European Commission

NWRM

Natural Water Retention Measures

www.nwrm.eu

Service contract n°07.0330/2013/659147/SER/ENV.C1

Case Study

Tolka

Environment

This report was prepared by the NWRM project, led by Office International de l'Eau (OIEau), in consortium with Actéon Environment (France), AMEC Foster Wheeler (United Kingdom), BEF (Baltic States), ENVECO (Sweden), IACO (Cyprus/Greece), IMDEA Water (Spain), REC (Hungary/Central & Eastern Europe), REKK inc. (Hungary), SLU (Sweden) and SRUC (UK) under contract 07.0330/2013/659147/SER/ENV.C1 for the Directorate-General for Environment of the European Commission. The information and views set out in this report represent NWRM project's views on the subject matter and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this report. Neither the Commission nor any person acting on the Commission's behalf may be held Key words: Biophysical impact, runoff, water retention, effectiveness - Please consult the NWRM glossary for more information.

NWRM project publications are available at
http://www.nwrm.eu

Table of content

I. Basic Information

Application ID *(Country_Numeric, e.g.: Greece_01)*	*Ireland_01*			
Application Name *(provide a short name)*	**Tolka**			
Application Location	Country: *(select from list in Annex 1)*	Ireland	Country 2: *In case of transboundary applications*	
	NUTS2 Code		*IE2*	
	River Basin District Code		*IEEA*	
	WFD Water Body Code			
	Description		*Catchment of the River Tolka through Dublin*	
Application Site Coordinates *(in ETRS89 or WGS84 the coordinate system)*	Latitude: 53.377121 *- ETRS89 or WGS84? Specify:*		Longitude: -6.303277 *- ETRS89 or WGS84? Specify:*	
Target Sector(s)	Primary:	Urban		
	Secondary:	Hydromorphology		
Implemented NWRM(s)	Measure #1:	*N1 – Basins and Ponds*		
	Measure #2:	*N2 – Urban wetlands*		
	Measure #3:	*F11 – Urban Forest Parks*		
	Measure #4:	*N10 – Bank stabilisation*		
Application short description	A series of measures was applied to the urban sections of the River Tolka to slow flood flows, reduce pollution and aid wildlife. These included the establishment of detention ponds to manage runoff storage; bank engineering to slow flows and prevent erosion; and planting trees along the river to slow runoff. Two phases of detention pond construction have been carried out, the latter as part of a wider 'Greenway' project to develop a green corridor with cycling route. After it was discovered that the pond was receiving leachate from an old landfill site, an integrated constructed wetland was created to improve the quality of the water. Later, a fountain was installed and barley straw bales applied to the pond to prevent algal blooms and remove further pollutants. Biodegradable anti-weed matting combined with planting was put in place to remove invasive species at the same time.			

II. Policy context and design targets

Brief description of the problem to be tackled	The measures were installed to address problems with water quality and flooding in the River Tolka in Dublin.	
What were the primary & secondary targets when designing	Primary target #1:	Flood control and flood risk mitigation

this application?	Primary target #2:	Regulation of the chemical status of freshwater	
	Secondary target #1:	Biodiversity and gene-pool conservation in riparian areas	
	Secondary target #2:	Mass stabilisation and control of erosion rates	
	Remarks		
Which specific types of pressures did you aim at mitigating?	Pressure #1:	WFD identified pressure	*Diffuse – Urban Runoff Point – Waste Disposal Sites*
	Pressure #2:	Other EU-Directive's identified pressure (specify)	*Birds Directive, Habitats Directive*
	Remarks		
Which specific types of adverse impacts did you aim at mitigating?	Impact #1:	WFD identified impact	*Chemical Pollution*
	Impact #2:	Other EU-Directive's identified impact (specify)	*River feeds into Special Protection Area (South Dublin Bay and River Tolka Estuary SPA) with important wildfowl populations*
Which EU requirements and EU Directives were aimed at being addressed?	Requirement #1:	WFD-achievement of good ecological status	*Improving water quality and providing additional aquatic habitat*
	Requirement #2:	WFD-achievement of good chemical status	*Addressing pollution*
	Requirement #3:	Floods Directive-mitigating Flood Risk	*Managing runoff and reducing flood risk to surrounding parts of Dublin*
	Requirement #4:	Other EU-Directive requirements (Specify)	*Improving conditions for SPA downstream*
	Remarks		
Which national and/or regional policy challenges and/or requirements aimed to be addressed?			

III. Site characteristics

	Dominant land use	*112 – Discontinuous urban*
	Secondary land use	*141 – Green urban areas*
	Other important land use	*511 - Watercourses*
	Remarks	
Climate zone	cool temperate moist	
Soil type		
Average Slope		
Mean Annual Rainfall	600 - 900 mm	

Mean Annual Runoff	300 - 450 mm	
Average Runoff coefficient (or % imperviousness on site)	0.5 - 0.7	
	Based on middling values for the catchment as a whole given in Verbeiren B et al.	
Characterization of water quality status (prior to the implementation of the NWRMs)	Poor ecological status (WFD) due to diffuse pollution (urban runoff) and point pollution (waste disposal sites)	
Comment on any specific site characteristic that influences the effectiveness of the applied NWRM(s) in a positive or negative way	*Positive way: No specific characteristics.*	
	Negative way: Original detention pond was installed by an old landfill site, and negatively affected water quality of pond. An Integrated Constructed Wetland was constructed to alleviate this.	

IV. Design & implementation parameters

Project scale	Medium (eg. public park, new development district)	*Tolka Park, and river banks / riparian environment of the river generally.*
Time frame	Date of installation/construction (MM.YYYY)	*1999-2000 (original ponds)* *2012-2013 (Greenway ponds)*
	Expected average lifespan (life expectancy) of the application in years	*Specify*
Responsible authority and other stakeholders involved	*Name of responsible authority/ stakeholder*	*Role, responsibilities*
	1. Dublin City Council	Authority
	2. Atkins Global	Consultants
	3. Tolka Trout Anglers	Stakeholder and volunteer work
	4. National Transport Authority	Greenway funding
	5.	
The application was initiated and financed by	Dublin City Council (+Greenway funding from National Transport Authority)	
What were specific principles that were followed in the design of this application?	Functionality (cross-cutting flood management, water quality, biodiversity).	
Area (ha)	Number of hectares treated by the NWRM(s).	*18.2 ha*
	18.2 ha of 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.	
Design capacity	No information received.	
Reference to existing	*Reference*	*URL*

engineering standards, guidelines and manuals that have been used during the design phase	1.		
	2.		
	3.		
	4.		
	5.		
Main factors and/or constraints that influenced the selection and design of the NWRM(s) in this application?			

V. Biophysical impacts

Impact category (short name) Select from the **drop-down menu** below:	**Impact description** (Text, approx. 200 words)	**Impact quantification** (specifying units)	
		Parameter value; units	% change in parameter value as compared to the state prior to the implementation of the NWRM(s)
Runoff attenuation / control	*Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received*		
Peak flow rate reduction	*Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received*		
Impact on groundwater	*Assumed to be minor or no effect.*		
Impact on soil moisture and soil storage capacity		*n/a*	
Restoring hydraulic connection		*n/a*	
Water quality Improvements	*Has the NWRM impacted the overall water quality? In which way? Please provide some explanatory text. Provide details on specific pollutants (N, P, TSS, Cu, Zn, E.coli, Fecal coliforms, etc.)*	*From wetlands alone:* *-91% Ammonia* *-16% Nitrate* *-6.5% Nitrite* *From Barley Straw:* *-99% E.Coli* *-92% Fecal coliforms* *-55% Ammonia* *-38% Nitrate*	
WFD Ecological	*These measures contribute to other, wider improvements to the*		

Status and objectives	*Tolka catchment which together have contributed to otter and salmon returning to the river.*		
Reducing flood risks (Floods Directive)	*Ponds and wetlands provide attenuation for surface runoff, although no quantified information has been received*		
Mitigation of other biophysical impacts in relation to other EU Directives (e.g. Habitats, UWWT, etc.)	*Contributes to water quality improvements that benefit the downstream SPA (Birds Directive).*		
Soil Quality Improvements		*n/a*	
Other		*n/a*	

VI. Socio-Economic Information

What are the benefits and co-benefits of NWRMs in this application?	The NWRMS 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 NWRM. The scheme as a whole provides extended cycle routes and amenity space		
Financial costs	***Total:***	*€4.1m*	*Total costs include whole scope of 'Greenway' works.*
	Capital:		
	Land acquisition and value:		
	Operational:		
	Maintenance:		
	Other:		
Were financial compensations required? What amount?	*Was financial compensation required: No (assumed, since land was already in public use prior to measures being implemented)*		
	Total amount of money paid (in €):		
	Compensation schema:		
	Comments / Remarks:		
Economic costs	*Actual income loss: Assumed to be zero, since land was already parkland prior to implementation of measure.*		
	Additional costs:		
	Other opportunity costs:		
	Comments / Remarks:		
Which link can be made to the ecosystem services approach? *Hint: The actual benefits of improving nature's water storage capacity are essentially linked to an improved provision of some of the following ecosystem goods and services:* - *Freshwater for drinking.* - *Water provision to deliver water services to the economy both for drinking and non-drinking purposes.* - *Water security (reliability of supply and resilience to drought).* - *Health security (control of waterborne diseases).* - *Flood security and protection.* - *Storm surge protection.*	- Flood security and protection. - Amenities: fishing, cycling, walking. - Possible improvements down-river in the Dublin Bay area and SPA, and therefore on ecosystem services provided there (improved coastal water quality).		

- *Biomass production.* - *Amenities (associated to habitat protection): fish and plants, tourism, recreation, and others.* - *Benefits of improved coastal water quality and ecological status for a sustainable commercial production of shellfish with human health and welfare values.*	

VII. Monitoring & maintenance requirements

Monitoring requirements	Biodiversity survey carried out. Water quality monitoring also carried out, although it has not been possible to obtain any details.
Maintenance requirements	
What are the administrative costs?	

VIII. Performance metrics and assessment criteria

Which assessment methods and practices are used for assessing the biophysical impacts?	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.
Which methods are used to assess costs, benefits and cost-effectiveness of measures?	
How cost-effective are NWRM's compared to "traditional / structural" measures?	
How do (if applicable) specific basin characteristics influence the effectiveness of measures?	These types of measures could be applied widely across Europe, requiring only a relatively small area of open land in proximity to an urban river. The effectiveness in cold climates, where ponds or wetlands would be likely to freeze in winter, would need consideration.
What is the standard time delay for measuring the effects of the measures?	

IX. Main risks, implications, enabling factors and preconditions

What were the main implementation barriers?	
What were the main enabling and success factors?	
Financing	
Flexibility & Adaptability	
Transferability	

X. Lessons learned

Key lessons	- 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 biodiversity potential of urban catchments. - Local community involvement is key to project success.

XI. References

Source Type	*Project Report*		
Source Author(s)	OPENFIELD Ecological Services		
Source Title	Biodiversity Survey of the Integrated Constructed Wetland at Tolka Valley Park, Finglas, Co. Dublin		
Year of publication	2008		
Editor/Publisher	OPENFIELD Ecological Services		
Source Weblink	Weblink		
Key People		*Name / affiliation*	*Contact details*
	1.		
	2.		
	3.		
	4.		

Source Type	*Scientific Article*		
Source Author(s)	John Stack, Yaqian Zhao		
Source Title	Performance Assessment of an Integrated Constructed Wetland-Pond System in Dublin, Ireland		
Year of publication	2014		
Editor/Publisher	Journal of Water Sustainability, Volume 4, Issue 1		
Source Weblink	Weblink		
Key People		*Name / affiliation*	*Contact details*
	1.		
	2.		
	3.		
	4.		

Source Type	*Other (specify)*	*Speech text*	
Source Author(s)	Lord Mayor of Dublin		
Source Title	Speech given at official opening of Tolka Valley Greenway		
Year of publication	2013		
Editor/Publisher	n/a		
Source Weblink	Weblink		
Key People		*Name / affiliation*	*Contact details*

	1.		
	2.		
	3.		
	4.		

Source Type	*Other (specify)*		*Presentation*
Source Author(s)	Maryann Harris		
Source Title	The Tolka catchment - fulfilling multiple roles: local government perspectives		
Year of publication			
Editor/Publisher	Parks and Landscape Services Division, Dublin City Council		
Source Weblink	Weblink		
Key People		*Name / affiliation*	*Contact details*
	1.		
	2.		
	3.		
	4.		

Source Type	*Scientific Article*		
Source Author(s)	Verbeiren B et al.		
Source Title	Impact Assessment Of Urbanisation On Hydrology For The River Tolka In Dublin, Ireland: A Case Study Of Remote Sensing Supported Hydrological Modelling		
Year of publication	2011		
Editor/Publisher	National Hydrology Conference 2011		
Source Weblink			
Key People		*Name / affiliation*	*Contact details*
	1.		
	2.		
	3.		
	4.		