

Biological Water Quality Assessment
of Watercourses in the Vicinity of
Molaisín Compost Ltd. at Kilmolash

Prepared by:

Pascal Sweeney M.Sc., MIEEM

Consultant Environmental Biologist,

Rahon,

Mallow

Co. Cork.

Tel. 022/26780

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1. INTRODUCTION

The present report by Pascal Sweeney, Consultant Environmental Biologist, was commissioned to assess the biological water quality of watercourses in the vicinity of the composting facility of Molaisín Compost Ltd. at Kilmolash, Co. Waterford. The design of the survey is such that the biological data relevant to the water quality of watercourses draining the area in which the composting facility is located can be directly compared with future data in order that any possible changes in biological water quality can be properly assessed.

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2. SAMPLING SITES

A small stream flowing to the Finisk River (EPA Code 18/F/02) drains the area of mostly agricultural land in which the composting facility is located (Map 1). Biological assessment of the water quality of this watercourse upstream of any possible influence of the composting facility is not possible because it is too small and slow-flowing for the assessment methodology to be applicable.

Three biological sampling sites were established. Site co-ordinates and other site information are presented in Appendix 1. Photographs of the sampling sites are shown in Appendix 2.

Site 1. A short distance upstream of the confluence with the Finisk River on the small stream that drains the area in which the composting facility is located.

Two sampling sites were established on the Finisk River, one upstream and one downstream of the confluence with the small stream.

Site 2. Approximately 80m upstream of the confluence with the stream flowing northwards from the composting facility. Results from this site establish the status of the Finisk River before it has been joined by the watercourse from the area of the composting facility.

Site 3. Approximately 50m downstream of the confluence with the stream flowing northwards from the composting facility. To avoid any possible influence of road runoff from the southern side, the sampling site is located on the northern side of a small island in the river. Results from this site establish the status of the Finisk River after it has been joined by the watercourse from the area of the composting facility and show any impact that the small stream has had on the river water quality.

3. METHODOLOGY

3.1 Biological Water Quality Assessment.

The procedure of assessment of biological water quality in this survey is the Biotic Index or Q-Scheme method used by staff of the Environmental Protection Agency, with whom the author has standardised the methodology in the field. Whilst many plants and animals can provide information on the quality of the aquatic environment, the community most widely employed in river water quality investigations is that of the larger and more readily visible invertebrate animals (macroinvertebrates) which colonise the river substrata. Within the macroinvertebrate community, the sensitivity and tolerance to pollution varies considerably from species to species. As a result, five main macroinvertebrate indicator groups can be identified. The relative proportions of the five groups within the macroinvertebrate community from any point in a river reflects the water quality at that particular point, once other relevant site-specific information is taken into account. The biological information can be condensed to a readily understandable form by means of a five point Biotic Index or Q-value. Intermediate ratings (e.g. Q3-4) are also used. The suffix /0 is used to denote any suspected toxic influence and the suffix * is used to denote the influence of sedimentation by fine particulate matter.

3.2 Field and Laboratory Procedures

Field work was carried out on 5 March, 2008. At each of the three sites, a qualitative assessment of habitat conditions was first carried out. Site co-ordinates were recorded using a Garmin *etrex* GPS handset. Site photographs were taken using a Olympus μ 300 digital camera. The percentage of the substrate covered by each taxon within the plant community was recorded. At each site a five-minute kick and stone wash sample was taken. Following sieving, each sample was live sorted for 30 minutes under laboratory conditions. Macroinvertebrates were preserved in 70% alcohol, examined microscopically and identified to the taxonomic level required to calculate Q-ratings by the EPA methodology. Based on the abundance of indicator groups and other relevant environmental data, a Q-value was determined for each site in accordance with the

biological assessment procedures used by of the EPA. The preserved samples were archived for future examination or verification.

The preserved samples were retained and stored in vials so that they may be checked, if necessary, in the future.

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4. RESULTS

4.1 Physical Data

The physical data and percentage plant cover of the substratum at each site are presented in Appendix 1.

4.3 Macroinvertebrate Community Analysis by Site.

The numbers of individuals of each macroinvertebrate taxon sorted in 30 minutes from samples taken at the three sites are given in Tables 1 to 3.

4.3.1 SITE 1

TABLE 1

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER
A	Very Pollution Sensitive	None Recorded	
B	Moderately Pollution Sensitive	None Recorded	
C	Moderately Pollution Tolerant	Tricladida	8
		<i>Gammarus duebeni</i>	190
		Polycentropodidae	4
		Elmidae	7
		Simuliidae	165
D	Very Pollution Tolerant	None recorded	
E	Most Pollution Tolerant	None recorded	
Taxa not assigned to any Indicator Group		Lumbricidae	2

The total absence of Groups A and B taxa and the total dominance of Group C at Site 1 dictates that a Q-value of Q3, indicating **moderately polluted** conditions must be assigned to this site.

4.3.2 SITE 2

TABLE 2

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER
A	Very Pollution Sensitive	Perlodidae	14
		<i>Ecdyonurus sp.</i>	6
		<i>Rhithrogena sp.</i>	47
B	Moderately Pollution Sensitive	Nemouridae	2
C	Moderately Pollution Tolerant	<i>Gammarus duebeni</i>	5
		<i>Baetis rhodani</i>	46
		Rhyacophilidae	3
		Hydropsychidae	2
		Elmidae	1
		Chironomidae (ex. <i>Chironomus</i>)	3
D	Very Pollution Tolerant	None recorded	
E	Most Pollution Tolerant	Tubificidae	3
Taxa not assigned to any Indicator Group		Lumbriculidae	2

The high representation of Group A, with three taxa present warrants a Q-value of Q4-5, indicating **unpolluted** conditions at Site 2.

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4.3.3 SITE 3

TABLE 3

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER
A	Very Pollution Sensitive	Perlodidae	8
		<i>Ecdyonurus sp.</i>	18
		<i>Rhithrogena sp.</i>	53
B	Moderately Pollution Sensitive	Taeniopterygidae	2
C	Moderately Pollution Tolerant	<i>Gammarus duebeni</i>	1
		<i>Baetis rhodani</i>	39
		Rhyacophilidae	2
		Elmidae	1
D	Very Pollution Tolerant	None recorded	
E	Most Pollution Tolerant	Tubificidae	3
Taxa not assigned to any Indicator Group		Lumbriculidae	2

The high representation of Group A, with three taxa present warrants a Q-value of Q4-5, indicating **unpolluted** conditions at Site 3.

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5. CONCLUSIONS

Analysis of the biological data collected in the present survey indicates that the small watercourse that drains the area in which the composting facility is located is moderately polluted. The condition of this stream is probably a reflection of the intensity of agricultural activity in its catchment. The section of the Finisk River close to the confluence is of high biological water quality. As Q4-5 was recorded at both Site 2 and Site 3, the watercourse draining the area in which the composting facility is located was not seen to have a biological impact on the water quality of the Finisk River. This is probably due to the fact that, although the stream is moderately polluted, the dilution factor when it enters the river is sufficiently great for any impact to be rendered insignificant.

No protected macroinvertebrate or macrophyte species were found in the present survey.

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APPENDIX 1
SAMPLING SITE DETAILS

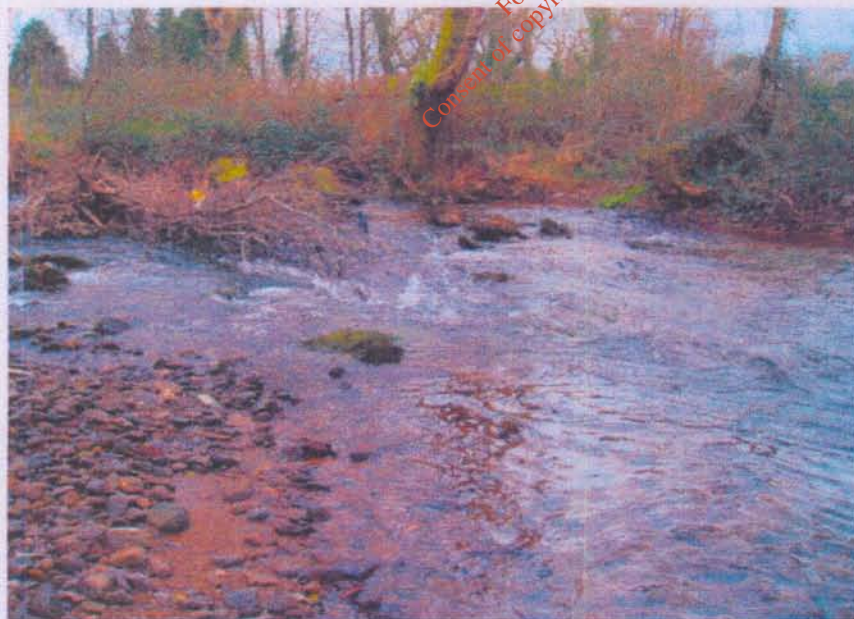
	Site 1	Site 2	Site 3
Location	Small Stream. Upstream (south) of public road bridge.	Finisk River c.80m upstream of confluence of small stream.	Finisk River c. 50m downstream of confluence of small stream, RHS (north) of island.
Grid Reference	X1337 9458	X1343 9472	X1332 9466
Width (m.)	0.4	10	180
Sampling Depth (cm.)	5	5 - 30	25
Substrate Composition (in order of occurrence)	1. Gravel 2. Cobble 3. Mud	1. Cobble 2. Gravel 3. Sand 4. Bedrock	1. Cobble 2. Gravel 3. Sand
Flow Type	Riffle: 100%	Riffle: 100%	Riffle: 100%
Instream Vegetation (% cover of substratum)	<i>Oenanthe crocata</i> : 5% <i>Apium nodiflorum</i> : 5%	<i>Ranunculus sp.</i> : 10% Moss: 5%	Moss: 5%
Dominant Bankside Vegetation	Bramble, gorse	Alder, Ash	Beech, Alder, Ash
Shade	Moderate	Heavy	Heavy
Photograph No.	1	2	3

APPENDIX 2
PHOTOGRAPHS OF SAMPLING SITES

Photograph 1. Site 1



Photograph 2. Site 2



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Photograph 3. Site 3



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APPENDIX 2 MAP

