River Tolka constructed wetland and enhancements, Ireland

Year of issue

2025

Summary

The River Tolka runs through Dublin, Ireland. In Tolka Valley Park, a suite of measures was implemented to slow flood flows, reduce pollution and support wildlife: runoff retention ponds, bank re-profiling to slow flows and prevent erosion, riparian tree planting, and integrated constructed wetlands (ICWs) to improve water quality (once leachate from a former landfill was detected). Later, a fountain and barley-straw bales were used to limit algal blooms, and invasive plants were managed with biodegradable matting and planting.

Built in two phases (1999–2001; 2009–2013 Greenway), the ICWs treat polluted stormwater from the Finglaswood Stream before it enters the Tolka. Since 2019, sources confirm the site remains operational and biodiversity-rich (reed/sedge swamps, breeding mute swan; spawning common frog). Dublin City Council reports active invasive-alien-species control in the park, and the Luas Finglas project includes remediation/mitigation works to the existing ICW, with design notes that low flows are routed through the ICW and higher flows bypass to the river. Governance/cost snapshots add context: the first ICW was relatively low-cost (~€40k) while the 2009–2013 phase exceeded €3 m. Tolka Valley Park is now ranked among Dublin's most important biodiversity sites due to the river and wetland chain.

Photo Gallery



Location

53.377121, -6.303277

Project

NWRM

National ID

Ireland_001

Sector

Hydromorphology

Installation Date

1999-2000 (original ponds) 2012-2013 (Greenway ponds)

Implementation status

Completed

Contact

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Overview

Location of the project

The River Tolka is located in eastern Ireland. It flows eastwards through Dublin and in to the Irish sea. The improvement sites are located along the urban reaches of the Tolka, particularly at the Tolka Valley Park.

Country

Ireland

NUTS2 Code

Southern and Eastern

Sponge measures implemented in the case study

Basins

Wetland restoration and management

Urban forest parks

Natural bank stabilisation

Objectives

Treat polluted stormwater/leachate (reduce odours, improve pond/river water quality), slow storm runoff before Tolka entry, enhance biodiversity/amenity, and establish a greenway connection. (No quantified pollutant-removal targets published for this site.)

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Other	Dublin City Council	Initiation of the measure	City Council	Responsible
Other	National Transport Authority	Financing	Funded Greenway	Supporting

Authority type	Authority name	Authority role	Comments	Authority responsibility
NGO	Tolka Trout Anglers	Other	Volunteer work	Supporting
Architects / Engineers	Atkins Global	Determination of design details of the measure	Consultants	—

Site Information

Climate Zone

Cool temperate moist

Precipitation

715.00 mm

Temperature (°C)

11.00 °C

Runoff

357.00 mm

Runoff coefficient

0.60

Elevation range

26 m

Vegetation class

Within/around the ICW the dominant habitats are reed & large sedge swamp (FS1) with Phragmites, Typha, Juncus, Iris pseudacorus; plus amenity grassland and wet woodland mosaics.

WFD Ecological status

Poor

WFD Chemical status

Unknown

Water quality status

Urban wastewater/urban runoff & hydromorphology pressures; eutrophication/sedimentation noted locally.

Design and Implementation

Project scale

Micro

Project scale specifications

A site-specific intervention at park/tributary scale (ICW cells, pond management, bank engineering) rather than a whole-catchment scheme.

Project area

18.2 ha

Project area specifications

The size of the Tolka Valley Park is 18.2 ha : a network of wetlands, parklands and walkways. Does not include previously-existing Tolka Valley park, or the linear extent of bank engineering works, or the area of anti-invasive species matting. Nor does it describe the actual area of detention ponds of ICWs

Principles

Functionality (cross-cutting flood management, water quality, biodiversity).

Constraints

Constructed wetlands depend on suitable hydrological regime that allows permanent presence of water in them.

Favourable preconditions

Availability of parkland space prior to the project

Financing

Total cost

4100000.00 €

Total cost information

Full cost of the "Greenway" programme of which the ponds and wetlands were part.

Costs land acquisition information

No land aquisition was needed, it was already public property.

Information on Economic costs - income loss

Assume none (land was already public parkland prior to implementation)

Compensations

Non

Compensations annual information

Assume none (land was already public parkland prior to implementation).

Policy and Governance

Policy description

The Tolka has poor ecological status (WFD) due to diffuse pollution (urban runoff) and point pollution (waste disposal sites).

Land ownership

Dublin City Council owns/manages the Tolka Valley Park lands that host the ICW (within Dublin City).

Policy targets

Pollutants Removal

Peak-flow reduction

Improved Biodiversity

Oher Societal Benefits

Target remarks

Flood control and flood risk mitigation, regulation of the chemical status of freshwater, Biodiversity and gene-pool conservation in riparian areas, Mass stabilisation and control of erosion rates.

Policy pressure

Directive	Relevant pressure
WFD identified pressure	Diffuse – Urban Runoff Point – Waste Disposal Sites
Other EU	Birds Directive, Habitats Directive

Policy impact

Directive	Relevant impact
WFD identified pressure	Chemical pollution
Other EU	River feeds into Special Protection Area (South Dublin Bay and River Tolka Estuary SPA) with important wildfowl populations

Requirement directive

Requirement directive	Specification
WFD-achievement of good ecological status	Improving water quality and providing additional aquatic habitat
WFD-achievement of good chemical status	Addressing pollution
Floods Directive-mitigating Flood Risk	Managing runoff and reducing flood risk to surrounding parts of Dublin
Other EU	Improving conditions for SPA downstream

Part of a wider plan

Oui

Wider plan

Wider plan type	Wider plan focus	Name	Comments
National	Environment & Biodiversity	Renew4GPP (Ireland pilot project)	Control of invasive species

Public consultation

Non

Has contractual arrangements

Non

Impacts and Monitoring

Monitoring System

Monitoring requirements

Biodiversity survey carried out. Water quality monitoring also carried out, although it has not been possible to obtain any details.

Monitoring parameters

There has been varied monitoring at the Tolka. Monitoring of biodiversity and water quality is ongoing but no detailed methodology or frequency is available in public sources. Monitoring relevant to the measure include ecology surveys (incl. macrophytes, amphibians, invertebrates), and water quality monitoring.

Maintenance

Maintenance requirements

Routine maintenance by Dublin City Council, including vegetation management and sediment removal.

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

Performance of the retention ponds/ wetlands is monitored by measurements of water quality and observation of fauna and flora.

Biophysical impact assessment method

Comparison of pre- versus post- implementation. Mostly qualitative for ecological and erosion effects; and also for attenuation of landfill leachate. Quantitative data available for chemical improvements relating to barley straw.

Socio-economic Impacts

Direct benefits

- Flood security and protection.
- Amenities: Enhanced recreational value improved walking/cycling access, increased park usage, fishing.
- Possible improvements down-river in the Dublin Bay area and SPA, and therefore on ecosystem services provided there (improved coastal water quality).

Direct benefits information

The measures have contributed to the overall benefits provided by the Tolka Greenway improvement scheme, including providing a green corridor and amenity space. Better angling and local wildlife interest have been provided by the measure. The scheme as a whole provides extended cycle routes and recreative space. The Tolka Park is promoted as a touristic area by the city of Dublin.

Ancillary benefits

Reduction in antisocial behaviour due to more active public space, strong community acceptance and integration into local planning.

Biophysical impacts: Hydrology

Information on runoff reduction

Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received

Information on peak flow reduction

Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received

Information on increased groundwater level

Assumed to be minor or no effect. Wetland design promotes waterlogged soils in targeted zones, fostering hydrophilic vegetation. No quantitative data available on changes in groundwater levels or soil moisture balance.

Information on reducing flood risks quantity

Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received.

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

In 2011, three wetland ponds were created at Cardiffsbridge to filter runoff before it reaches the river. These wetlands now support rich wildlife, with planted reeds and sedges thriving alongside naturally colonized species. Dominant plants include common reed, bulrush, and yellow iris, with wetter areas also hosting wild angelica and reed canary grass. Otters and salmon have returned since 2011, indicating better river health.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

The wetland influences water quality on its own. In addition, barley straw bales were added to ponds in 2012 to prevent algal blooms (and can be assumed to have been successful, since there has been no evidence of the algae since).

Water quality improvements - Nitrogen (N) - Unit

% reduction pf pollutant

Information on water quality Improvements (N)

The constructed integrated wetland achieved:

- 91% reduction in ammonia concentrations
- 16% reduction in nitrate concentrations
- 6.5% reduction in nitrite concentrations.

The addition of barley straw provided further benefits, reducing ammonia by 55% and nitrate by 38%

Information on water quality improvements (E.coli)

The addition of barley straw to the pond/weltand achieved a 99% reduction in e-coli concentrations

Soil quality overall improvements

N/A info

Information on soil quality overall improvements

Some erosion control measures were implemented on the floodplain of the River Tolka. These measures may improve soil quality by retaining soils, but no specific information was available.

Ecosystem erosion control

Oui

Information on ecosystem erosion control

Before and after photos of sediment capture measures reveal less exposed soil on river banks.

Biophysical impacts: Others

Ecosystem impact climate regulation

No specific impact

Mitigation other biophysical impacts

Contributes to water quality improvements that benefit the downstream SPA (Birds Directive).

Lessons Learned

Key lessons

The Tolka Valley Park Integrated Constructed Wetlands (ICWs) in Dublin are a notable example of using nature-based solutions to enhance urban water quality and biodiversity.
- Parks in urban areas can serve as biodiversity reserves and offer opportunities to contribute to achieving good ecological status of waterbodies under the WFD.
- Soft engineering techniques can be cost-effective and enhance the biodiversity potential of urban cactchments.
- Local community involvement is key to project success.

Drivers

Driver type	Driver role	Comments
Balancing different objectives	Main driver	There were multiple objectives to the improvements to the Tolka, relating to the WFD, Floods Directive, EU LIFE Project, "Greenway" development, recreational and access objectives in Dublin

Success factors

Success factor type	Success factor role
Attitude of relevant stakeholders	Main factor
Attitude of the public	Secondary factor

Transferability

The Tolka Valley constructed wetlands are largely transferable to other urban or peri-urban areas facing water pollution, stormwater runoff, and biodiversity loss. Their modular design, low maintenance needs, and ability to deliver multiple benefits make them appealing for cities aiming to implement cost-effective, nature-based solutions.
However, some challenges may limit direct replication. Constructed wetlands require adequate space, suitable hydrology, and community support. Effectiveness may also vary depending on climate and pollution type. Therefore, while the concept is broadly applicable, site-specific assessments are essential for success.

Basin characteristics influence

This type of measures could be applied widely across Europe, requiring only a relatively small area of open land next to an urban river. The effectiveness in cold climates, where ponds or wetlands are likely to freeze in winter, would need consideration.

Sources

Sources

The Tolka catchment - fulfilling multiple roles: local government perspectives

Tolka Valley Greenway opening speech by Lord Mayor

Performance Assessment of an Integrated Constructed Wetland-Pond System in Dublin, Ireland

The Tolka catchment - fulfilling multiple roles: local government perspectives

Biodiversity Survey of the Integrated Constructed Wetland at Tolka Valley Park, Finglas, Co. Dublin

Impact Assessment Of Urbanisation On Hydrology For The River Tolka In Dublin, Ireland: A Case Study Of Remote Sensing Supported Hydrological Modelling

A short guide to three Dublin City woodlands

How green is my Tolka Valley?

Finglas Strategy - Baseline Analysis Report