

**Biological Assessment of the Water Quality of
the Rivers Funshion and Gradoge in the Vicinity of
Discharges from the Dairygold Plant at
Mitchelstown**

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1. INTRODUCTION

The present report by Pascal Sweeney, Consultant Ecologist, was commissioned by Dairygold Cooperative Society Ltd. It consists of the biological assessment of water quality of the River Funshion, upstream and downstream of the treated effluent discharge point, and of the Gradoge River, upstream and downstream of the surface water discharge. Its purpose is to help assess the current impacts on the rivers of these discharges.

The situation is complicated by the fact that the effluent from Uisce Éireann Mitchelstown wastewater treatment plant (WWTP) discharges to the River Funshion through the same pipe as does the Dairygold treated effluent and this combined discharge is a short distance downstream of the confluence with the Gradoge River. Furthermore, the storm overflow from the Mitchelstown WWTP, discharges untreated sewage to the Gradoge in periods when this plant is overloaded during heavy rainfall events. Surface water runoff from part of the urban area of Mitchelstown also enters the Gradoge River.

The scope of this survey is the assessment of the macroinvertebrate fauna and the establishment of Q-values in accordance with the procedures of the EPA (EPA, 2021). Pascal Sweeney, the author of the current report, has attended twelve Q-Scheme inter-calibration events with EPA river biologists and was contracted by EPA to carry out Q-value assessments of Operational and Surveillance Monitoring Sites in every summer from 2012 to 2023, in fulfilment of the needs of the Water Framework Directive monitoring programme.

2. SAMPLING SITES

Two sites on the River Funshion (EPA Code 18/F/05) were sampled, one upstream and one downstream of the discharge point. Two sites on the Gradoge River (EPA Code 18/G/13) were also sampled, one upstream and one downstream of the two discharge points. Site coordinates and other site information are presented in Appendix 1. Photographs of the sampling sites are shown in Appendix 2.

Funshion Site 1. 30m downstream Ballyarthur Bridge. This is the next bridge downstream of EPA Station 0100 (approximately 650m downstream). Results from this site give information on the water quality of the River Funshion upstream of the confluence of the Gradoge River and the discharge point of the combined Dairygold treated effluent and the Mitchelstown WWTP effluent.

Funshion Site 2. Approximately 250m downstream of the treated effluent outfall. The site is approximately 250m upstream of EPA Station 0200. Results establish the water quality status of the R. Funshion downstream of all discharges from Dairygold, as well as from the Mitchelstown WWTP and other urban runoff from Mitchelstown. To avoid a localised impact, sampling was undertaken just upstream of cattle access to the river.

Gradoge Site 1. Approximately 40m upstream of the surface water discharge at the Clonmel road. Results from this site give information on the water quality of the Gradoge River upstream of surface runoff from the Dairygold plant.

Gradoge Site 2. Approximately 50m upstream of the confluence with the River Funshion (EPA Station 18/G/13/0200). Results from this site give information on the water quality of the Gradoge River downstream of the Dairygold surface water discharge, as well as urban surface water runoff from Mitchelstown and the Mitchelstown WWTP storm outfall.

3. METHODOLOGY

Field work was carried out on 13 September, 2023. At all sites, kick sampling of benthic invertebrate fauna, identification of macroinvertebrates and assessment of ecological quality was carried out using the EPA's Quality Rating System (Q-Value), as described in the EPA Standard Operating Procedure for River Monitoring 2021, was carried out. Aquatic macrophytes were assessed at all sites where they occur. Additional information was recorded at each site including general river characteristics and hydromorphological indicators. Photographs were taken with a digital camera.

4. RESULTS

Appendix 3 presents the list of macroinvertebrate taxa identified and their relative abundances, in accordance with the EPA Standard Operating Procedure for River Monitoring.

Macroinvertebrate Community Analysis by Site.

Funshion Site 1. The fauna of this site is dominated by Group C (Relatively Pollution Tolerant) species. Group A (Very Pollution Sensitive) is represented by a few specimens of the flat mayfly nymph, *Ecdyonurus sp.*. Three Group B (Relatively Pollution Sensitive) species are present in low numbers. No Group D (Very Pollution Tolerant) were found and tubificid worms from Group E (Most Pollution Tolerant) were present in low numbers. With a few specimens from Group A and few from Groups B and E and no Groups D representation in a fauna dominated by Group C, this invertebrate community indicates a Q-value of **Q3-4**.

Funshion Site 2. Similar to Funshion Site 1, the fauna of this site is dominated by Group C species and Group A is represented by a few specimens of the flat mayfly nymph, *Ecdyonurus sp.* Only one Group B species is present in low numbers. Single specimens of three Group D species were found and Group E was absent. With a few specimens from Group A and few from Groups B and E and no Groups E representation in a fauna dominated by Group C, this invertebrate community indicates a Q-value of **Q3-4**.

Gradoge Site 1. The fauna of this site is dominated the Group C species. Group A is represented by low numbers of the flat mayfly *Ecdyonurus sp.* Two species from Group B are present in low numbers. Groups D and Group E are each represented by a few specimens of a single species. With low numbers of Group A taxa, some Group B, no Groups D or E representation in a fauna dominated by Group C, this invertebrate community indicates a Q-value of **Q3-4**.

Gradoge Site 2. *Gammarus duebeni* from Group C dominates the fauna here. Group A is absent. Groups B, D and E are absent. This faunal composition with Group C dominant and Groups A, B, D and E absent indicates a Q-value of **Q3**.

The Q-values ascribed to each site in the present survey and the corresponding ecological quality is summarised in Table 1.

TABLE 1
Ecological Quality 2023

SITE	Q-value	CURRENT ECOLOGICAL QUALITY
Funshion Site 1	Q3-4	Moderately Ecological Quality
Funshion Site 2	Q3-4	Moderately Ecological Quality
Gradoge Site 1	Q3-4	Moderately Ecological Quality
Gradoge Site 2	Q3	Poor Ecological Quality

5. CONCLUSIONS

In Table 2, past Q-values recorded by Sweeney Consultancy at these sites can be compared with those recorded in the present survey. As was the case in 2020, 2021 and 2022, the sampling sites upstream of any influence from Dairygold discharges (Sites F1 and G1) were found to be in unsatisfactory condition, with Moderate Ecological Quality (Q3-4) recorded. Macroinvertebrate community analyses indicate a slight decline in biological water quality from Gradoge Site 1 to Gradoge Site 2, but no change in Q-value from Funshion Site 1 to Site Funshion 2.

The biological water quality of the Gradoge declines from moderate to poor ecological quality in the c. 2km between the two sites assessed. However, this cannot conclusively be attributed solely to inputs from Dairygold, as there are other potential sources of impact, such as runoff from the urban area of Mitchelstown also entering the river and the possibility of inputs from the Mitchelstown WWTP storm overflow during the heavy rainfall of July 2023, which was 2.4 times greater than the long-term average for the month (see Met Eireann rainfall data, Appendix 4). Despite the poorer quality of the lower end of the Gradoge, the site on the Funshion downstream of the combined Dairygold and Mitchelstown WWTP outfall and the Gradoge confluence does not show any decline in ecological quality from the upstream site on the Funshion, which indicates that the treated effluent discharge is not having a significant additive effect on the biota of the Funshion at the downstream site.

TABLE 2.
Q-values 2010 - 2023

Date	Sept 2010	Sept 2012	Sept 2013	Sept 2014	Sept 2015	Sept 2016	Sept 2017	June 2018	June 2019	Sept 2020	Sept 2021	Sept 2022	Sept 2023
SITE													
Funshion Site 1	Q3-4	Q4	Q3-4	Q3-4	Q4	Q3-4	Q3-4	Q4	Q4	Q3-4	Q3-4	Q3-4	Q3-4
Funshion Site 2	Q3	Q3-4	Q3	Q3-4	Q3	Q3-4	Q3-4	Q4	Q4	Q3-4	Q3-4	Q3	Q3-4
Gradoge Site 1	Q3-4	Q3-4	Q3-4	Q3-4	Q3	Q3-4	Q3-4	Q3-4	Q4	Q3-4	Q3-4	Q3-4	Q3-4
Gradoge Site 2	Q3	Q3-4	Q3-4	Q3-4	Q3	Q3	Q3-4	Q3-4	Q4	Q3	Q3-4	Q3-4	Q3

APPENDIX 1

SAMPLING SITE LOCATIONS and SITE DETAILS

Site	Funshion Site 1
Watercourse	River Funshion
EPA River Code	18/F/05
EPA Site Code	None
	Downstream of Site 0100
GPS Reading	R8065 1430
Location	30m downstream Ballyarthur Br.
Photograph No.	1
Wet Width (m)	10
Sampling depth (m)	0.15
Flow	Riffle: 70%
	Glide: 30%
Substrate	Cobble: 50%
	Coarse Gravel: 30%
	Fine Gravel: 10%
	Sand: 10%
Instream Vegetation	<i>Vaucheria sp.</i> : 3%
	<i>Fontinalis antipyretica</i> : 5%
	<i>Platyhypnidium riparioides</i> : 1%
	<i>Hygrohypnum sp.</i> : 2%
	<i>Ranunculus sp.</i> : 10%
	<i>Apium nodiflorum</i> : 3%
Shade	Moderate

Site	Funshion Site 2
Watercourse	River Funshion
EPA River Code	18/F/05
EPA Site Code	None
	Upstream of Site 0200
GPS Reading	R7941 1363
Location	330m d/s of treated effluent discharge
Photograph No.	2
Wet Width (m)	12
Sampling depth (cm)	0.25
Flow	Riffle: 100%
Substrate	Cobble: 20%
	Coarse Gravel: 25%
	Fine Gravel: 25%
	Sand: 20%
	Silt: 10%
Instream Vegetation	<i>Cladophora sp.</i> : 1%
	<i>Fontinalis antipyretica</i> : 2%
	<i>Hygrohypnum sp.</i> : 1%
	<i>Ranunculus sp.</i> : 30%
	<i>Oenanthe crocata</i> : 3%
	<i>Glyceria fluitans</i> : 1%
	<i>Apium nodiflorum</i> : 1%
Shade	Light

Site	Gradoge Site 1
Watercourse	Gradoge River
EPA River Code	18/G/13
EPA Site Code	None
	Downstream of Site 0100
GPS Reading	R8178 1308
Location	u/s of Clonmel Rd. Surface water discharge
Photograph No.	3
Wet Width (m)	3
Sampling depth (cm)	0.25
Flow	Riffle: 80%
	Glide 20%
Substrate	Cobble: 10%
	Coarse Gravel: 250%
	Fine Gravel: 25%
	Sand: 40%
Instream Vegetation	<i>Phalaris arundinacea</i> 2%
	<i>Fontinalis antipyretica</i> : 5%
	<i>Callitriche sp.</i> 10%
	<i>Ranunculus sp.</i> 10%
	<i>Apium nodiflorum</i> : 5%
Shade	Moderate

Site	Gradoge Site 2
Watercourse	Gradoge River
EPA River Code	18/G/13
EPA Site Code	0200
GPS Reading	R7980 1368
Location	50m u/s confluence with R. Funshion
Photograph No.	4
Wet Width (m)	5
Sampling depth (m)	0.3
Flow	Fast Glide: 100%
Substrate	Cobble: 20%
	Coarse Gravel: 25%
	Fine Gravel: 10%
	Sand: 40%
	Silt: 5%
Instream Vegetation	<i>Cladophora sp.</i> : 1%
	<i>Fontinalis antipyretica</i> : 1%
	<i>Callitriche sp.</i> 1%
	<i>Ranunculus sp.</i> 5%
	<i>Potamogeton crispus</i> : 20%
	<i>Apium nodiflorum</i> 1%
Shade	Light

APPENDIX 2 PHOTOGRAPHS OF SAMPLING SITES

Photo 1: Funshion Site 1



Photo 2: Funshion Site 2



Photo 3: Gradoge Site 1



Photo 4: Gradoge Site 2



APPENDIX 3

MACROINVERTEBRATES FAUNAL RESULTS SEPTEMBER 2023

Relative abundance expressed as D: Dominant; N: Numerous; C: Common; F: Few; SS: Single Specimen

TAXON	Funshion Site 1	Funshion Site 2	Gradoge Site 1	Gradoge Site 2
Group A (Sensitive)				
<i>Ecdyonurus sp.</i>	F	F	F	
<i>Rhithrogena sp.</i>				
Group B (Less Sensitive)				
<i>Leuctra sp.</i>	F	F	F	
<i>Alainites muticus</i>	S			SS
Glossosomatidae	F			
Limnephilidae				F
Goeridae			SS	
<i>Sericostoma personatum</i>				SS
Group C (Relatively Tolerant)				
Tricladida	SS		SS	
Lumbriculidae	SS	F		F
Lumbricidae				F
<i>Potamopyrgus antipodarum</i>		F	F	
<i>Ancylus fluviatilis</i>		F	F	F
Hydracarnidae		SS		F
<i>Gammarus sp.</i>	N	C	N	D
<i>Baetis rhodani</i>	N	N	N	N
<i>Seratella ignita</i>	F	F	SS	
Hydropsychidae	S		SS	F
Rhyacophilidae	S	F	F	SS
<i>Elmis aenea</i>	F		F	F
<i>Limnius volckmari</i>	C	F	F	F
Simuliidae	F	F		C
<i>Dicranota sp.</i>	F	F	F	F
Chironomidae (ex. <i>Chironomus</i>)		F		F
Group D (Very Tolerant)				
<i>Helobdella stagnalis</i>		SS		
<i>Glossiphonia sp.</i>			F	
<i>Radix balthica</i>		SS		
<i>Pisidium sp.</i>				SS
<i>Asellus sp.</i>		SS		
Group E (Most Tolerant)				
Tubificidae	F		F	F
Q-value	Q3-4	Q3-4	Q3-4	Q3

APPENDIX 4

Met Eireann Rainfall Records

(Moorepark, Fermoy)

MONTHLY DATA - MOORE PARK

Monthly values for MOORE PARK up to 16-nov-2023

Total rainfall in millimetres for MOORE PARK

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
2023	104.1	17.2	144.4	52.8	34.4	56.6	150.1	87.6	136.0	250.8	44.9
2022	43.5	96.9	83.1	69.3	43.6	73.4	33.5	27.6	139.9	230.4	167.8
2021	72.7	189.9	52.7	22.5	130.8	26.9	62.9	58.3	102.3	125.3	33.4
2020	89.7	152.8	47.9	64.8	37.2	72.9	73.4	145.1	43.0	101.5	118.9
LTA	111.0	80.1	85.5	65.6	69.3	70.2	62.0	83.6	79.5	113.3	105.4