

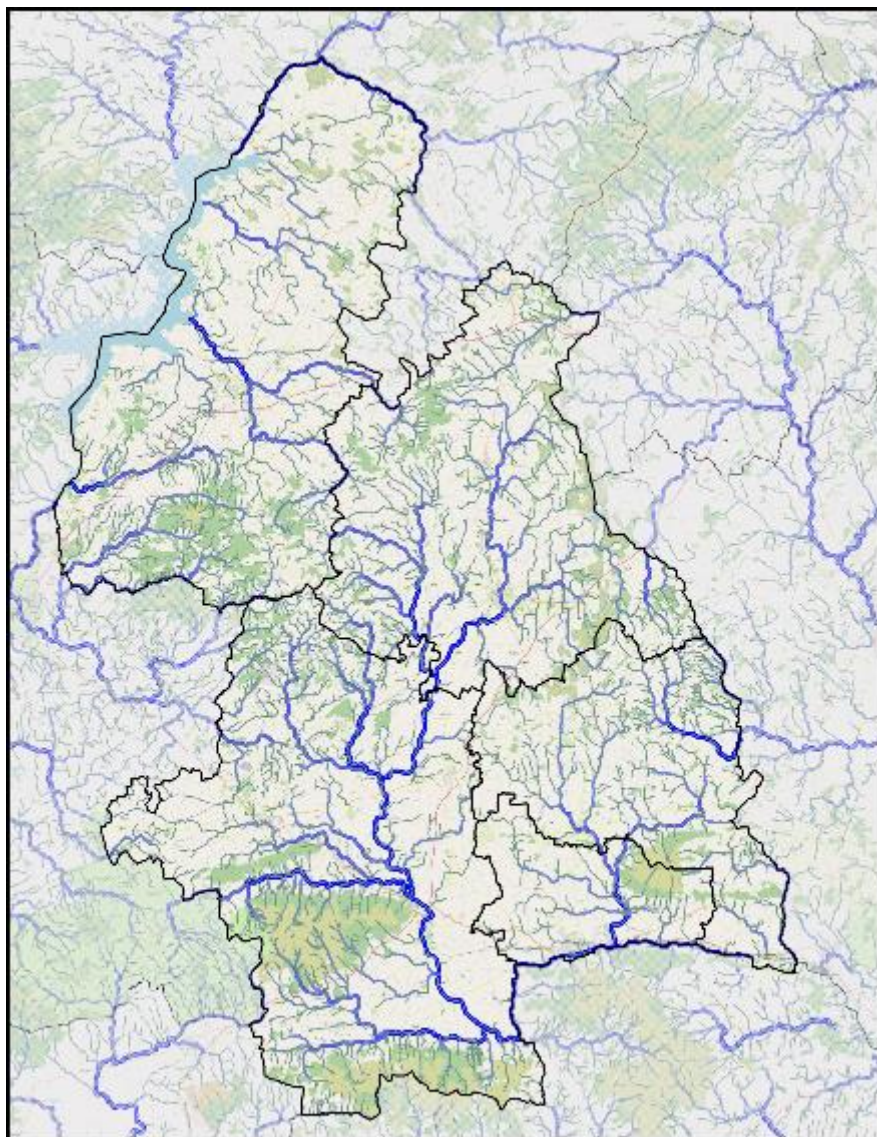


Nature-based Solutions

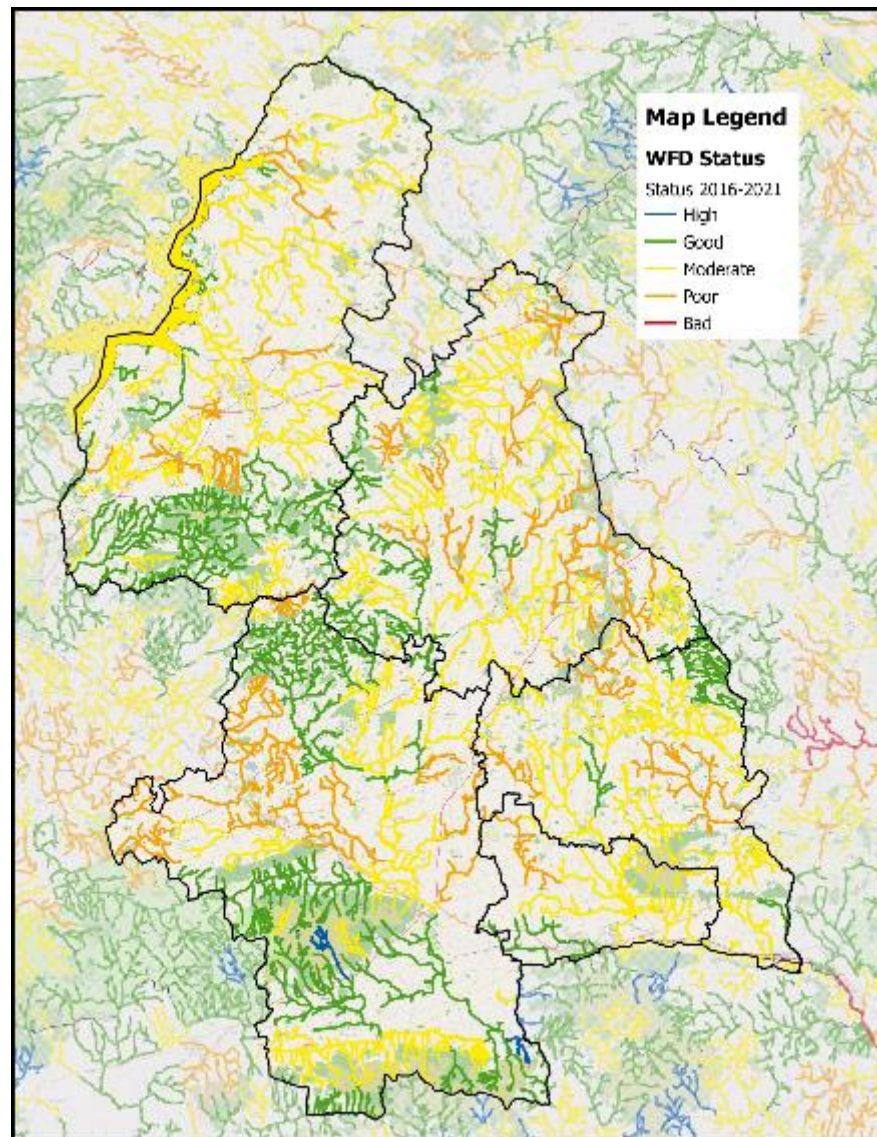
Presentation to Tipperary Tidy Towns

by Fran Igoe, LAWPRO: 08/02/25

Newcastle West – courtesy Michael O'Connell



Rivers in County Tipperary



Map Legend

WFD Status

Status 2016-2021

— High

— Good

— Moderate

— Poor

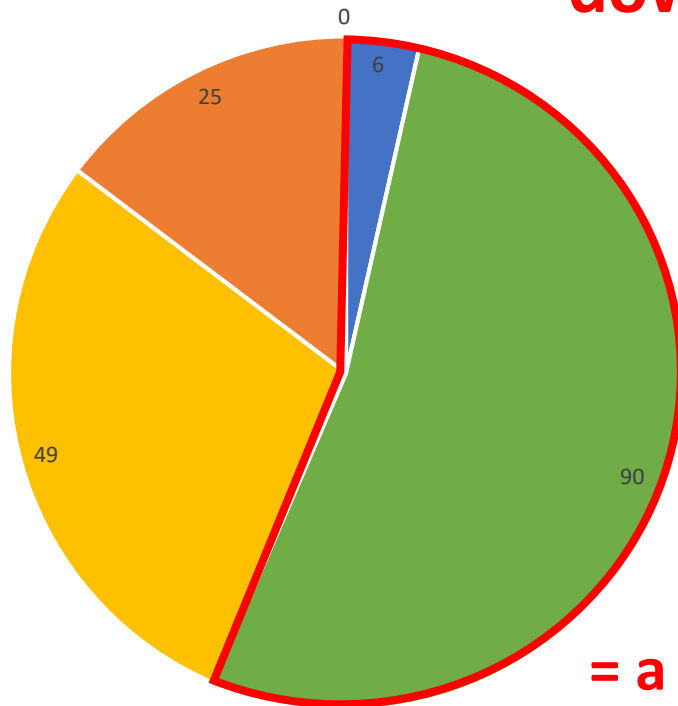
— Bad

**Rivers in County Tipperary:
 WFD Status 2016-2021**

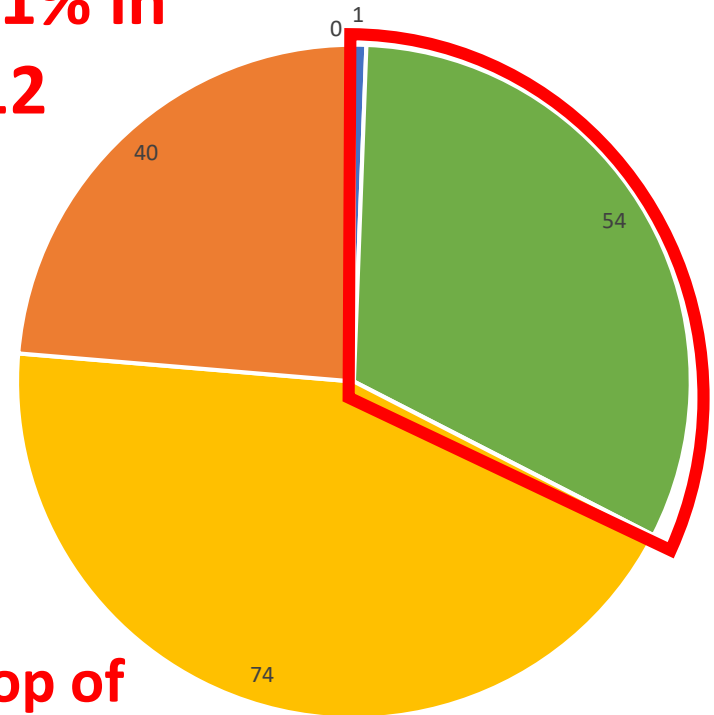
Water Quality In Tipperary

**Only 33%
satisfactory
down from 61% in
2010-2012**

2010-2015



2016-2021



**= a relative drop of
46% in about 12 years**

■ High ■ Good ■ Moderate ■ Poor ■ Bad

■ High ■ Good ■ Moderate ■ Poor ■ Bad

Rapid assessment of water quality indicators downstream and upstream of Thurles Bridge on 11/09/24



Kick sample to look at water quality indicator aquatic bugs



High level of silt evident



**Kick sample
taken down stream
of Thurles Bridge on 11/09/24**

- Very poor result
- Almost no aquatic life
- A few water shrimps (Gammarus), some biting midge larvae (Simulium) Extensive Cladophora algae
- No invertebrates typical of clean water such as mayflies or stoneflies - essential food for trout and salmon.



Freshwater shrimp



Blackfly larva



High level of silt and algae (below) and river weed (above)





High level of silt (below) and river plant growth evident (above) upstream



Nature-based solutions



If delivered appropriately, Nature-based Solutions can significantly contribute to addressing multiple societal challenges

One third of climate mitigation needed to meet the goals of the Paris Agreement can be provided by Nature-based Solutions



Constructed wetlands



Green urban spaces



Bioswales

Types of Nature-based Solutions

Courtesy of The International Water Association <https://iwa-network.org>



Natural wetlands



Mangroves



Reforestation

A fishes worst nightmare!

River
literally
filtering
through
gabion stairs

Gabions on
both banks

Reno
mattress
covers bed
of river





Random boulders for shelter for fish and for birds and mammals to sit

Diverse flow regime, greater habitat complexity & heterogeneity and more stable channel for flood conveyance

River bank vegetation establishing along banks generated by deposition of silt

Gravel introduced for spawning fish

2009







Combining targeted measures and European Innovation Partnership funding to deliver water improvement.....for the public good.



Nature-based Measures For farms under the Farming for WaterEIP



Measure – riparian set back



Riparian margin rich in biodiversity. Courtesy of LAWPRO

Measure – silt interception ponds



Sediment and nutrient interception ponds. Courtesy of IRD Duhallow Farming for Bluedot EIP

Measure – diversion of “soiled water”



Vegetated bund at end of field to trap sediment from tillage
Courtesy of ASSAP / Fingal

Measure – diversion of “soiled water”



Waterbar diverting soiled water during high rainfall events to a sediment trap. Courtesy of IRD Duhallow Farming for Bluedot EIP

Measure - wetlands



Nutrient interception wetland with high biodiversity value. Courtesy of IRD Duhallow

Water quality risk: Urban Storm Water Management and combined sewer networks

- Historically – get water off site as quickly as possible
- Combined sewers designed for small populations & more permeable surfaces
- Now many combined sewers have inadequate capacity
- Sewage treatment plants dealing with lightly contaminated water unnecessary
- Storm overflows = great pollution risk
- Climate change will exacerbate the above



Water quality risk:

Contaminated surface water runoff from traffic



Barntown, Wexford



Dungarvan, Waterford

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

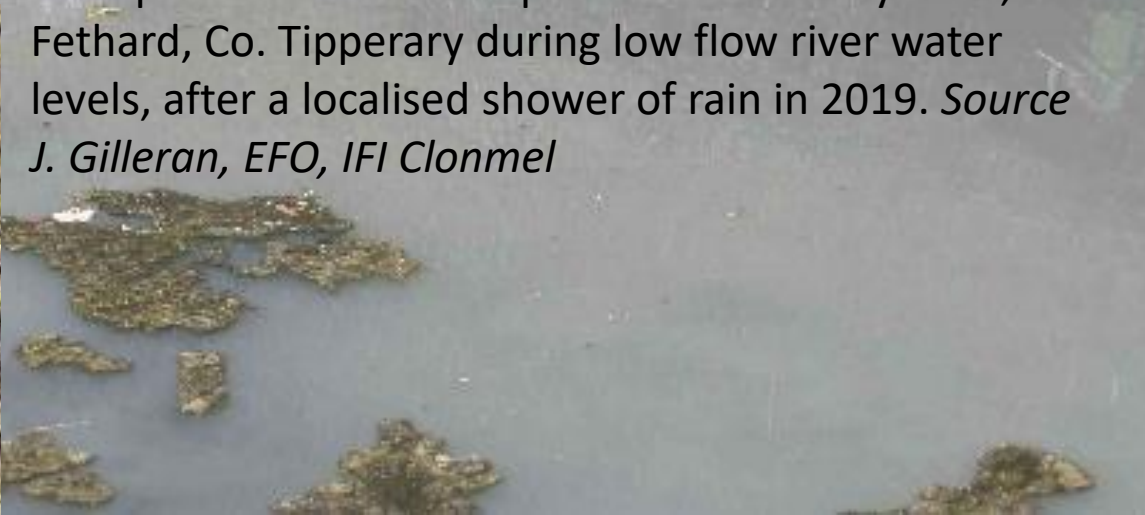


Table 2. Sources of pollutants released by vehicular traffic in urban areas.

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); Hjortenkrans 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, PAHs, Microplastics	Hvitved-Jacobson and Yousef (1991); Van Duin et al. (2008); Lindgren (1996); Markiewicz et al. (2017); Magnusson et al. (2016); Horton et al. (2017b); Vijayan et al. (2019a)

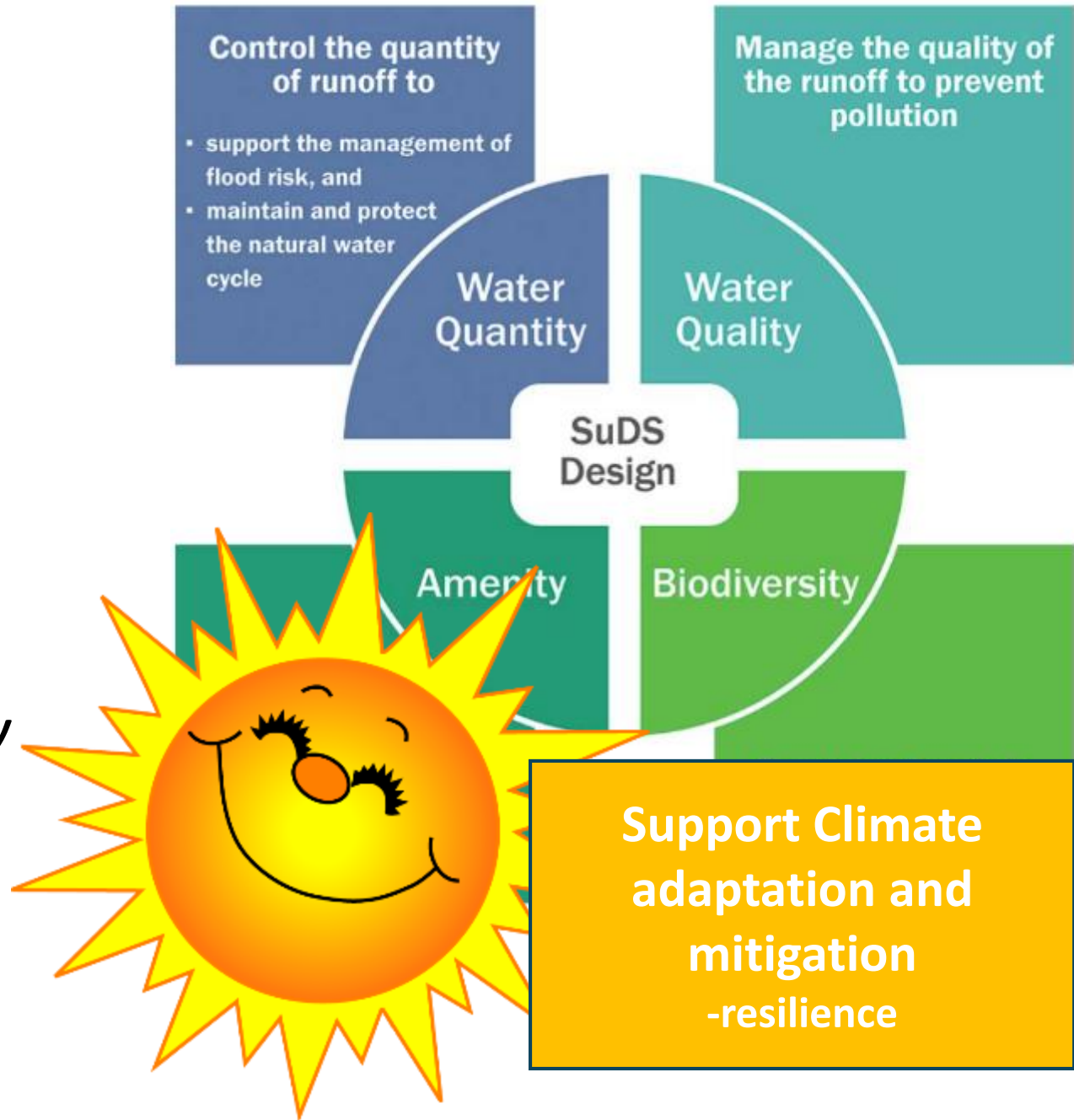


Example of Stormflow impact on Clashawley River, Fethard, Co. Tipperary during low flow river water levels, after a localised shower of rain in 2019. *Source J. Gilleran, EFO, IFI Clonmel*



Sustainable Urban Drainage Systems:

Nature-based SuDS relevant to climate action and water quality must be factored into climate adaptation & resilience planning



Surface water runoff management in ROI

SuDS – Sustainable urban Drainage Systems



Often....



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*

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

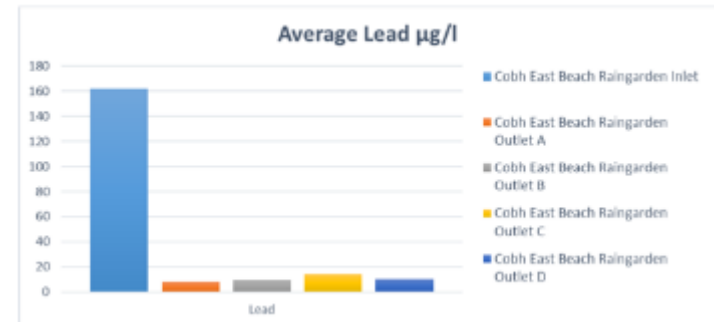
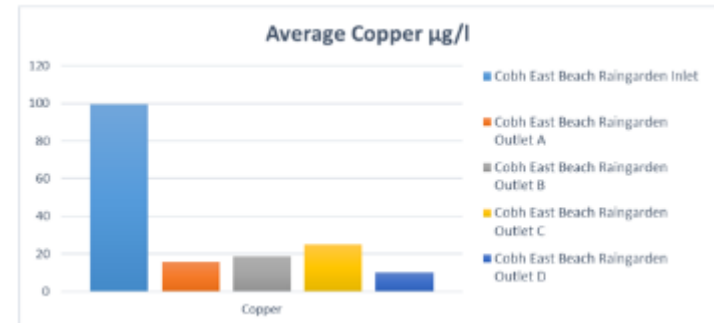
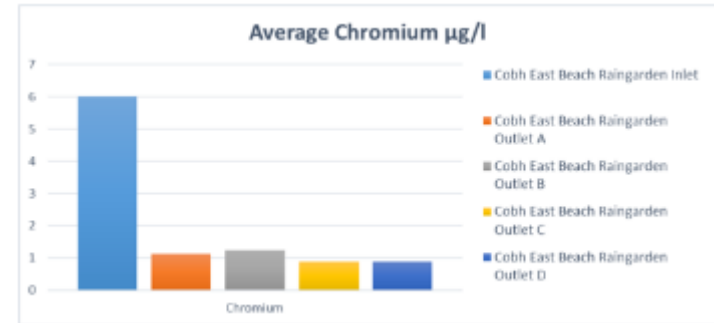
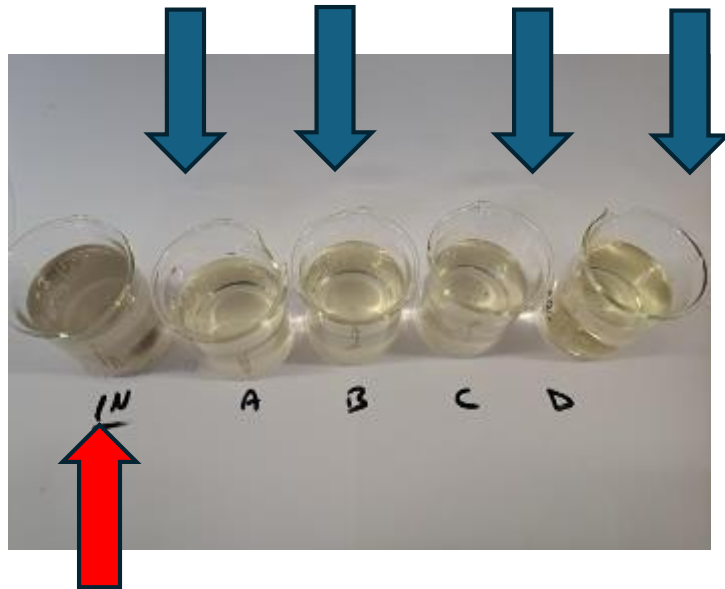


return > scientific reports > articles > article
SCIENTIFIC REPORTS

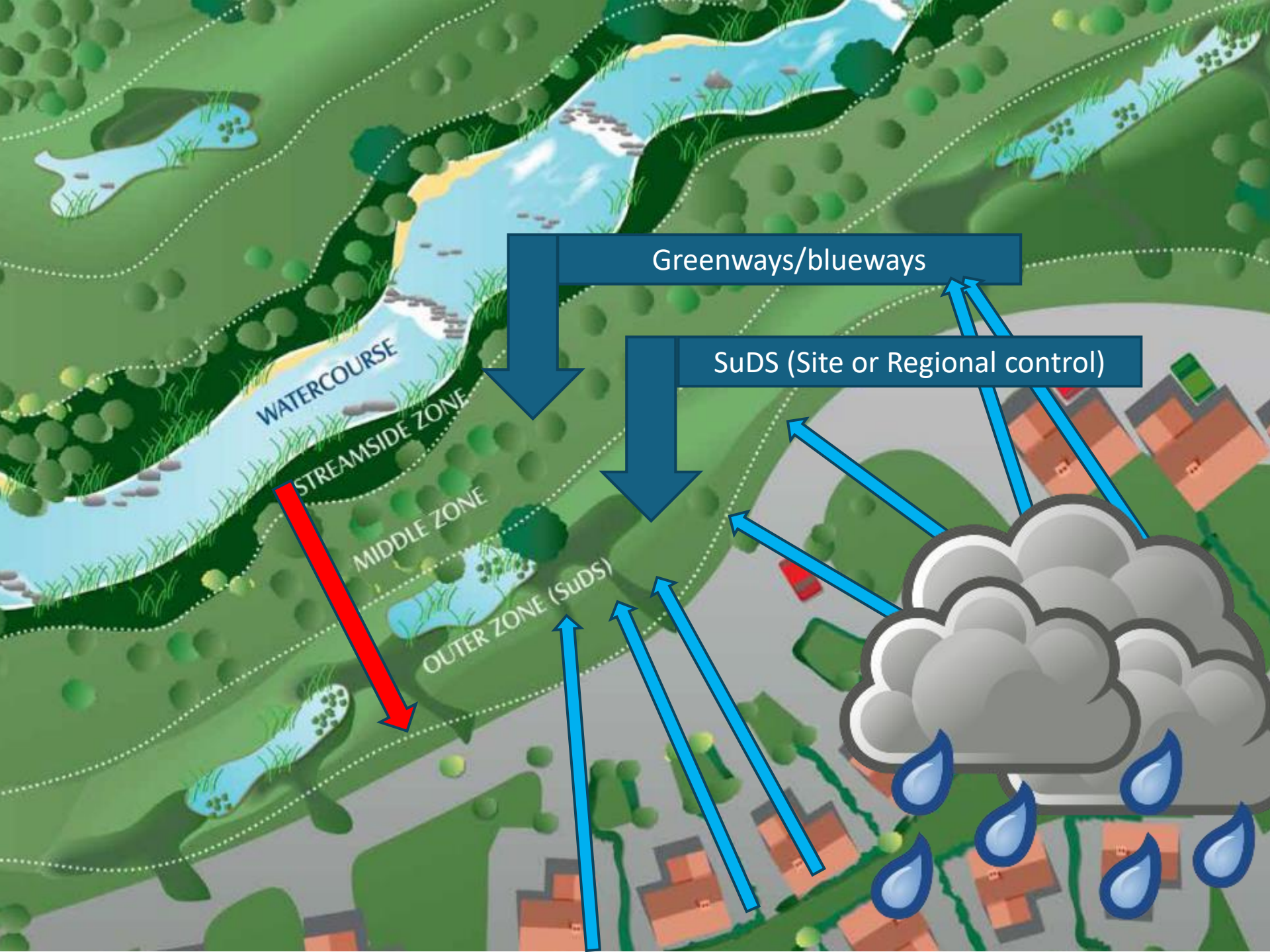
Article | Open Access | Published: 12 February 2018
Urban stormwater runoff negatively impacts lateral line development in larval zebrafish and salmon embryos

Alexander Young, Valentin Kochanov, Jennifer K. McKinley, John D. Stark & Allison E. Curtis

NBS Demonstrator Project



The pilot project forms an integral part of the climate action commitments outlined in Cork County Council's Cobh Town Centre Urban Design Plan.



Greenways/blueways

SuDS (Site or Regional control)

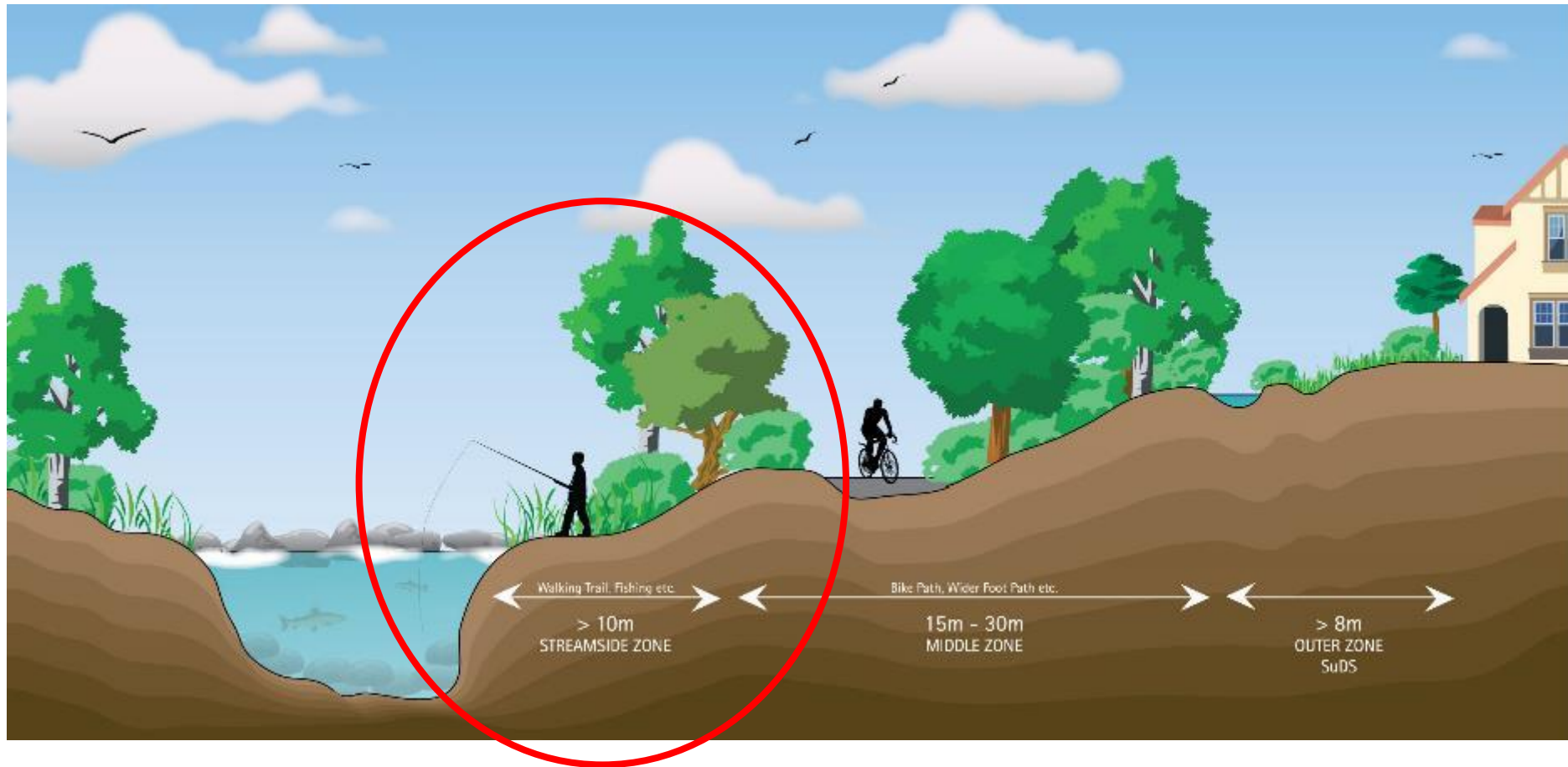
WATERCOURSE

STREAMSIDE ZONE

MIDDLE ZONE

OUTER ZONE (SuDS)

NBS bring multiple benefits



Objective OS03

To have regard to the 'Planning for Watercourses in the Urban Environment Guidelines' (Shannon Regional Fisheries Board) when considering development proposals in the vicinity of rivers and streams within and adjoining the plan area.

Objective OS04

To ensure riparian buffer zones, a minimum of 10m in width (in some cases buffers zones up to 50m may be appropriate), are created between all watercourses and any future development. In considering the appropriate width, the Council will have regard to 'Planning for Watercourses in the Urban Environment Guidelines' (Shannon Regional Fisheries Board).

Objective OS05

To only consider proposals for culverting/piping of streams and watercourses where these works are deemed absolutely necessary and appropriate. Inland Fisheries Ireland (IFI), National Parks and Wildlife Service (NPWS) and the Office of Public Works (OPW) consulted, where appropriate.

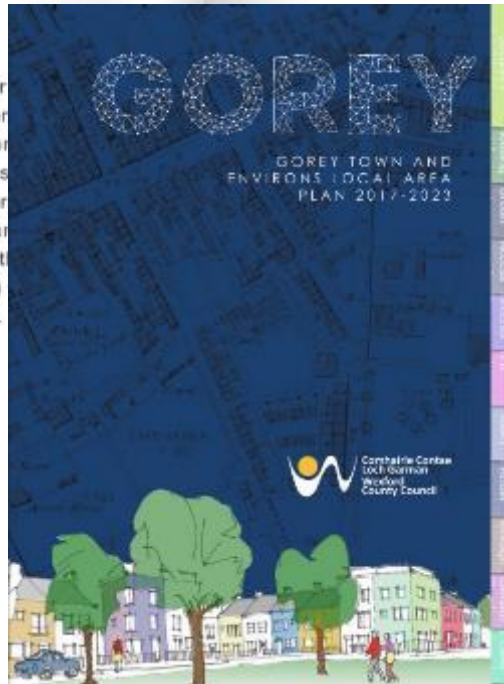


FIGURE 34 Indicative Layout of a Riparian Zone

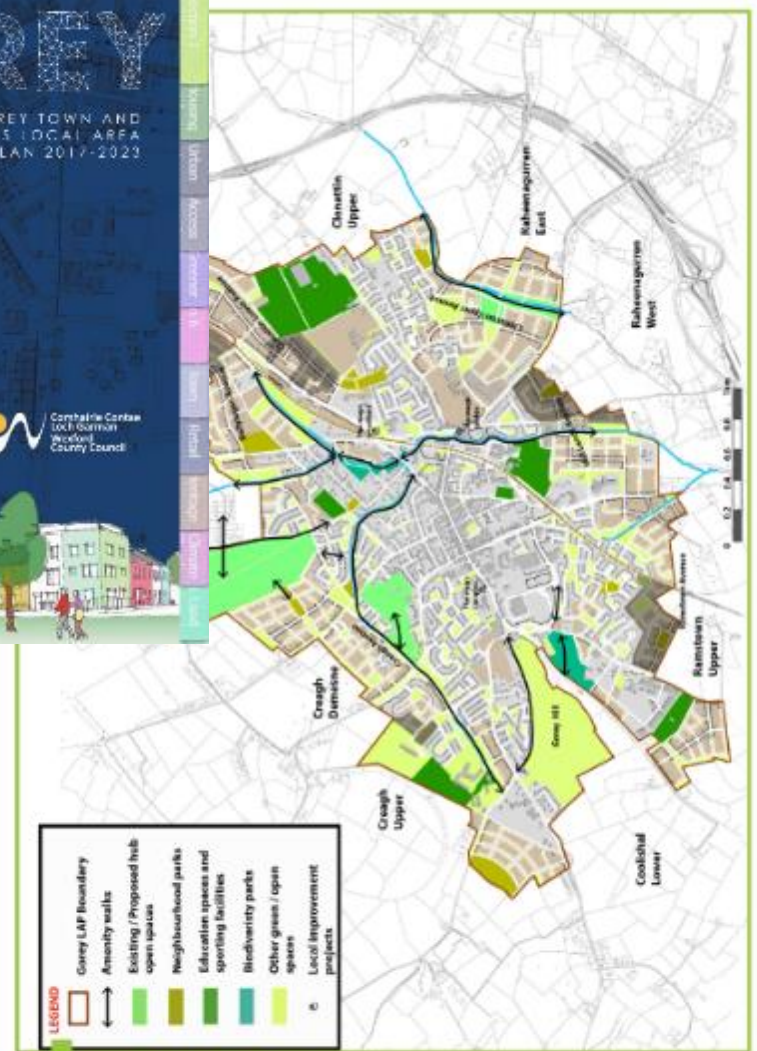
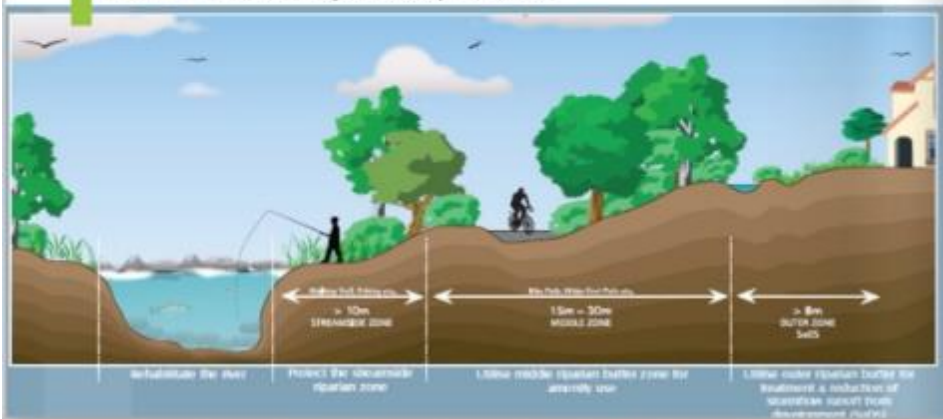
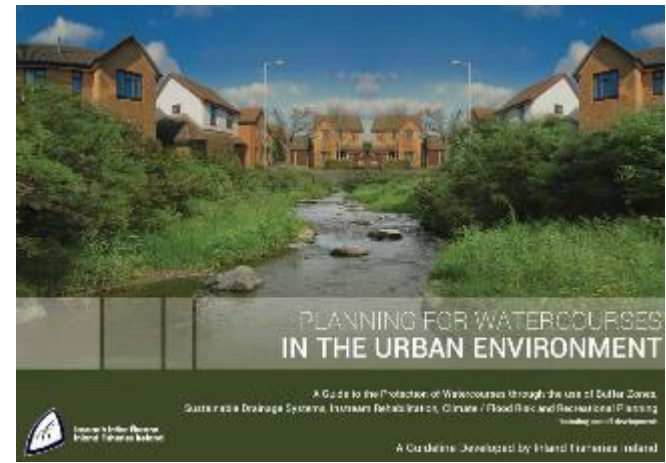


FIGURE 30 Open Space and Green Infrastructure Concept

What does that look like in practice?



Active travel route back from the river and flood plain function intact. River Ara, Tipperary town



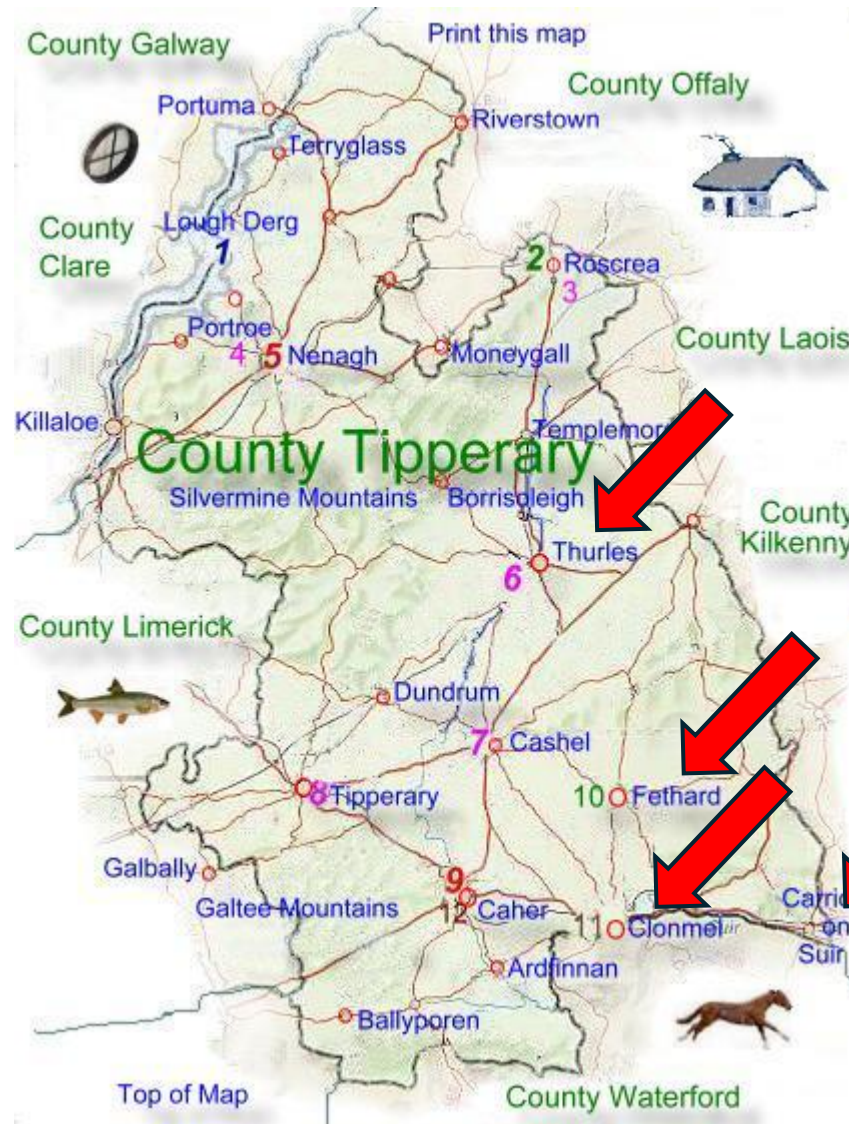
Nature-based solutions (integrating water) - Wider public good/multiple benefits

- Nature-based solutions providing for better management of water in **public spaces**
- Reinforced grass for parking bays **reduces hard surface runoff** into conventional drainage network
- Swales allow for collection of water from hard surfaces, slow the flow and provide **biodiversity benefits**
- Bioretention area allows for **water attenuation**
- Meadow grass land, wildflowers and native trees also capture water, **sequester carbon**.
- All provide for a **better user experience**



Min Ryan Park, Wexford

Some examples from Tipperary



Locations of some (urban) nature-based solutions in Tipperary

Cashel Road: Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel
(engineer – Gillian Flynn)

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Suir Island: Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel
(engineer Eamonn O’Connell)

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Clonmel

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



Bioretention Areas (Rain Gardens) – Ormond Castle, Carrick-on-Suir

Demonstrator Project Example – Carrick on Suir LAWPRO Support Provided



- The project objective is to treat storm water run-off from the adjacent public road, which is discharging into the Bog Field and ultimately into the River Suir.
- Provision Swales, Settlement Forebay, Storm Water Basin.
- Rewilding of the area through appropriate planting will also facilitate improved carbon sequestration in the area.

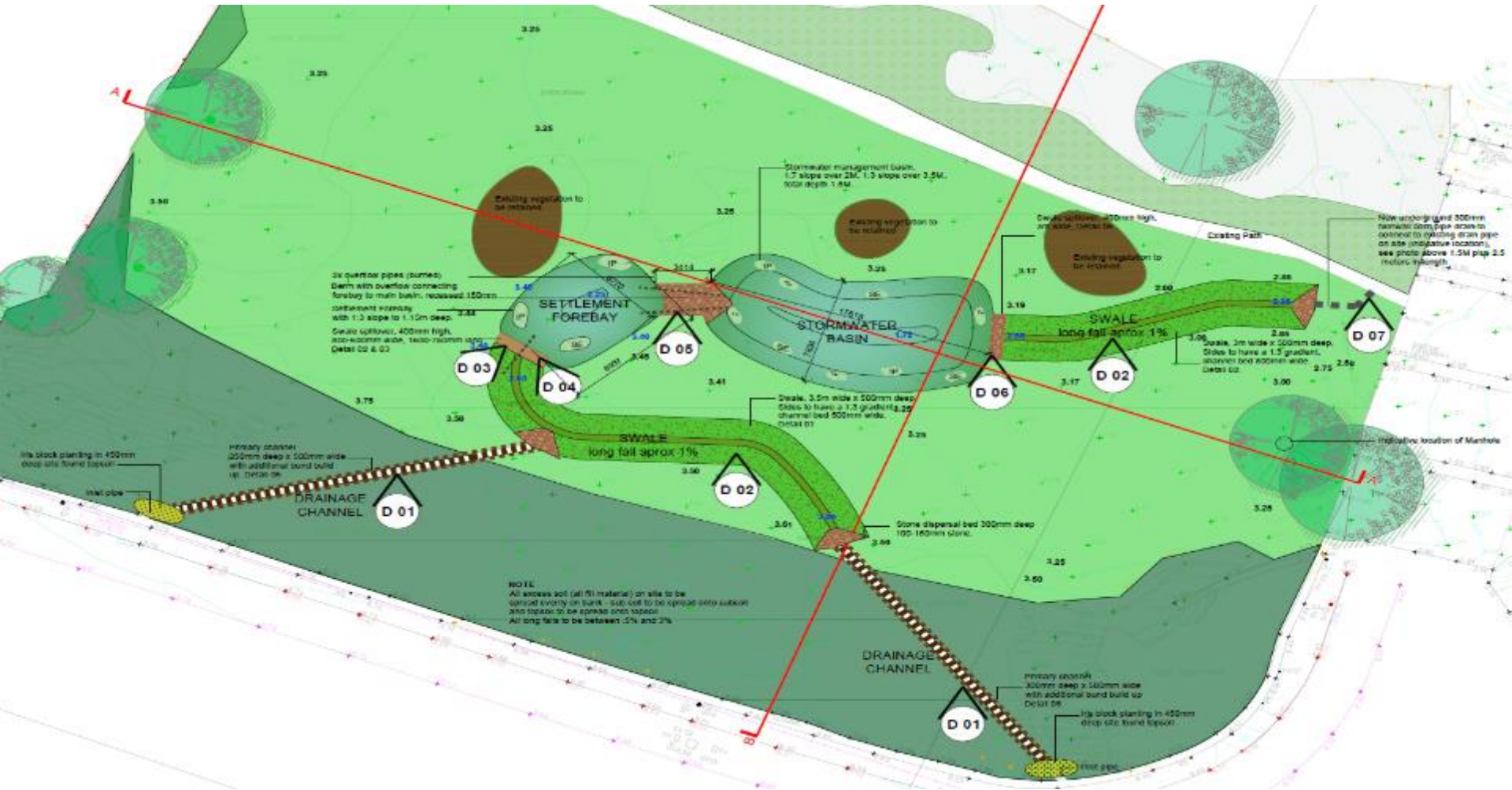
Pre-Existing Situation (Location known locally as the bog field)

Demonstrator Project Example – Carrick on Suir LAWPRO Support Provided



Pre-existing surface run-off situation

Demonstrator Project – Carrick on Suir LAWPRO Support Provided



Layout of NbS Features

Demonstrator Project Example – Carrick on Suir LAWPRO Support Provided



Civil / Excavation works completed. Landscaping with suitable native & wildflower planting to be completed for rewilding.

Example of project delivery by a Local Authority with LAWPRO supports (NbS Demonstrators)



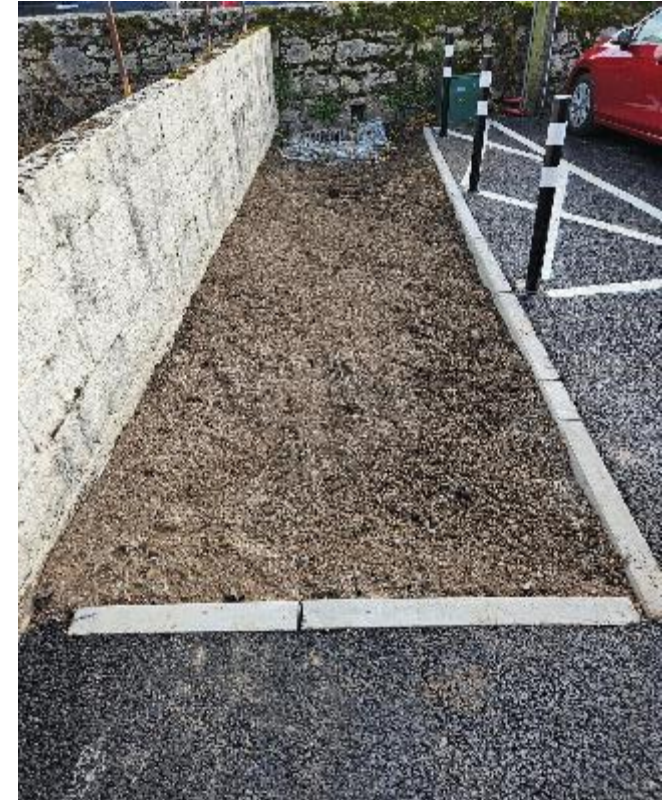
NbS features (swales & interception ponds) – The Bog Field, Carrick-on-Suir

Demonstrator Project Example – Carpark Fethard LAWPRO Support Provided

Rain Garden No.1



Rain Garden No. 2



Soil-Mix Recently Installed Ready for Planting by Fethard Tidy Towns
along with Stone Chip Mulch (Note: Carpark recently resurfaced)

Demonstrator Project Example – Carlow Town LAWPRO Support Provided



Completed Rain Garden Project (Bioretention Areas)

Demonstrator Project Example – Carlow Town LAWPRO Support Provided



Completed Rain Garden Project (Bioretention Areas)



Survey of pedestrians (Carlow town, n = 47: Aug 2024)	Yes
Do you know what this is?	34%
Do you think we should put more of them around the town?	89%
Do you think there should be a public meeting or social media campaign to explain what they are?	55%
Do you think there should be signage to explain what they are?	68%
Would you be willing to help maintain them?	53%

Carlow's rain gardens are a free draining soil mix that cleans, stores and conveys runoff water



Figure 5 LAWPRO provided funding and support to the above project. Similar projects are under way at other locations and can be designed to look attractive with proper design, planning and landscaping.



Community participation & support

Gairdín na mBáistí agus Gaothlacha Céisille CEASHILL RAIN GARDEN & WETLANDS



Water runs down the gutter to the plants. It is stored in the soil and plants.

Water runs down the gutter to the plants. It is stored in the soil and plants. It is captured by the water storage tank, and then flows to the lough.

Water runs down the gutter to the plants. It is stored in the soil and plants. It is captured by the water storage tank, and then flows to the lough.

AN LOCH BUÍ

The Yellow Lough is a natural wetland area, which is a valuable habitat for a wide range of plants and animals. It is a natural water storage area, which helps to reduce the risk of flooding. The water in the lough is used for a variety of purposes, including irrigation and recreation. The lough is a valuable resource for the community, and it is important to protect it for future generations.

THE YELLOW LOUGH

The Yellow Lough is a natural wetland area, which is a valuable habitat for a wide range of plants and animals. It is a natural water storage area, which helps to reduce the risk of flooding. The water in the lough is used for a variety of purposes, including irrigation and recreation. The lough is a valuable resource for the community, and it is important to protect it for future generations.



Damselfly nymph
in the water.



Yellow flowers
in the water.



Purple flowers
in the water.



Tall plant
in the water.



Purple flowers
in the water.



Small flowers
in the water.



Butterfly
on the water.



Nature-based solutions for communities



Nature-based solutions for community groups

Askeaton Community Group – (rainwater planters)

Designing for biodiversity:

Pond draining a pitch and putt course. Surface water treatment. Diversity of plant and invertebrate life.

Wetland constructed 2014: courtesy IRD Duhallow



Two Carrick-on-Suir projects aim to reduce pollutants from run off surface water

The nature based solution projects are being rolled out at the Bog Field in Carrickbeg and Ormond Castle Park



The water treatment pods and vegetated swales created at the Bog Field at Carrickbeg,

Public awareness of nature-based solutions and participation is key to bringing people along



The Sinn Féin councillor said he previously had a row with the Council's Environment Section as he thought the Bog Field should be developed into a skateboard park for the town's youth.

However, he now saw where the Council and LAWPRO were coming from on seeing the work that is being done there.

Tidy Towns – what you can do!

- 1. Look at your town and see what nature-based solutions might work?
- 2. Look for nature-based solutions in planning applications and developments?
- 3. Does your town have a rainwater management plan.
- 4. Get involved in helping maintain raingardens?
- 5. Put up signage and explain to people what the purpose of nature-based solutions are in your town
- 6. Can they support wildlife (biodiversity)
- 7. Work with LEADER, Climate Action, Biodiversity, LAWPRO funding, the local engineer in the council and anyone who can assist.

A GUIDE FOR COMMUNITY GROUPS

WORKING WITH WATER, BIODIVERSITY AND CLIMATE CHANGE



Smart Villages

Getting smart about climate change, water quality, biodiversity and quality of life.

Smart Villages are communities in rural areas that use innovative solutions to improve their resilience, building on local strengths and opportunities. Indeed, once all the LEADER principles are applied, it creates the conditions for the development of Smart Village initiatives.

Climate Change Resilience

Smart Village strategies should plan for predicted extremes in weather patterns brought about by climate change. Our villages are at increased threats from flooding and droughts and these have implications for water quality, biodiversity loss and our overall quality of life. Here are some tips to create more resilient communities.

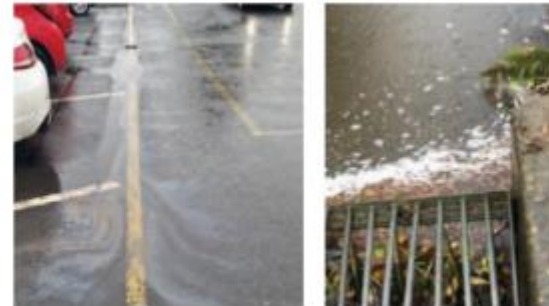
Practical considerations include:-

Rainwater Management Planning:

working out how rainwater flows across the village to manage it better using nature-based solutions to protect water quality, reduce flood risk, enhance biodiversity and place making.



Water quality: conservation and protection of water quality is important. Road runoff can contain contaminants from motor vehicles and other pollutants. Building in nature-based solutions and rainwater management planning will provide better protection.



Nature-based solutions: nature-based solutions intercept and reduce pollutants (up to 90%) from surface water on roads and fields, provide biodiversity benefits and can "slow the flow". And they can be very attractive making the village a nice place to live!!



Building in these concepts into a Smart Village plan provide great resilience to climate change events.
Contact LAWPRO for more information. www.lawwaters.ie