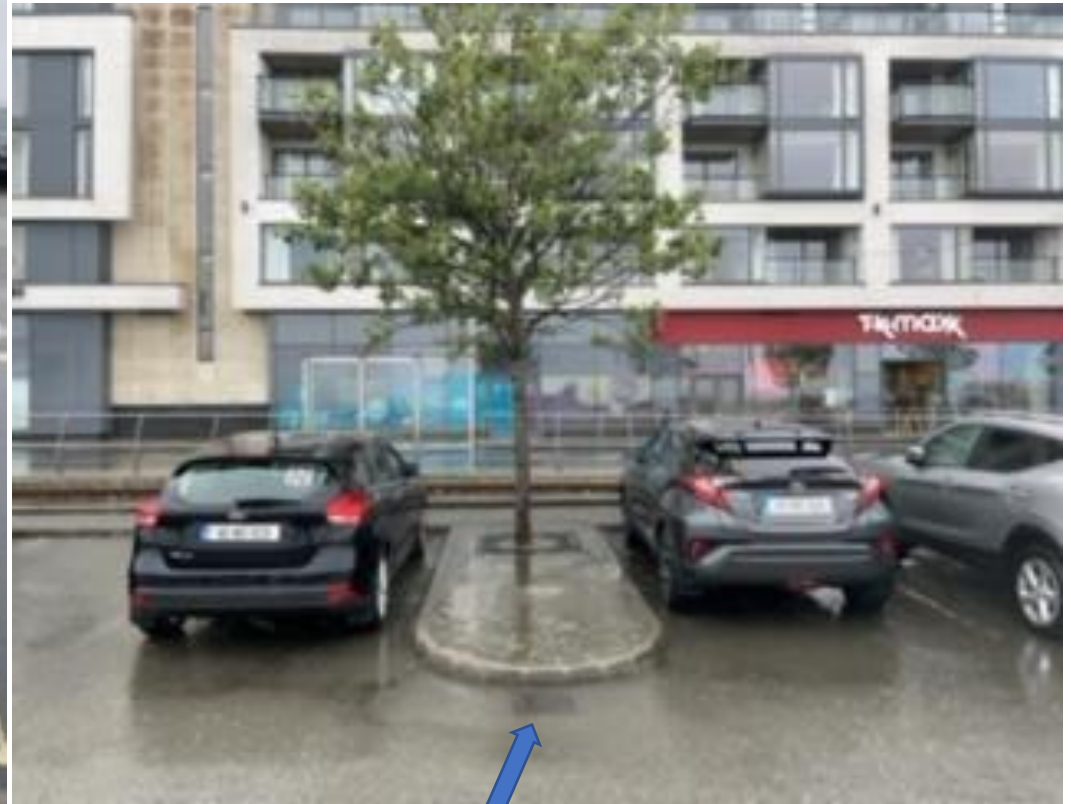
Tree pits but not connected to surface water from the car park



Carpark adjacent to SPA



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!



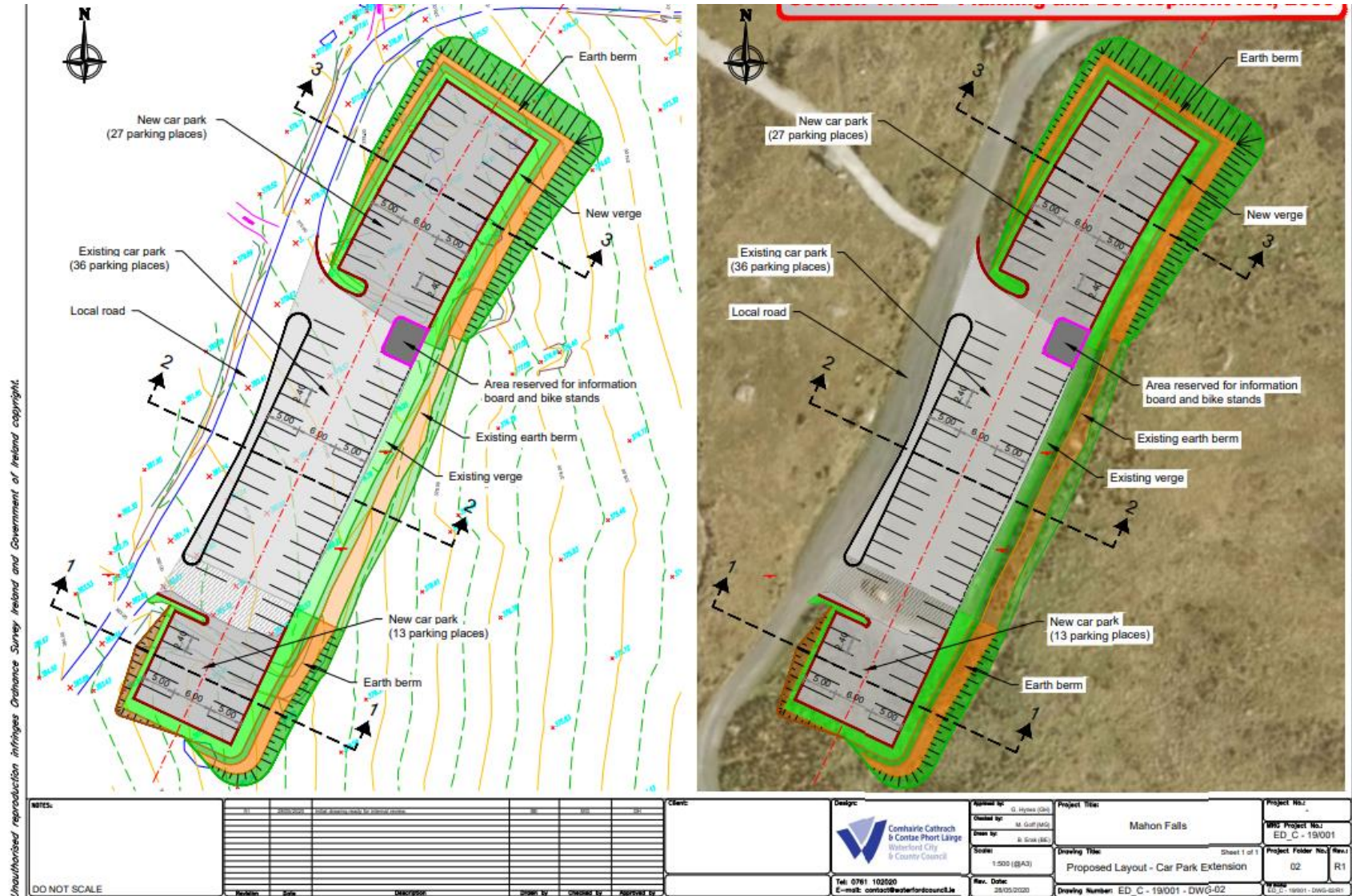
Not working well. Tree pit base clogged. Little or no freeboard, surface water is by passing.



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

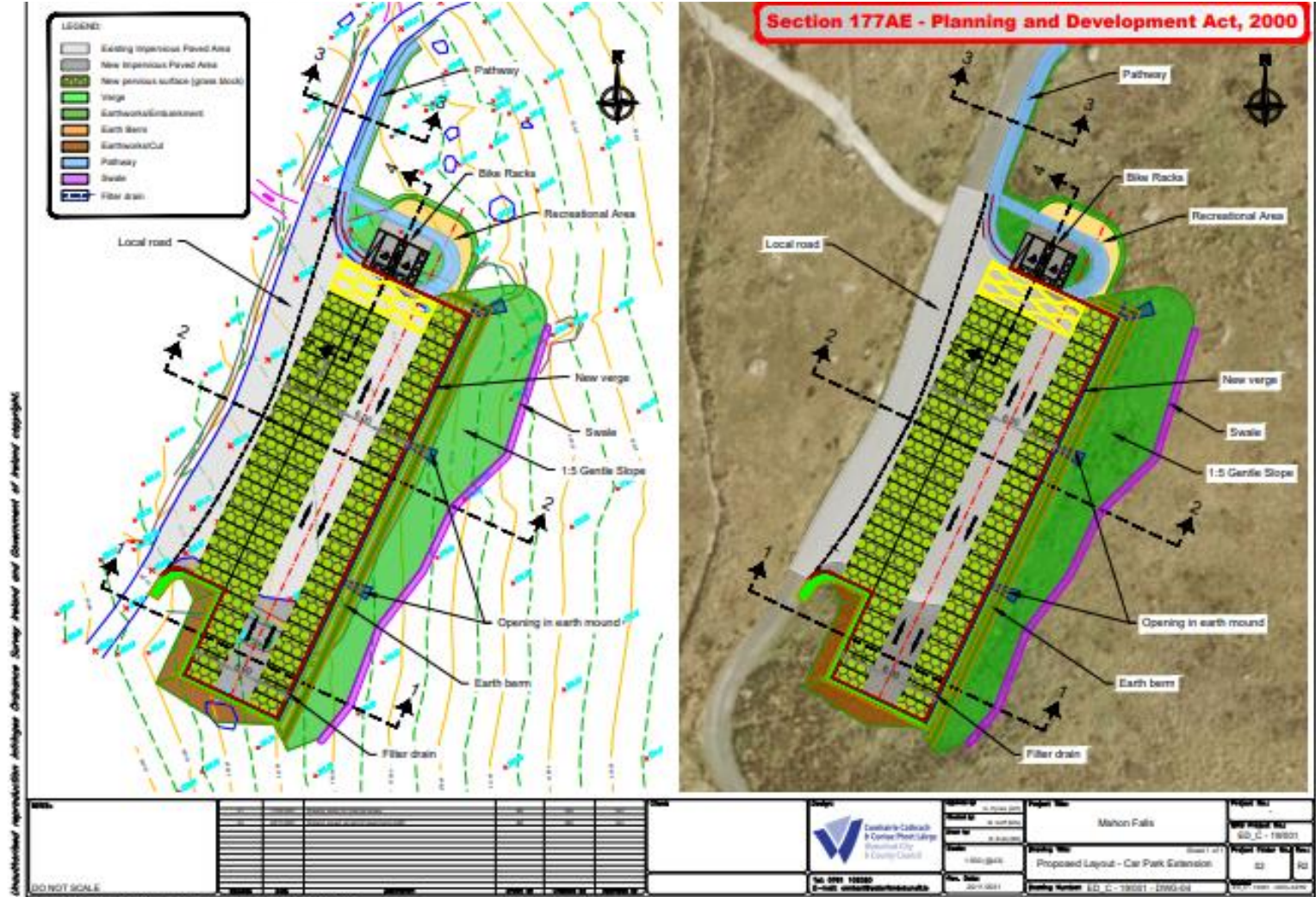


# Design into all Local Authority projects. E.g carpark design with no Nature-based SuDS.





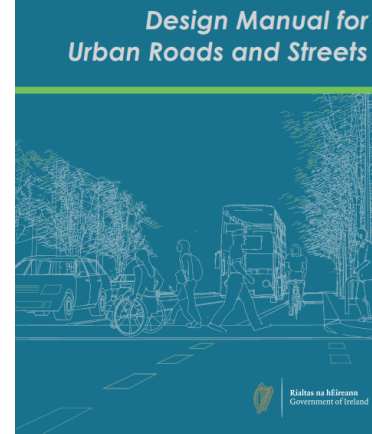
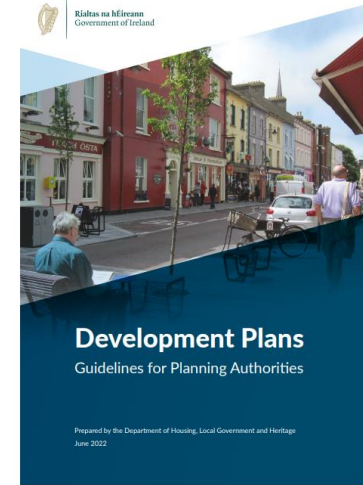
# Same carpark design with Nature-based SuDS.



"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."

# NBS will be Measure within the next RBMP (2022-2027)

- Needs ongoing support
- Relatively new to most sectors – must be integrated and multidisciplinary
- Need for support from the top as well as bottom up support
- Feedback from public consultations on the RBMP – strong support.
- Currently working on DMURs advice note with DOT & DHLGH
- Interagency working group to share info on locations of URDF, RRDF, Active Travel and with Irish Water.



# What about communities!



## A how-to-guide for Rainwater Planters

Design and build your very own rainwater planter



Comhairle Cathrach  
Bhaile Átha Cliath  
Dublin City Council

# Tidy Towns

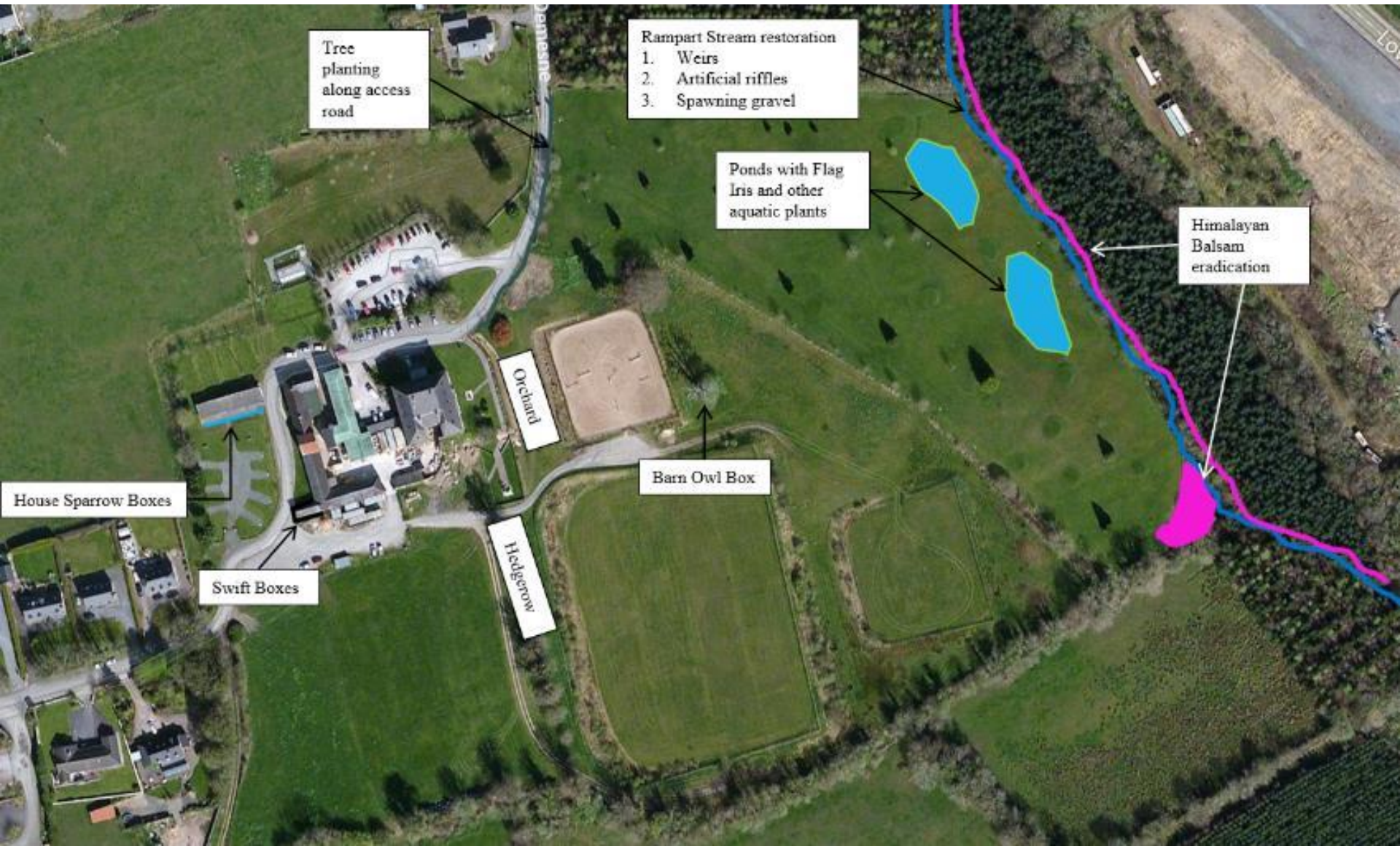


Geashill, Tidy Towns, Co Offaly. Funded via LAWPRO. World Water Day planting of wetland



# Designing in Nature to SuDS projects

e.g., building in opportunities to enhance nature on a site



# 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

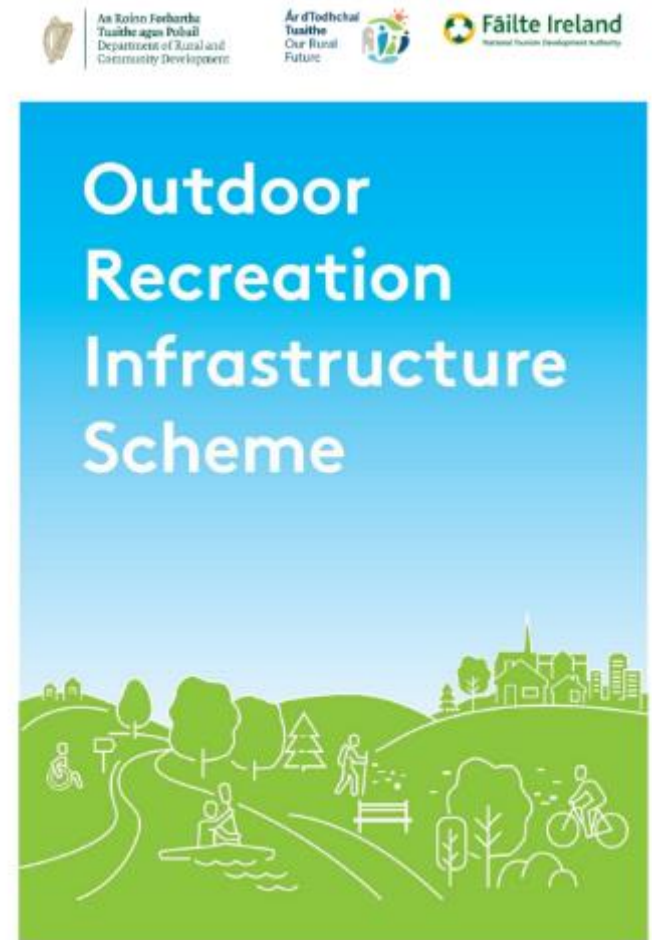
# Public engagement – co-design with local communities at the different levels



GSI planning at the Overton Campus near Bronzeville, Chicago developed a plant voting board for the rain garden to collect feedback on the types of plants and gathering space amenities folks wanted to see at the site.

# Greenways & Blueways

- Challenges of Greenways (Blueways) along rivers especially SACs/SPAs.
- Original concept may vary as practicalities of maintenance and community influence as considered
- Q. Are these developments a hydromorphological pressure? Is there an issue for biodiversity and Conservation Objectives of Natura 2000 sites?
- Could routes be designed to avoid impacts and disturbance? For long routes and cumulative effects (as each community looks for their own Greenway) is there a need to take a strategic view?



# Riparian areas particularly vulnerable



- Urban growth will put pressure on existing riparian area
- Greenways, blueways, active travel routes etc already moving into these areas
- Hydromorphological pressure under WFD – issue for biodiversity also etc
- Leaving more space between the river and development– green zones can absorb some of this pressure

# All encompassed by a Rainwater management plan (surface water management plan)



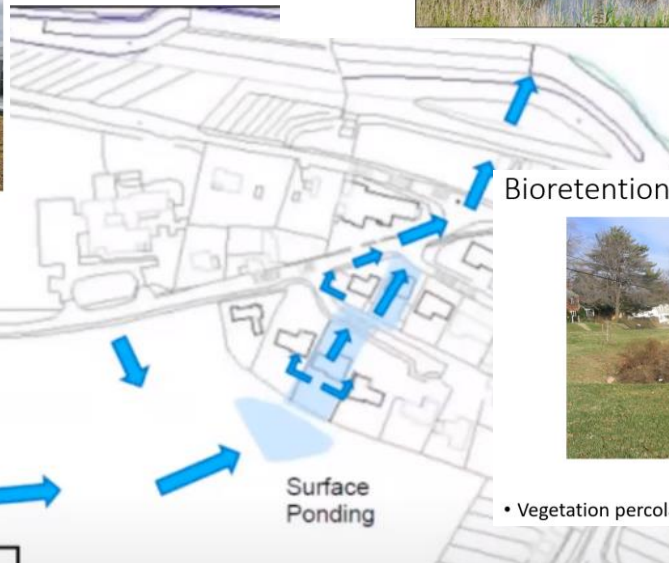
Green roof



Courtesy Dún Laoghaire Rathdown CoCo, E. Carroll & J. Craig

## Ponds/wetlands

Shallow side slopes  
Erosion protection  
Amenity and Biodiversity



• 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:

- Flooded areas
- Overland flow paths

## SWALES



Effectively grassed drains – but wide and mostly dry

## Rain gardens



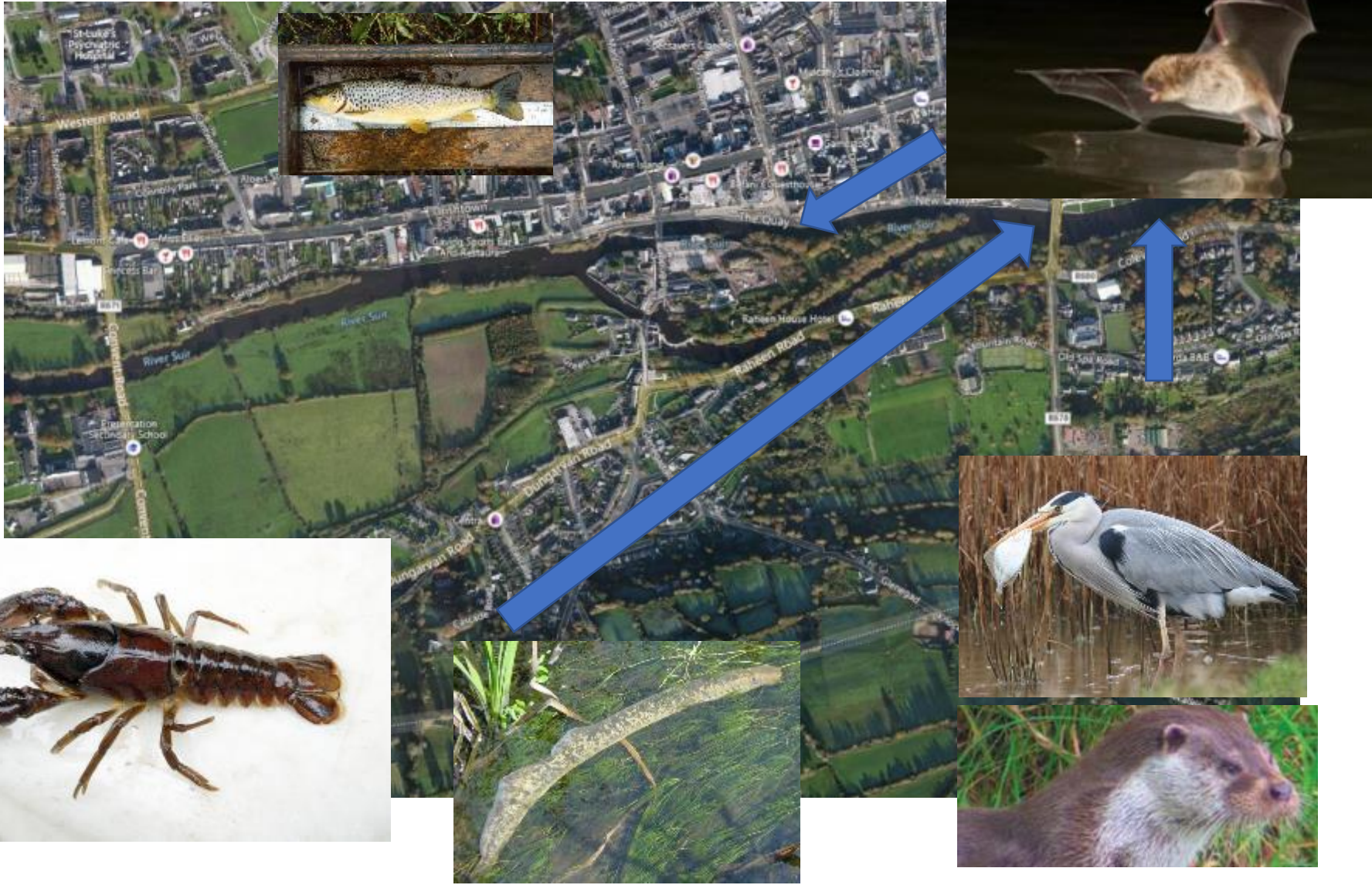


# Conclusion

- Nature based solutions follow international best practice
- Important for Biodiversity but also Climate, Water, and place making
- Projects should enhance nature and avoid habitat fragmentation, degradation or disturbance
- Opportunities to improve projects for a range of multiple benefits
- Guidance developed by DHLGH on Nature based rainwater management
- Lots of webinars at [Nature-based Solutions - Local Authority Water Programme \(lawaters.ie\)](https://www.lawaters.ie)
- Maintenance considerations & build in All Ireland Pollinator Plan
- Let water and nature guide your project...must build in water!!
- Consultation, design and construction are key!

We need to crack on with it!

# .....and protect our Biodiversity!



# Thank you

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

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

