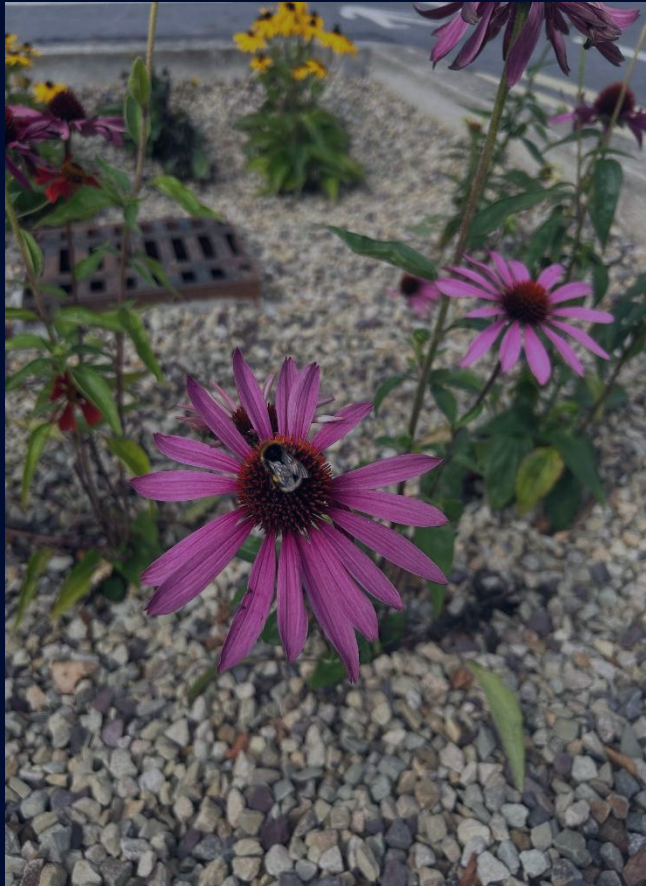


Session 2 - Nature-based Solutions (NbS) Practical Implementation



Tom Brennan, CEng MIEI
Eamonn O'Connell, CEng MIEI
Local Authority Waters
Programme (LAWPRO)

Session 2 - Nature-based Solutions (NbS)

Practical Implementation

Contents

- **Context for Nature-based Solutions**
- **Mainstreaming Nature-based Solutions – Guidance Documents**
- **Mainstreaming Nature-based Solutions – Demonstrators**
- **Top Tips & Lessons Learned**
- **Practical Implementation – Overview of Challenges & Barriers**
- **Taking In Charge & Maintenance of Nature-based Solutions**
- **Finance Barriers & Land Acquisition**
- **Infrastructure Climate & Nature Fund**

LAWPRO Role

Local Authority Waters Programme (LAWPRO) works on behalf of Ireland's 31 local authorities to protect and restore good water quality in our rivers, lakes, estuaries, ground and coastal water through catchment science and local community engagement.

- Working with different sections of LAs e.g., planning, engineering, environment, biodiversity to develop best Nature-based Solutions (NbS) practice for Ireland
- Working with DHLGH and other government departments bring LA feedback forward and develop policy
- Develop training with professional bodies and practitioners
- Work with CAROs, biodiversity officers and public representatives
- Strong community (Community Water Officer) and science focus
- Funding for NbS demonstrator exemplar projects & NbS delivery by Communities via the CWDF

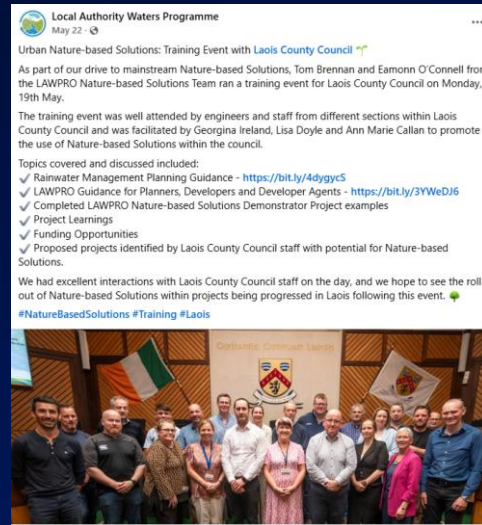


NATURE-BASED SOLUTIONS
TO PROTECT AND RESTORE URBAN, RURAL, COASTAL AND RIVERINE ENVIRONMENTS

ENGINEERS IRELAND
CPD APPROVED EVENT 2025

Two Day National Conference
Dundalk Institute of Technology
4th-5th June 2025

The poster features a circular diagram titled 'NATURE-BASED SOLUTIONS' showing the integration of natural and built environments. It includes logos for Dundalk Institute of Technology, Engineers Ireland, and various partner organizations like OPW, An Roinn Talmhaíochta, and Uisce Éireann.



Local Authority Waters Programme
May 22 · 2,207 followers

Urban Nature-based Solutions: Training Event with Laois County Council

As part of our drive to mainstream Nature-based Solutions, Tom Brennan and Eamonn O'Connell from the LAWPRO Nature-based Solutions Team ran a training event for Laois County Council on Monday, 19th May.

The training event was well attended by engineers and staff from different sections within Laois County Council and was facilitated by Georgina Ireland, Lisa Doyle and Ann Marie Callan to promote the use of Nature-based Solutions within the council.

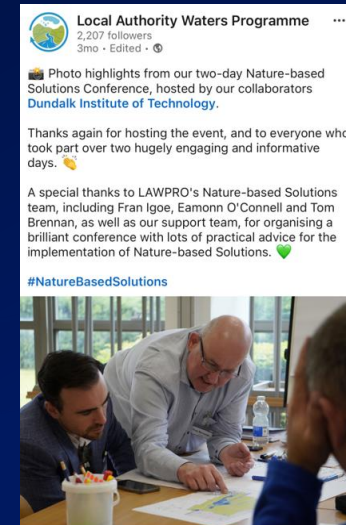
Topics covered and discussed included:

- ✓ Rainwater Management Planning Guidance - <https://bit.ly/4dygyt5>
- ✓ LAWPRO Guidance for Planners, Developers and Developer Agents - <https://bit.ly/3YWeDj6>
- ✓ Completed LAWPRO Nature-based Solutions Demonstrator Project examples
- ✓ Project Learnings
- ✓ Funding Opportunities
- ✓ Proposed projects identified by Laois County Council staff with potential for Nature-based Solutions.

We had excellent interactions with Laois County Council staff on the day, and we hope to see the roll out of Nature-based Solutions within projects being progressed in Laois following this event.

#NatureBasedSolutions #Training #Laois

The post includes a group photo of the attendees and organizers.



Local Authority Waters Programme
3mo · Edited · 2,207 followers

Photo highlights from our two-day Nature-based Solutions Conference, hosted by our collaborators Dundalk Institute of Technology.

Thanks again for hosting the event, and to everyone who took part over two hugely engaging and informative days.

A special thanks to LAWPRO's Nature-based Solutions team, including Fran Igoe, Eamonn O'Connell and Tom Brennan, as well as our support team, for organising a brilliant conference with lots of practical advice for the implementation of Nature-based Solutions.

#NatureBasedSolutions

The post includes a photo of people working at a table during the conference.



IMPROVING TOWN CENTRE FIRST PLANS THROUGH NATURE-BASED SOLUTIONS

BACKGROUND TO THIS TRAINING

Nature-based solutions (NbS) provide multiple benefits to place making in the urban environment. These include climate adaptation, mitigation, water quality, flood risk, biodiversity, mental health, urban cooling, and others.

This course will provide Town Centre First (TCF) teams training to better integrate NbS into their settlement plans and projects, and support the delivery of Local Authority Climate Action Plans and Biodiversity Action Plans.

ABOUT THIS TRAINING

The workshops will involve worked examples of TCF type projects integrating NbS through practical hands-on training with expert consultants and LAWPRO's NbS team. Each TCF team is required to bring plans of TCF projects under development to assist in the identification of NbS within their settlement area. Each TCF team is requested to bring:

1. A1 maps showing TCF area
2. Design drawings with stormwater information where relevant
3. Laptop with access to relevant TCF information

WHO NEEDS TO ATTEND

Those responsible for the delivery of TCF projects. This could include the following - TCFs, Local area engineers, architects, planners, flood engineers, municipal district staff, technicians, landscape architects, biodiversity officers. Provision is made for each Local Authority to provide a minimum of 5 staff.

WHY YOU SHOULD ATTEND

This is a free event and it is important that Local Authorities take the opportunity to improve on their TCF place making and delivery on multiple benefits within their plans and projects. Uisce Éireann (Irish Water) will be in attendance to provide support regarding combined and wastewater networks within settlement areas, where the data is available.

VENUES & DATES

The Local Authority Services Training Group (LASITG) network of centres will host this training.

Training Centre	Dates
ROSCREA TRAINING CENTRE	8TH & 9TH OCTOBER 2025
CASTLEBAR TRAINING CENTRE	10TH OCTOBER 2025
BALLYCOOLIN TRAINING CENTRE	16TH OCTOBER 2025
BALLINCOLLIG TRAINING CENTRE	27TH NOVEMBER 2025

REGISTRATION: TEA & COFFEE 9.00-9.30AM, CLOSE 10.00AM, LUNCH PROVIDED.

PARTICIPANTS ARE ADVISED TO REVIEW THE INTRODUCTORY VIDEO RECORDED BY THE LGMA

CLICK HERE | Review Video Here

CONSULT WITH THE NATIONAL TCF OFFICE FOR DETAILS OF VENUES AND DATE ASSIGNED TO YOUR LOCAL AUTHORITY.

Context for Nature-based Solutions (NbS)

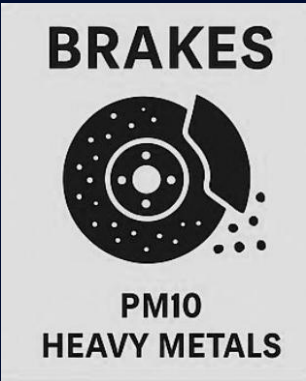
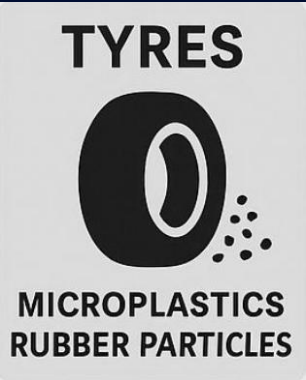
Urban Stormwater Management

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



Context for Nature-based Solutions (NbS)

Stormwater – First Flush



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

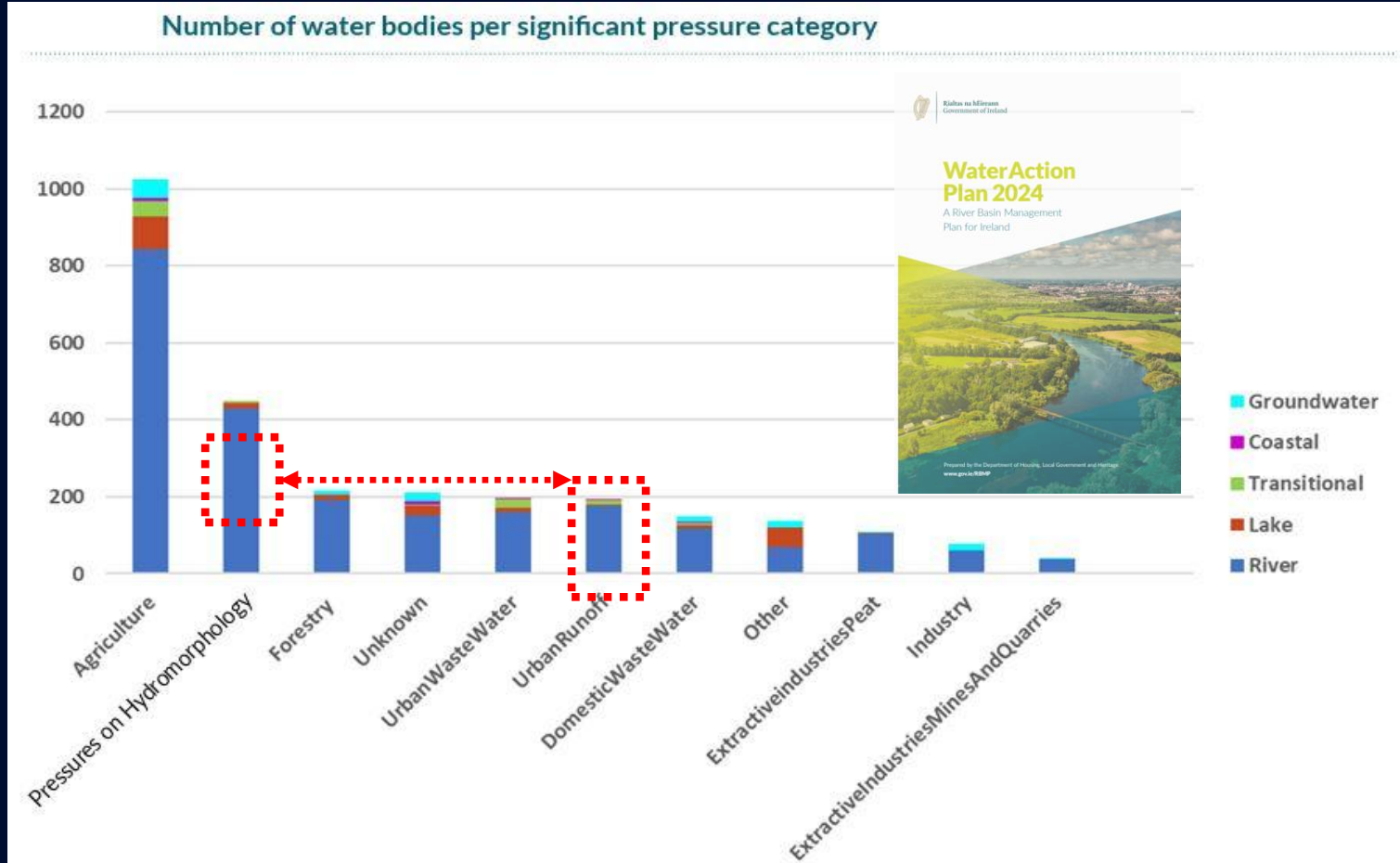
Table 2. Sources of pollutants released by vehicular traffic in urban areas.		
Specific source	Pollutants released	References
Vehicle operation		
Exhaust gases and particles	Hydrocarbons, PAHs, NOx, Ni, BTEX	Markiewicz et al. (2017); Brinkmann (1985); Huber et al. (2016); Kayhanian (2012); Duong and 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	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)

Context for Nature-based Solutions (NbS)

Stormwater – First Flush



Context for Nature-based Solutions (NbS)



Nature-based solutions and Urban Sensitive Design also offer opportunities for

- River Restoration
- Deculverting / Daylighting*
- Reconnecting hydrological pathways (via RMP process)
- Large scale integration into public spaces

*'River Daylighting' - the process of removing a river or stream from its buried or piped state and restoring it to an open, above-ground channel, often in urban areas

Whilst the focus will be on **Urban Runoff**, NbS projects can also address Pressures on **Hydromorphology** in the urban environment (both greenfield and brownfield sites)

Context for Nature-based Solutions (NbS) - Climate Action /

Mitigation

- Currently we are **overly reliant on conventional piped systems**. During downpours the **capacity of these drainage systems can be overwhelmed** causing pluvial flooding
- **Rainwater Management using NbS measures or interventions can help to manage the effects of increased or high-density rainfall** due to Climate Change within (1) existing settlement, (2) proposed future expansions of settlements or (3) development / regeneration zones
- **NbS Climate Adaption & Mitigation Measures and Interventions can contribute to climate resilience of an urban catchment regardless of size**



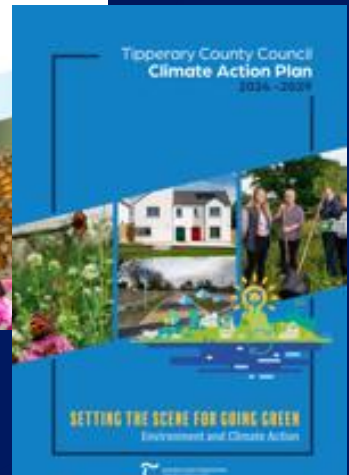
Help manage flood risk



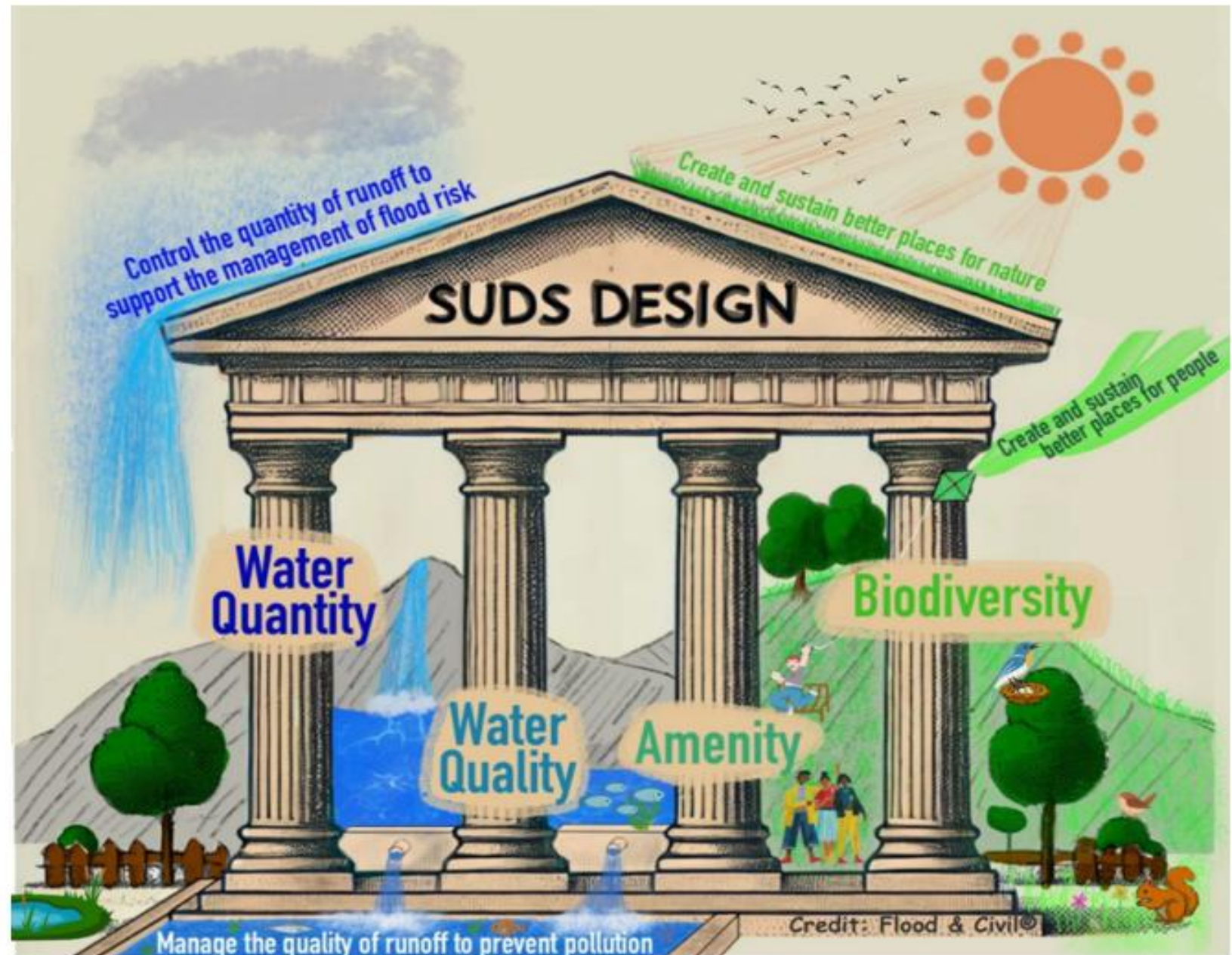
Climate adaptation
and resilience

Climate Change Key Risks to Local
Authority Service Delivery:

- ☐ River Flooding
- ☐ Extreme Precipitation

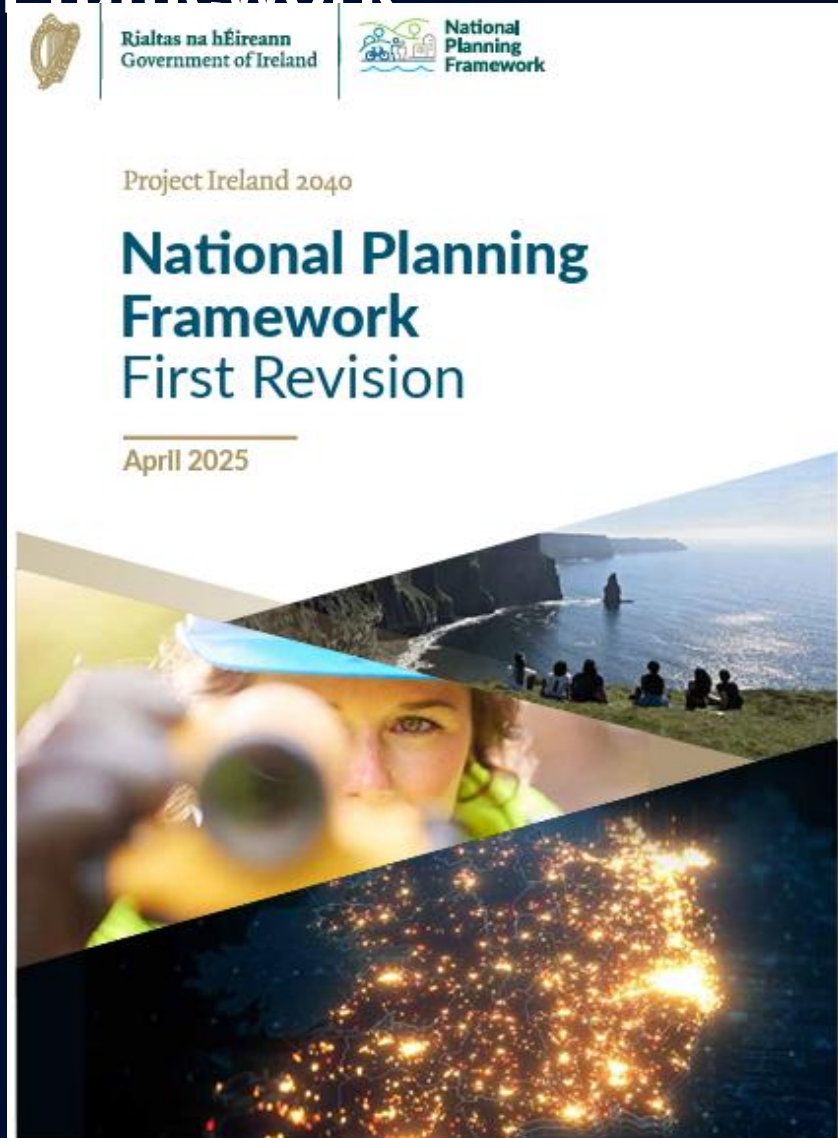


Nature-based Solutions **leverage nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future.**



Context for Nature-based Solutions (NbS) – National Planning Framework

Framework



National Policy Objective 80

Support the retrofitting of existing environments to cater for surface water run-off through the use of nature based solutions.

National Policy Objective 79

Support the management of stormwater, rainwater and surface water flood and pollution risk through the use of nature-based solutions and sustainable drainage systems, including the retrofitting of existing environments to support nature based solutions.

National Policy Objective 77

Enhance water quality and resource management by:

- *Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.*
- *Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, and nature based solutions, to create safe places.*

National Policy Objective 82

Integrated planning for Green and Blue Infrastructure will be incorporated into the preparation of statutory land use plans while maintaining ecosystem services and ecosystem functions and conserving and/or restoring biodiversity.

Under the NPF the Government will support :

- **Green and Blue adaptation including nature based solutions** which seeks to use ecological properties to enhance the resilience of human and natural systems in the face of climate change, such as creation of green and blue spaces and parks and waterways to enable better management of urban micro-climates.

Context for Nature-based Solutions (NbS) – Sustainable Development

Goals



Mainstreaming Nature-based Solutions (NbS) - Guidance Documents

DMURS Advice Note 5

Design Manual for Urban Roads and Streets



Greening and Nature-based SuDS for
Active Travel Schemes

September 2023



- Developed with Department of Transport, NTA, LAWPRO and DHLGH water and planning units
- Build in Nature-based Solutions into streetscapes
- Use Nature-based Solutions to improve place making – aesthetics, traffic management
- Clear before and after visualisations
- NB: DMURS top tips in what to and what not to do ([See Eamonn's slide below](#))

Figure 4.3: Rain garden schematic – Cross Section



As well as retrofitting into existing streets rain gardens could be installed as part of more linear Active Travel projects alongside new cycling infrastructure as shown in Scenarios 4a and 4b below.

Scenario 4a– Where new cycle tracks are installed on carriageway then the existing verge could be repurposed as a rain garden to collect run off from the footways.



NTA Guidance

Scenario 4b– If cycletracks can be constructed adjacent to the footpath then this could allow rain gardens to collect surface water run off from the carriageway as well as the footway. In this scenario the planting would also provide separation between cyclists and motor vehicles.



Mainstreaming Nature-based Solutions (NbS) - Guidance Documents



Implementation of Urban Nature-based Solutions

Guidance Document for Planners, Developers and Developer Agents

January 2025
Version 2.0

Local Authority
Waters
Programme

aligned communities | sustainable management | healthy waters



Comhairle Chontae Chill Chainnigh
Kilkenny County Council



Comhairle Contae Thiobraid Árann
Tipperary County Council

Uisce Éireann
Irish Water



Óifig an Rialaitheora Pleanála
Office of the Planning Regulator

ENGINEERS IRELAND

IRISH PLANNING INSTITUTE
Institiúid Pleanála na hÉireann



IRISH LANDSCAPE INSTITUTE
INSTITIÚID TÍRDHREACHA NA hÉIREANN



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Chapter 4 contains worked examples and case studies of Traditional and NbS Urban Drainage Designs across different development typologies at a variety of scales. These should be read in conjunction with the Nature-based Solutions Toolbox (Chapter 3, p13-22)

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Definition: Shallow vegetated channels designed principally to convey and treat runoff

Design Sources:
CIRIA SuDS Manual 2015 – Chapter 17
CIRIA Guidance on the construction of SuDS (C768) – Chapter 30
Advice Note 5 Road and Street Drainage using Nature-based Solutions – Design Manual for Urban Roads and Streets

There are three major swale variations - the Conveyance & Attenuation Swale, the Dry Swale and the Wet Swale. A Conveyance & Attenuation Swale is a shallow vegetated channel. A Dry Swale is a Conveyance Swale that has the addition of a filter medium and underdrain system. A Wet Swale is a Conveyance Swale, designed to deliver wet and/or marshy conditions at the base.

Key benefits:

- » Well suited to managing pavement runoff as a result of their linear design
- » Provides interception storage volumes
- » Used to integrate attractive vegetated corridors into streetscapes
- » Can be adapted to natural overland flow paths to provide direction for runoff
- » Pollution and blockages are visible at the surface and are easily dealt with
- » Minimal difference between maintenance requirements for a swale and a general landscape feature and, as such, maintenance can be incorporated into existing general landscape maintenance regimes. Where a Dry Swale is used it requires no additional maintenance over the case where a separate landscape and drainage maintenance strategy is in place. Maintenance requirements for a Wet Swale are lesser than those for a Dry Swale.
- » Reduce the urban heat island effect by providing cooling via the return of moisture to the air through evapotranspiration from vegetation.

Key considerations:

- » The shape of the swale has an impact on its function, typical design practice is to provide a trapezoidal or

parabolic cross-section as these offer good hydraulic performance and are the easiest form to construct and maintain

- » The longitudinal slope of any swale should be constrained to between 0.5-3%, where slopes are greater than 3% check dams should be incorporated to ensure efficient use of storage space and to slow runoff velocities. Where runoff velocities are greater than recommended standards, permanent reinforcement matting ground protection should be considered
- » Swale depths need to be considered against side slopes to ensure the NbS feature doesn't pose a hazard. The normal maximum swale depth is 400-600mm
- » The bottom width of a swale should generally be between 0.5-2m. Where widths are greater than 2m, the use of flow dividers (separates out flow) and flow spreaders (uniformly disperse flow) should be considered to prevent flow channelling (constraining flow to a concentrated area)

Risks/Constraints:

- » Difficult to incorporate into dense urban landscapes where space is limited
- » Requires check dams when on a steep site. Generally, not suitable where longitudinal slopes are greater than 10% even with the addition of check dam



Figure 8: Dry Swale - Min Ryan Park, Wexford

#2: Swales

See Chapter 4 (p23-37) for case studies showing the NbS Toolbox used across different typologies of development at a variety of scales

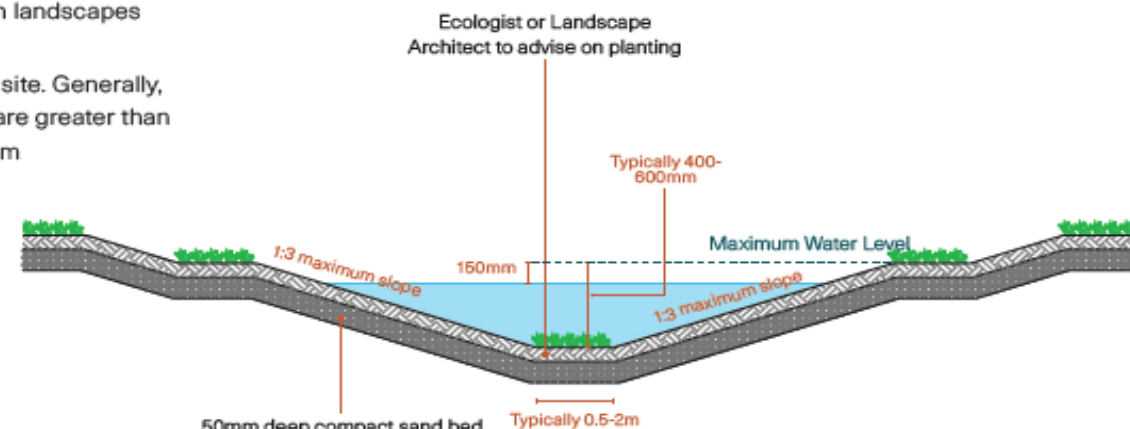


Figure 9: Typical Wet Swale Detail

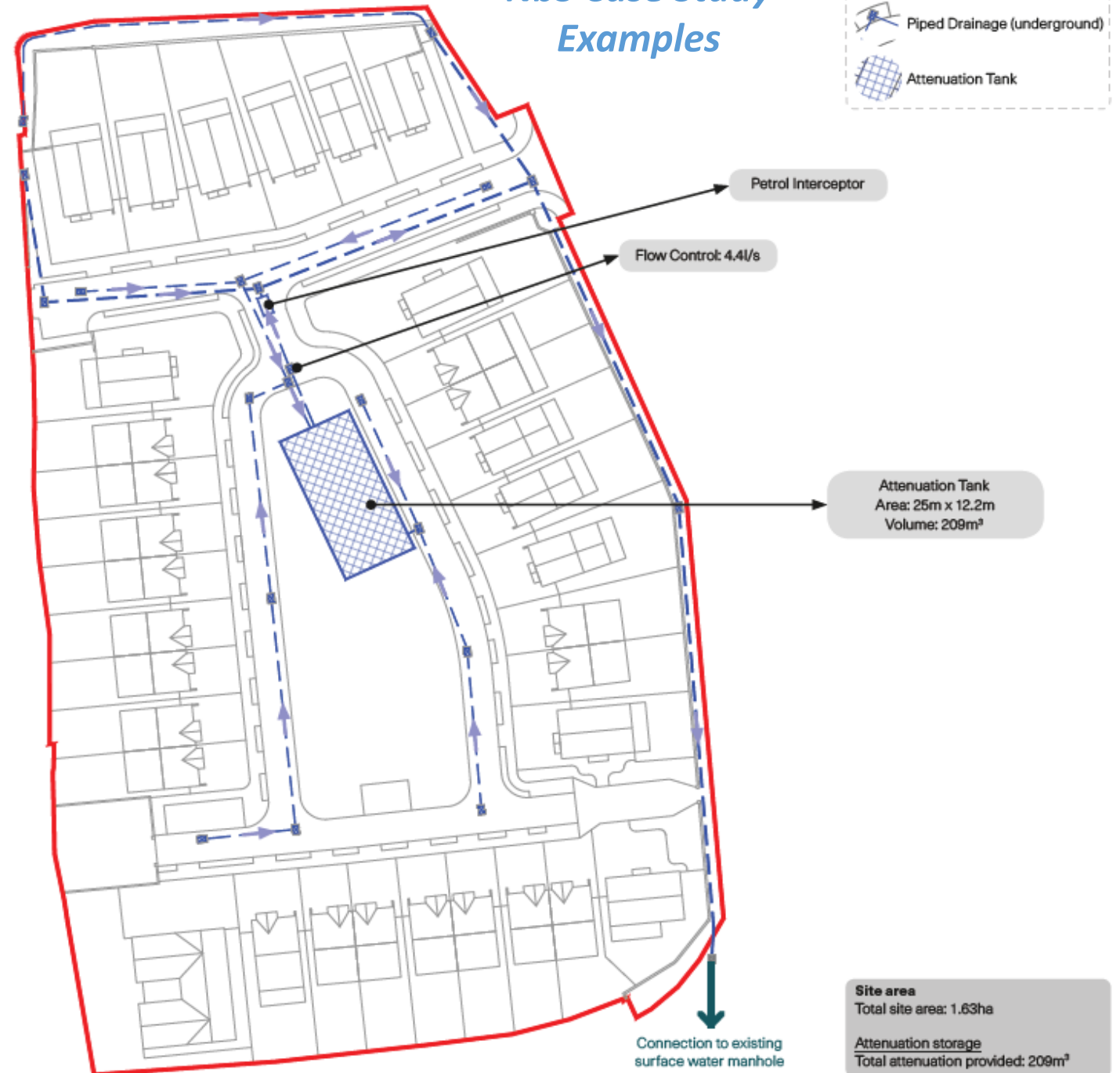
4.1 Small Edge of Town Development

NbS Case Study Examples

The development typology is a residential site of a traditional cul-de-sac style design.

The proposals comprise of 33 homes with front and rear gardens and a central green area for multi-amenity use.

The site is located just over 15minutes walk from the centre of town.



NbS Case Study Examples

NbS Approach Key

-  Bioretention Systems
-  Detention Basins
-  Proprietary Reinforced Grass Systems

Refer to Appendix D (p51) which explores the methodology behind this Case Study in detail.

Site area

Total site area: 1.63ha
 Total permeable development area: 0.66ha
 Total impermeable development area: 0.97ha
 Urban creep allowance: 10%
 Total impermeable area modelled for storage: 1.07ha
 m^3/m^2 catchment storage coefficient: 0.05

Attenuation storage

Total required attenuation: 502 m^3
 Total attenuation provided: 510 m^3

Water quality

Pollution hazard indices

- » Land use: individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change
- » Pollution hazard level: low
- » Total suspended solids (TSS); metals; hydrocarbons: 0.5; 0.4; 0.4

NbS mitigation indices (TSS; metals; hydrocarbons)

- » Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth: 0.8; 0.8; 0.8
- » Total SuDs mitigation indices $\geq$ pollution hazard index (taking into account NbS trains)

Site is considered to adequately deal with pollution risk

Hierarchy of Discharge

- » 1. Infiltration
 Quaternary sediments - gravels derived from limestone => infiltration is likely to be viable.
 Conservative infiltration rate assumed: 1.08m/hr

Bioretention Systems:

Total area: 277 m^2
 Freeboard depth: 0.2m
 Bioretention soil depth: 0.75m
 Sub-base depth: 0.3m
 Bioretention soil porosity: 30%
 Sub-base porosity: 30%
 Effective storage: 143 m^3



Proprietary Reinforced Grass Systems

Area: 99 m^2
 Sub-base depth: 0.4m
 Porosity: 30%
 Effective storage: 12 m^3

Detention Basin:

Top area: 1,017 m^2
 Base area: 760 m^2
 Basin depth: 0.4m
 Above-ground storage: 355 m^3
 Side slopes: 1 in 5



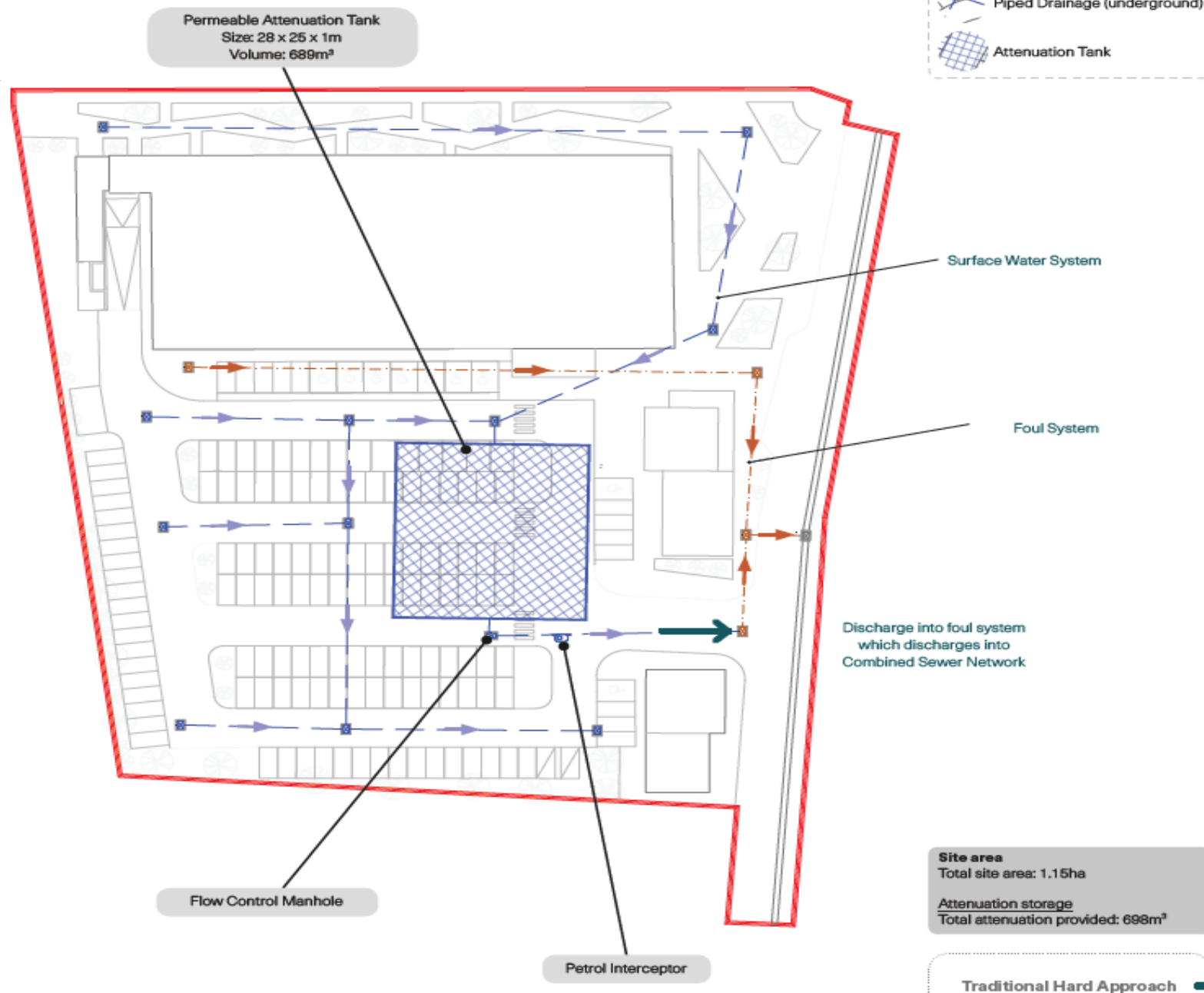
Type A, Total Infiltration

NbS Approach
 (Outline Design)

The development typology is an infill commercial development.

The proposals comprise of two single storey commercial buildings with a larger retail unit identified for supermarket use.

The development includes a car park for retail use and is located within the extents of the town centre.





Site area

Total site area: 1.15ha
Total permeable development area: 0.13ha
Total existing highway catchment area: 0.11ha
Total impermeable development area: 0.92ha
Urban creep allowance: 10%
Total impermeable area modelled for storage: 1.01ha
m³/m² catchment storage coefficient: 0.14

Attenuation storage

Total required attenuation: 1,369m³
Total attenuation provided: 1,370m³

Water quality

Pollution hazard indices

- » Land use: commercial yard and delivery areas, non-residential car parking with frequent change, all roads except low traffic roads and trunk roads/motorways
- » Pollution hazard level: medium
- » Total suspended solids (TSS); metals; hydrocarbons: 0.7; 0.6; 0.7

NbS mitigation indices (TSS; metals; hydrocarbons)

- » Swale: 0.5, 0.6, 0.6
- » Bioretention system: 0.8; 0.8; 0.8
- » Permeable pavement: 0.7, 0.6, 0.7
- » Total SuDs mitigation indices ≥ pollution hazard index (taking into account NbS trains)

Site is considered to adequately deal with pollution risk

Hierarchy of Discharge

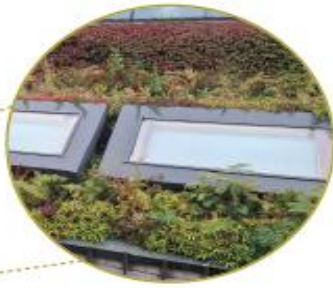
- » 1. Infiltration
Quaternary sediments - urban => infiltration is unlikely to be viable.
- » 2. Discharge to surface water body
No suitable surface water body present within the vicinity of the site
- » 3. Discharge to the public surface water sewer
Discharge into existing sewer at greenfield runoff rate: 2.80l/s

NbS Case Study Examples

Bioretention Systems:
Area: 1042m²
Freeboard depth: 0.2m
Bioretention soil depth: 0.8m
Sub-base depth: 0.4m
Bioretention soil porosity: 30%
Sub-base porosity: 30%
Effective storage: 583m³



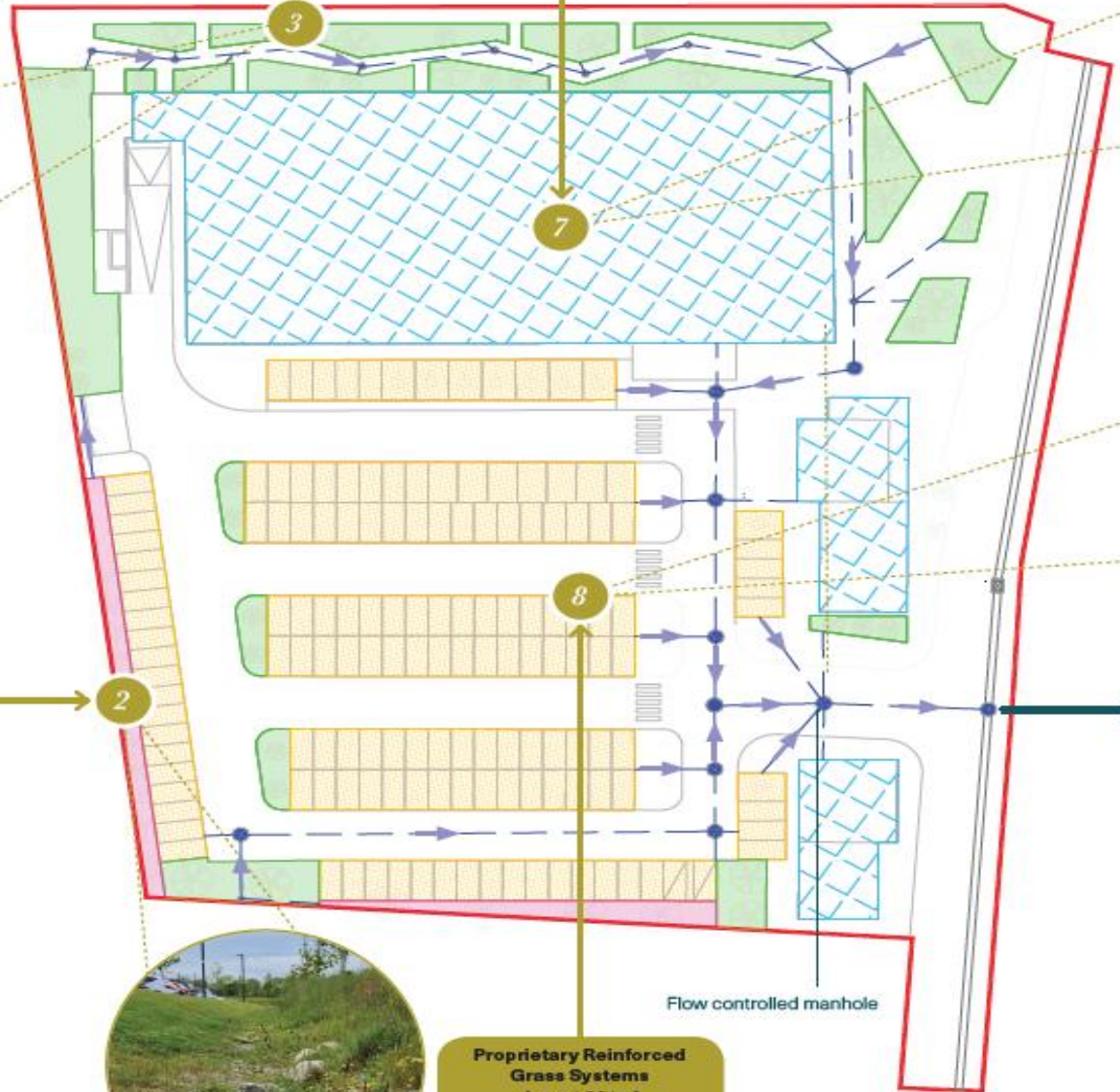
Blue-Green Roof:
Area: 2,585m²
Attenuation depth: 0.2m
Porosity: 95%
Effective storage: 491m³



Swales:
Area: 188m²
Freeboard depth: 0.15m
Bioretention soil depth: 0.4m
Sub-base depth: 0.3m
Bioretention soil porosity: 30%
Sub-base porosity: 30%
Effective storage: 68m³



Proprietary Reinforced Grass Systems
Area: 1,901m²
Sub-base depth: 0.4m
Porosity: 30%
Effective storage: 228m³



**NbS Approach
(Outline Design)**

Mainstreaming Nature-based Solutions (NbS) - Guidance Documents



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

Rainwater Management Plans Guidance for Local Authorities

2024



[gov.ie](https://www.gov.ie) - Rainwater Management Plans -
Guidance for Local Authorities
(www.gov.ie)

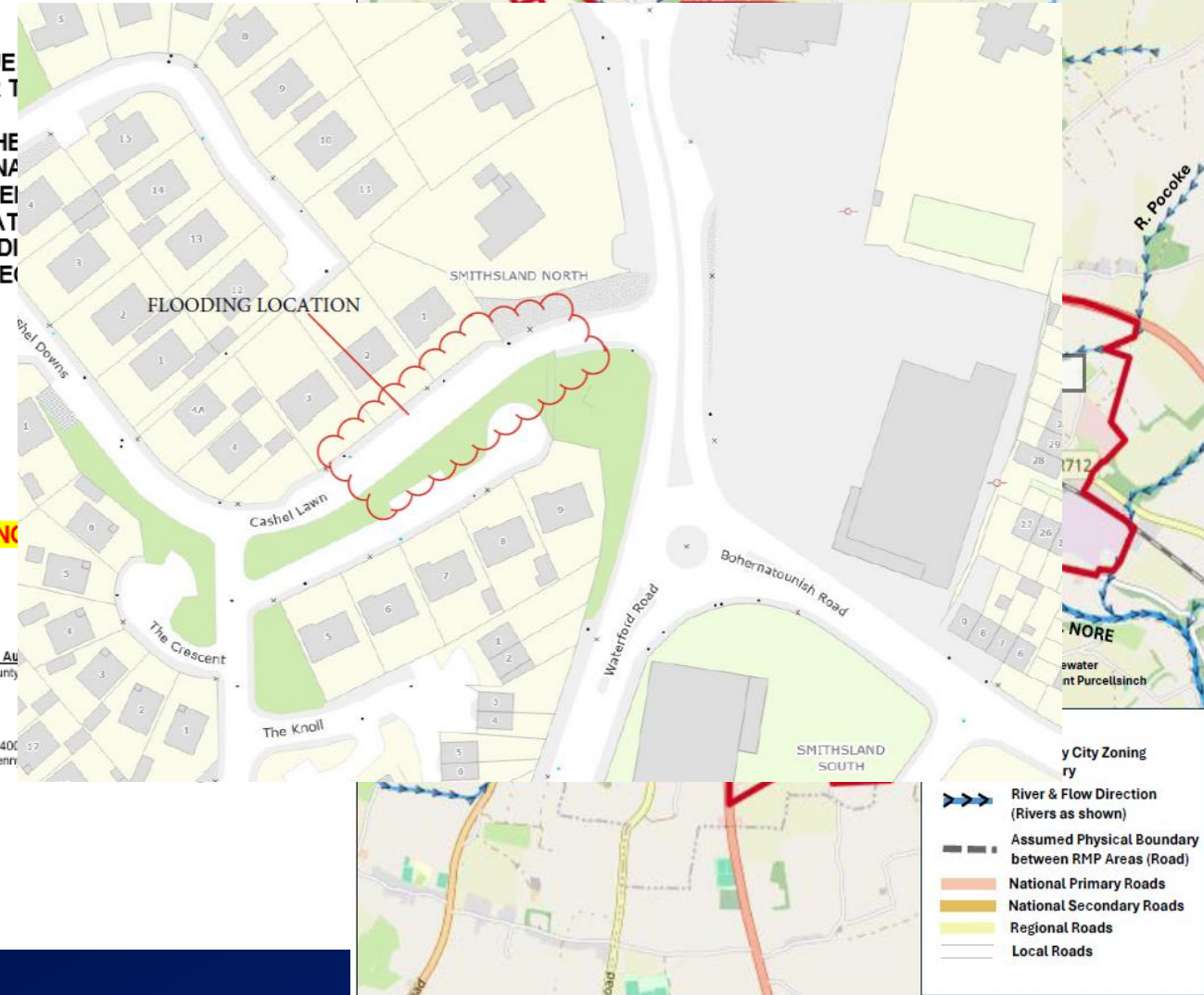


Local Authority
Waters
Programme
vibrant communities | catchment assessment | healthy waters

REQUEST FOR TENDERS
FOR THE
MANAGEMENT OF
KILKENNY NATURAL
INCLUSIONS
STRATEGY

12:00 NO

Contracting Authority
Kilkenny County
County Hall,
John Street,
Kilkenny.
Tel: 056-779400
E: info@kilkenny

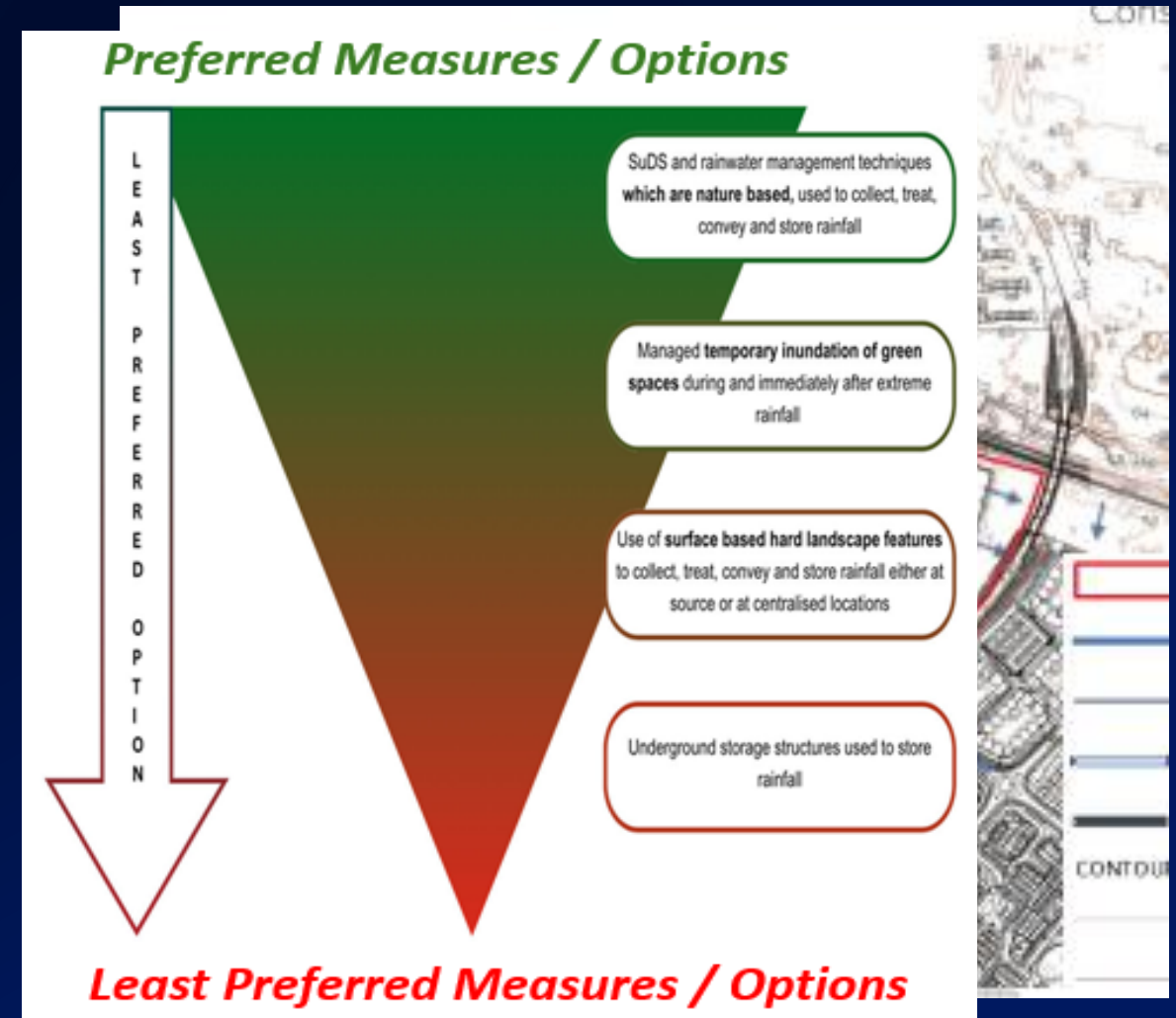


Mainstreaming Nature-based Solutions (NbS) - Guidance Documents

Rainwater Management Plan Guidance

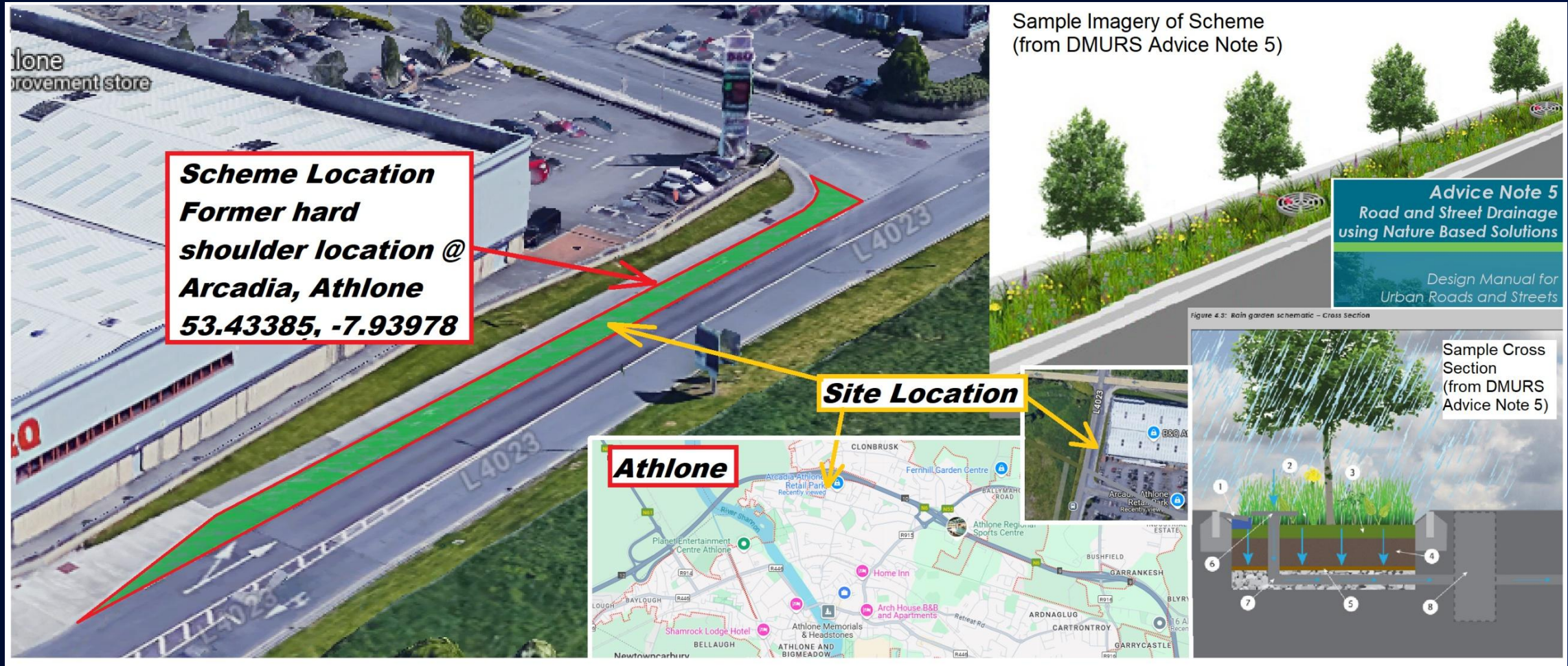
- Management of stormwater as it moves across urban areas
- Maps out the process and identifies data sources
- In support of settlement plans irrespective of scale
- Important in understanding of cloudburst scenarios
- Use existing maps and data
- Work off local knowledge
- Identify preferential flow routes based on topography and informed by the above
- Maps out the process and identifies data sources
- Should direct planning, brownfield site retrofits
- Key to protecting Combined Sewer networks and minimising overflows

Follow the water Local Knowledge is important



Mainstreaming Nature-based Solutions (NbS) - Demonstrators

Rain Garden Arcadia Retail Park - Athlone



Mainstreaming Nature-based Solutions (NbS) - Demonstrators

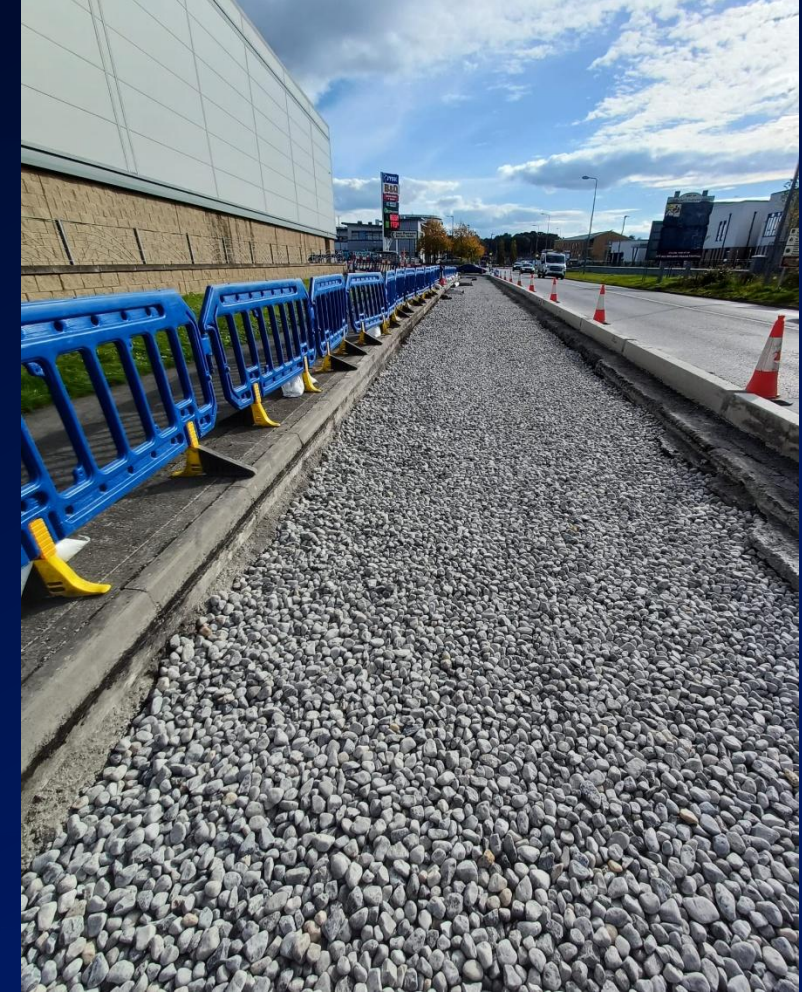
Rain Garden Arcadia Retail Park – Athlone (2026)



Existing Turning Lane / Shoulder area



Excavation commenced Kerb Installed



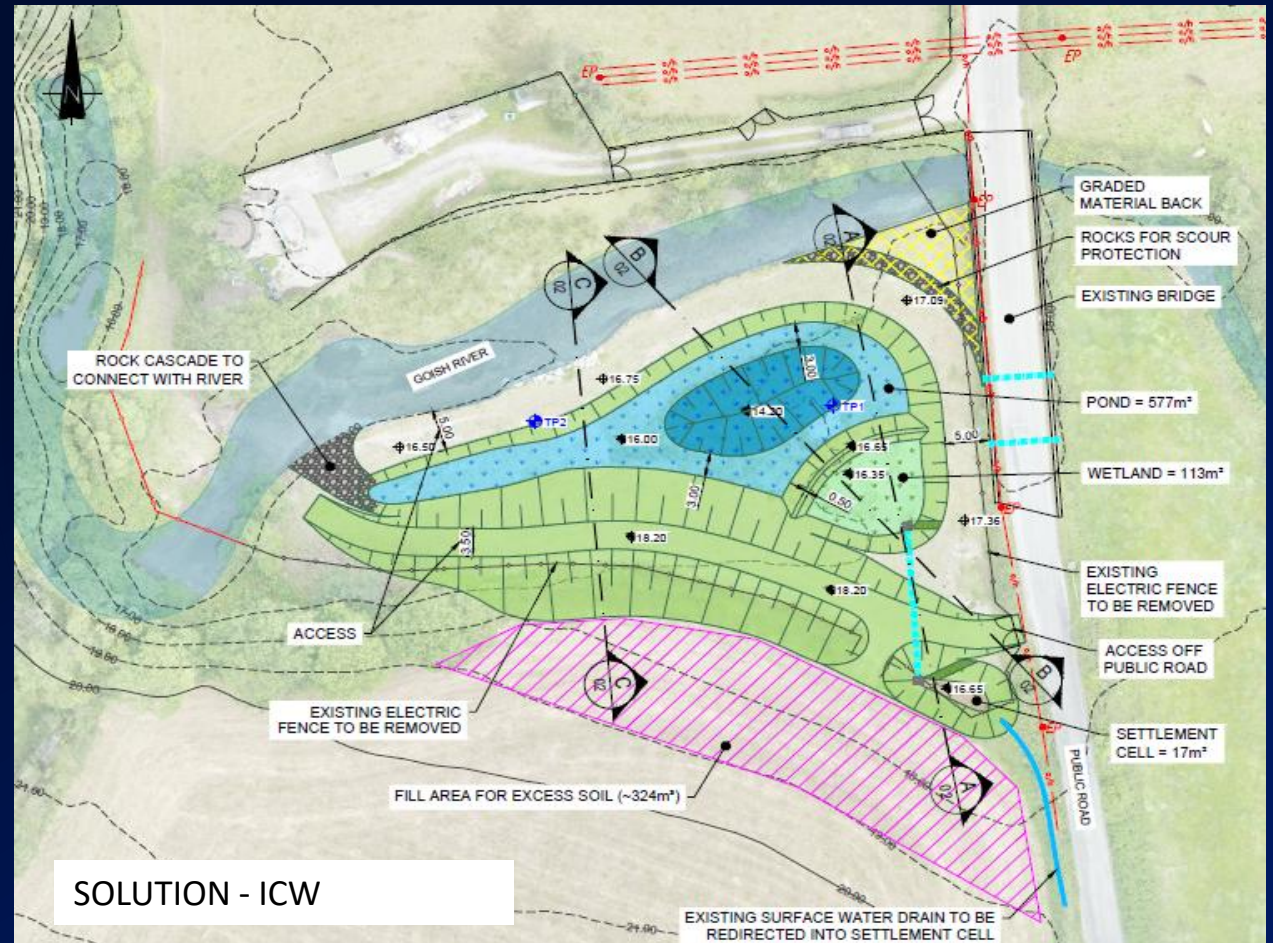
Drainage Layer installed

Mainstreaming Nature-based Solutions (NbS) - Demonstrators

Integrated Constructed Wetland (ICW) – Coolroe, Aglish Village Waterford (2025)



- Flooding on Local Road affecting access to village and services including primary school.
- Integrated Constructed Wetland (ICW) for flood storage.



Drawing Courtesy of VESI Environmental Ltd & Waterford City & County Council

Mainstreaming Nature-based Solutions (NbS) - Demonstrators

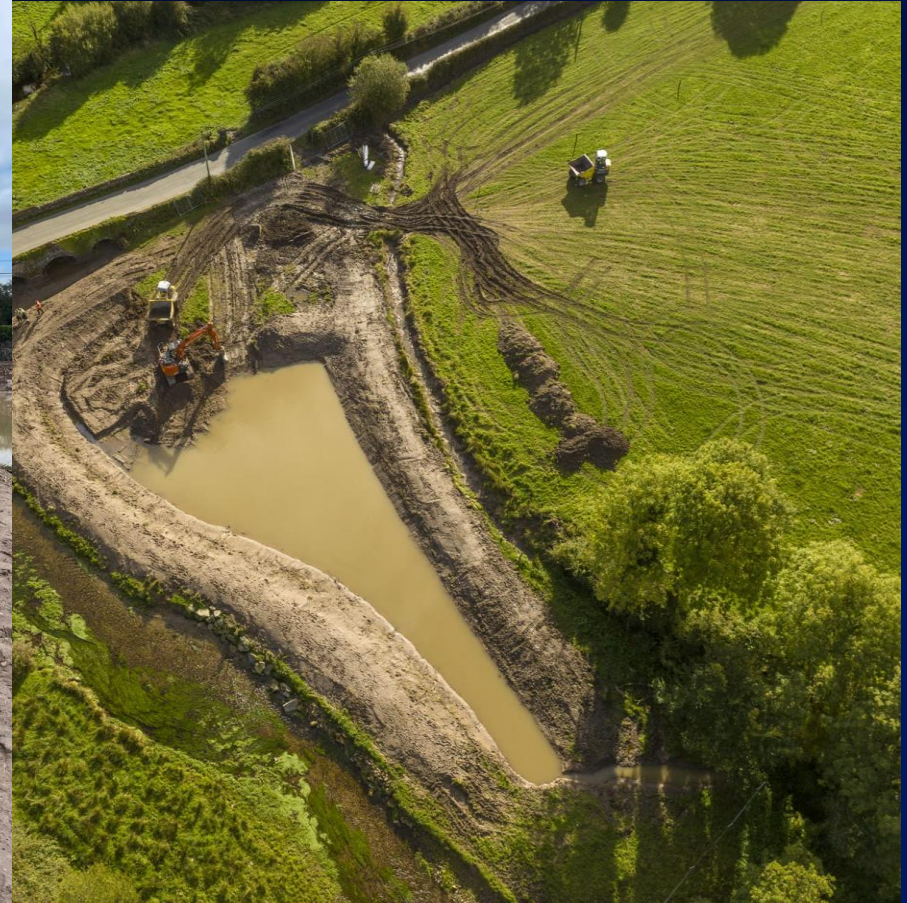
Integrated Constructed Wetland (ICW) – Coolroe, Aglish Village Waterford (2025)



General Site Clearance Completed



Picture Courtesy of Waterford City
& County Council



for the ICW

Mainstreaming Nature-based Solutions (NbS) - Demonstrators

Integrated Constructed Wetland (ICW) – Coolroe, Aglish Village Waterford (2025)

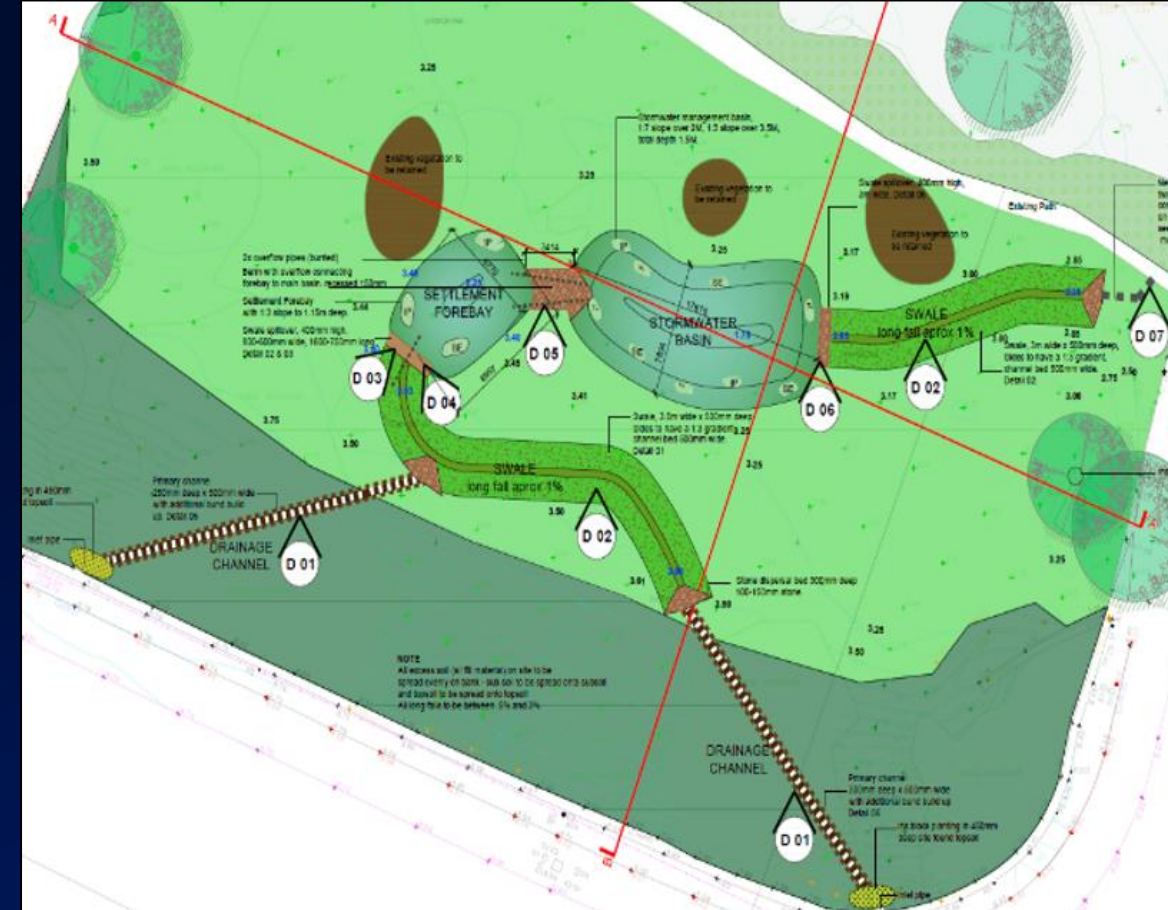


Picture Courtesy of Waterford City & County Council

- Educational aspect with local Villerstown National School
- 33 No. pupils visited the site on day 1 when ICW feature was being marked out
- Pupils were given a brief outline of the project
- Pupils were given acorns & horse Chesnuts to plant in pots
- Pupils will plant these on site next year
- Further talks with pupils will happen upon project completion to include LAWPRO & IFI

Mainstreaming Urban Nature-based Solutions (NbS) - Demonstrators

Swales Settlement Ponds Bog Field Carrick on Suir Co. Tipperary



Background & Context plus Design Plan View

Mainstreaming Urban Nature-based Solutions (NbS) - Demonstrators

Swales Settlement Ponds Bog Field Carrick on Suir Co. Tipperary



Completed Project (photo taken August 2025)

Shortlisted at the National Property Awards 2025
(Corporate Social Responsibility Initiative)

Mainstreaming Urban Nature-based Solutions (NbS) - Demonstrators

Rain Gardens Carlow Town



Pre-development

Photo: Ciaran Brennan, Carlow Co. Co.

Google Pin <https://maps.app.goo.gl/Tt6jVpu51RW7kiGw7>

Mainstreaming Urban Nature-based Solutions (NbS) - Demonstrators

Rain Gardens Carlow Town



Project Complete



Photo: Ciaran Brennan, Carlow Co. Co.

Google Pin <https://maps.app.goo.gl/Tt6jVpu51RW7kiGw7>

Mainstreaming Urban Nature-based Solutions (NbS) - Demonstrators

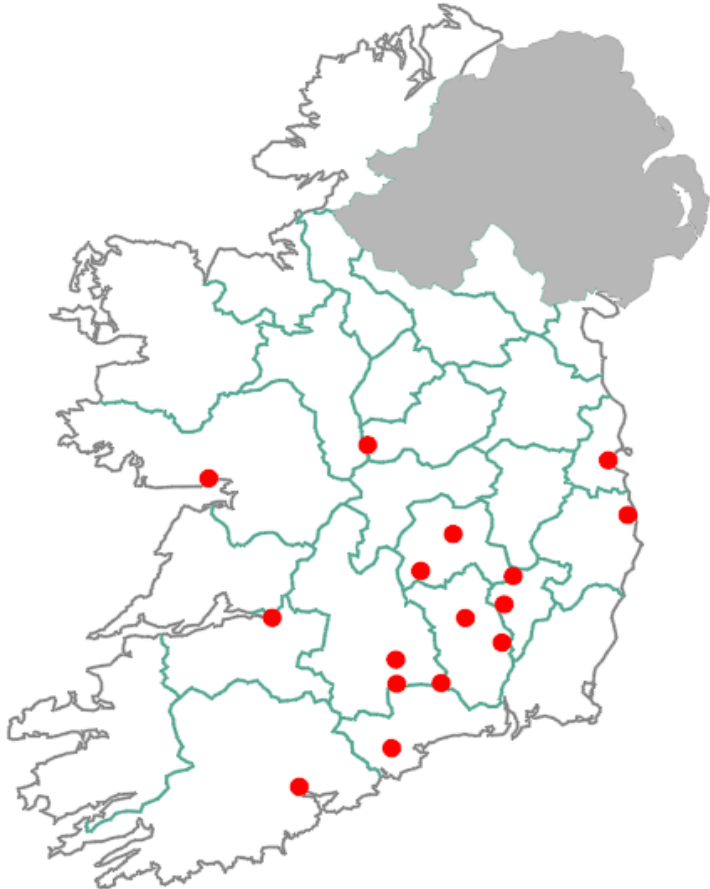


Figure 1: Locations of 2024 & 2025 LAWPRO NbS Demonstrator Projects

Local Authority	Location	NbS Feature	ITM Coordinates
Carlow CoCo	Dublin Road, Carlow Town	Rain Gardens	X 672372 Y 677227
Carlow CoCo	Bagenalstown	Rain Gardens	X 270552 Y 161547
Cork City Co	Railway Park, Montenotte	Bioretention Areas, Swales & Tree Pits	X 568651 Y 572416
Dublin City Co	OLM Secondary School, Drimnagh	Rain Gardens	X 711914 Y 732493
Galway City Co	Woodquay Park	Rain Gardens	X 529735 Y 725676
Laois CoCo	JFL Avenue, Portlaoise	Rain Gardens	X 647161 Y 698236
Laois CoCo	Ballinakill	Rain Gardens	
Limerick C&CC	Island Road, Limerick City	Rain Gardens, Swales & Tree Pits	X 557934 Y 657786
Tipperary CoCo	The Bog Field, Carrick-on-Suir	Swales & Detention Pond	X 640038 Y 621492
Tipperary CoCo	Ormond Castle, Carrick-on-Suir	Rain Gardens	X 640359 Y 621708
Tipperary CoCo	Cashel Road, Clonmel	Rain Garden	X 619142 Y 624672
Tipperary CoCo	Suir Island Car Park, Clonmel	Rain Gardens	X 620305 Y 622211
Tipperary CoCo	Fethard	Rain Gardens	X 620412 Y 634978
Kilkenny CoCo	Crokers Hill, Kilkenny	Tree Pits, Swales, & Detention Ponds	X 649615 Y 656172
Kilkenny CoCo	Graiguenamanagh	Rain Gardens	X 670782 Y 644050
Waterford C&CC	Coolroe Bridge, Aglish	Wetland Ponds	X 610786 Y 592159
Westmeath CoCo	Arcadia Retail Park, Athlone	Rain Garden	X 604009 Y 742655
Wicklow CoCo	Blacklion Manor Road, Greystones	Rain Gardens	X 728155 Y 712934

LAWPRO NbS
Demonstrator
Programme

**PRACTICAL
IMPLEMENTATION OF
NATURE-BASED
SOLUTIONS**

**KEEP
IT
SIMPLE**

Top Tips to achieve effective nature-based rainwater management

The Design Manual for Urban Roads and Streets (DMURS) Advice Note 5



- The design and construction criterion for any nature-based drainage feature **must achieve the rapid and effective removal of rainwater** from the pavement surface and the diversion of that flow into the nature-based feature.
- Designer and contractor must **focus on the design and construction of the inlets** from the pavement into the nature-based feature.
- The highest finished level within the nature-based feature must be a specified depth (**freeboard**) below the level of the paved area.
- **The existing road gullies** adjacent to nature-based features should be **relocated so that they are within the nature-based feature**. The top level of the gully grid should be designed to allow maximum water storage within the nature-based feature while **preventing excess flows overflowing back** onto the pavement surface.
- Only use trees where there is **adequate soil volume** available and where conflict with underground services can be avoided.
- Use **appropriate soil** mixtures (e.g., engineered soils for raingardens).
- Choose the **correct vegetation**. Look to use native plants as much as possible. Always aim for low maintenance with resilient plants that can withstand the urban environment, periods of waterlogging and drought.

Lessons learned along the journey



KEEP
IT
PRACTICAL





Challenges and Barriers to Implementation of Nature-based Solutions

The Irish Green Building Council in partnership with Trinity College Dublin and funded by the Housing Agency, is investigating how nature-led residential development can become the norm rather than the exception in Ireland.

Their research highlights several barriers that must be addressed if nature-led development is to become the new norm:

- **Policy and Regulation**
- **Knowledge and Skills**
- **Access to Expertise**
- **Long-Term Maintenance**
- **Financial Barriers**

Initial Findings of the BIO-NEIGHBOUR project:

[Main Challenges To Incorporating and Maintaining New Nature-Led Residential Developments at Scale](#)



The aim is to move away from traditional grey solutions.....



..... and toward Nature-based Solutions for surface water management



Detention basin
Seven Mills,
Dublin 22

Maintenance Barriers



Necessary maintenance of NbS Feature (Bioretention System)

Once developments are completed, there is often no clear responsibility or funding model for maintaining green infrastructure. This raises concerns about the long-term survival and effectiveness of nature-based features, especially in public or shared spaces.

3 Bioretention Systems for further information refer to p16		Frequency
Regular Inspections		
Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary		Quarterly
Check operation of underdrains by inspection of flows after rain		Annually
Assess plants for disease infection, poor growth, invasive species etc and replace as necessary		Quarterly
Inspect inlets and outlets for blockages		Quarterly
Regular Maintenance		
Remove litter and surface debris and weeds		Quarterly (or more frequently for tidiness or aesthetic reasons)
Replace any plants, to maintain planting density		As required
Remove sediment, litter, and debris build-up from around inlets or from forebays		Quarterly to biannually
Occasional Maintenance		
Infill any holes or scour in the filter medium, improve erosion protection if required		As required
Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch		As required
Remedial Actions		
Remove and replace filter medium and vegetation above		As required but likely to be >20 years

Source: Implementation of Urban NbS – Guidance Document for Planners, Developers & Developer Agents

Necessary maintenance of Bypass Separators (Petrol Interceptors)

Separators are designed to capture oil and hazardous substances (such as hydrocarbons, metals and suspended solids) that would otherwise pollute the environment.

If your separator is not properly serviced and monitored, it can suffer blockages which can cause overflow or flooding, eventually polluting surrounding groundwater.

Separator Service & Maintenance Plan

- Complete an internal inspection of the structure for internal damage.
- Check closure device to ensure it is unrestricted by the new filter.
- Remove oil probe to be cleaned and tested to ensure it's operational.
- Fit all covers and check separator is fully operational.
- Complete logbook and sign off on-site.
- Routine empty/desludge*



***At 3, 6 or 12-month intervals - dependent on asset size and type.**

LAWPRO guidance on the Taking in Charge processes & maintenance of urban NbS in the Local Authority Sector

- Engagement with all 31 Local Authorities on Taking in Charge and maintenance on urban NbS
- Focused discussions with LAs actively implementing, maintaining and taking in charge urban NbS, including associated costs of same
- Investigate experiences relevant for rural based LAs and urban LAs
- Analysis of results including;
 - Maintenance
 - Best practices, Management options, Community role, Costs of NbS maintenance vs conventional surface water management systems, Health & Safety considerations and insurance norms, Gap analysis of equipment required
 - Taking in Charge
 - Map out taking in charge options suitable for Local Authorities in Ireland
 - Cost considerations for NbS

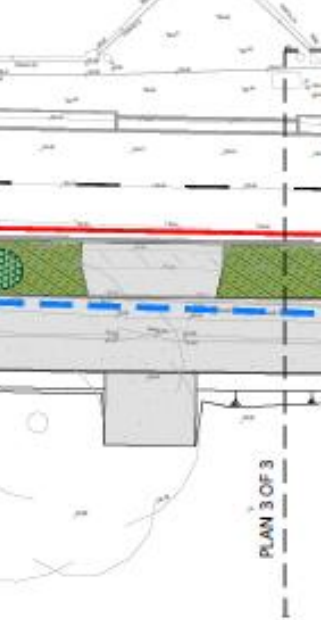
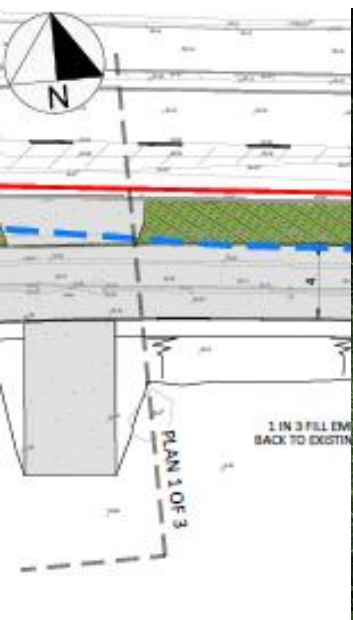
Final scoping report with roadmap for Taking in Charge and practical recommendations for maintenance

Financial Barriers

Nature-based surface water management features often lack dedicated funding or incentives, particularly when it comes to public realm improvements.



Land Acquisition funding may be required for some Large Scale NbS Measures



Example Prop

- NbS as per a
- Contribution
- NbS subsequ

os.

Upscaling and mainstreaming Nature-based Solutions in the Urban Environment to deliver on Ireland's River Basin Management Plan: - through the Infrastructure, Climate and Nature Fund

In 2026, the NbS Demonstrator Programme will be retired and replaced by a dedicated Fund for NbS capital projects.

On behalf of the Department of Housing, Local Government and Heritage, LAWPRO's NbS Team will manage an NbS budget to support the upscaling and mainstreaming of NbS in the urban environment over the next 5 years.

The opportunity exists to harness the power of NbS and exploit the multiple benefits it can deliver in the areas of; climate adaptation, biodiversity, pluvial flooding, water quality and hydromorphology improvements, amenity, place making and healthy living spaces.

We have secured substantial funding for urban NBS which will be a multi-year programme from 2026 to 2030.

Project legacy:

This will build competency and capacity within the Local Authority sector and lead to the development of a multi disciplinary process to upscale and mainstream urban NbS in Ireland.

Call, Fund criteria etc to be confirmed - WATCH THIS SPACE

Session 2 - Nature-based Solutions (NbS) Practical Implementation

Tom Brennan & Eamonn O'Connell LAWPRO

THANK YOU



An Roinn Aeráide,
Fuinnimh agus Comhshaoil
Department of Climate,
Energy and the Environment



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

