

**BIOLOGICAL MONITORING OF SURFACE WATER QUALITY IN
THE VICINITY OF GORTADROMA LANDFILL, COUNTY
LIMERICK**



August 2022

REPORT PREPARED FOR LIMERICK CITY & COUNTY COUNCIL

by

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1. INTRODUCTION

As part of the monitoring of water quality in the vicinity of the landfill site at Gortadroma, County Limerick, Conservation Services, Ecological Consultants have been commissioned by JRE Ltd. on behalf of Limerick City & County Council to carry out biological sampling and water quality assessment in accordance with EPA Q-rating methodology at four locations on the White River (Owvane) upstream and downstream of the landfill site. Sampling was carried out on 26th August 2022.

2. METHODOLOGY

2.1. SITE SELECTION

Biological sampling and water quality assessment was carried out at four sites specified by EPA. The most recent previous sampling at these sites was in August 2021 (Conservation Services 2021). The location of the sites is shown on Map 1.

2.2. HABITAT ASSESSMENT

Habitat assessment was carried out at each of the four sites selected for invertebrate/water quality assessment. These sites were assessed in terms of:

- Stream width and depth
- Substrate type, listing substrate fractions in order of dominance, i.e. large rocks, cobble, gravel, sand, mud etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area
- Instream vegetation, listing plant species occurring and their percentage coverage of the stream bottom at the sampling site
- Dominant bankside vegetation, listing the main species overhanging the stream
- Estimated summer cover by bankside vegetation, giving percentage shade of the sampling site
- Rating of the site as habitat for trout adult, nursery and spawning on a scale of Poor/Fair/Good/Very Good/Excellent. This rating assesses the physical

suitability of the habitat; the presence/absence/density of salmonids at the site will also depend on present and historical water quality and accessibility of the site to fish.

To illustrate the habitat quality, photographs were taken using a digital camera.

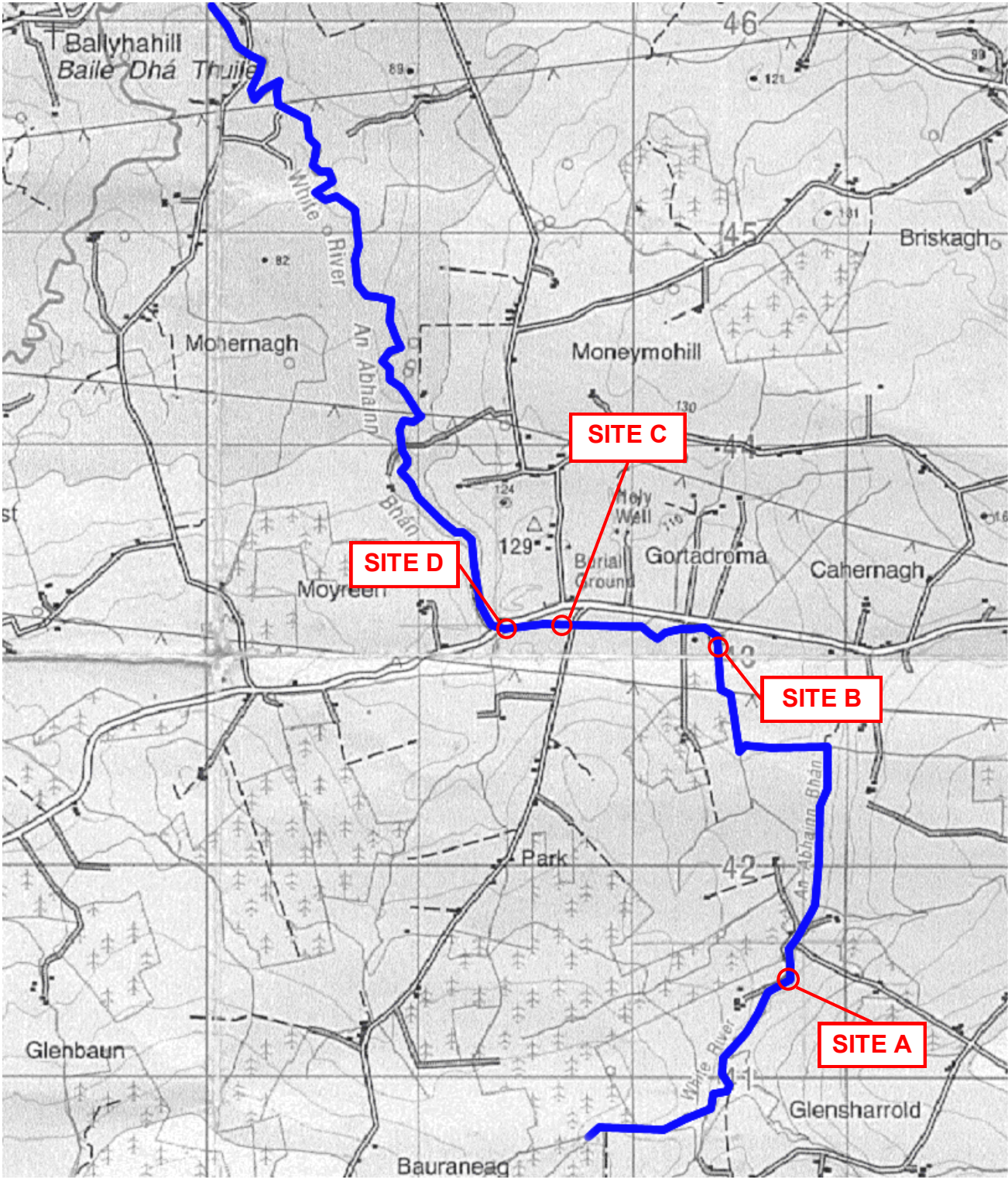
2.3. INVERTEBRATE SAMPLING AND WATER QUALITY ASSESSMENT

A five-minute kick and stone wash sample was taken at each sampling site. Each sample was live sorted for 30 minutes, and macroinvertebrates were stored in 70% alcohol. Invertebrates were identified to the level required for the EPA Q-rating method (McGarrigle *et al* 2002) using high-power and low-power binocular microscopes.

Based on the relative abundance of indicator species, a biotic index (Q-rating) was determined for each site in accordance with the biological assessment procedure used by the Environmental Protection Agency (McGarrigle *et al*, 2002) and S.I. No. 258 of 1998 (Phosphorus Regulations), and more detailed unpublished methodology (McGarrigle, Clabby and Lucey pers. comm.)

Biotic Index	Water Framework Directive Ecological Quality	Quality Status
Q5	High	Unpolluted Waters
Q4-5	High	
Q4	Good	
Q3-4	Moderate	Slightly Polluted Waters
Q3	Poor	Moderately Polluted Waters
Q2-3	Poor	
Q2	Bad	Seriously Polluted Waters
Q1-2	Bad	
Q1	Bad	

MAP 1 BIOLOGICAL MONITORING SITES



3. RESULTS

Description of habitat at the sampling sites is given in Appendix 1. Q-ratings are shown on Map 2.

3.1. SITE A

The invertebrate community at this site tabulated below merits a Q-rating of Q4 indicating unpolluted conditions and Good ecological quality.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2022
A	Very Pollution Sensitive	<i>Protonemura sp.</i>	2
		<i>Ecdyonurus sp.</i>	36
		Heptageniidae (small/damaged)	8
		<i>Rhithrogena sp.</i>	3
B	Moderately Pollution Sensitive	<i>Leuctra sp.</i>	7
		<i>Baetis muticus</i>	31
		<i>Agapetus sp.</i>	1
		Goeridae	1
		<i>Lepidostoma hirtum</i>	1
		<i>Sericostoma personatum</i>	1
C	Moderately Pollution Tolerant	<i>Ancylus fluviatilis</i>	1
		<i>Potamopyrgus antipodarum</i>	14
		<i>Gammarus duebeni</i>	55
		<i>Baetis rhodani</i> agg.	55
		<i>Serratella ignita</i>	13
		<i>Hydropsyche sp.</i>	75
		<i>Polycentropus sp.</i>	7
		<i>Rhyacophila sp.</i>	9
		<i>Velia sp.</i>	1
		Elmidae	27
		Ceratopogonidae	1
		Chironomidae (ex. <i>Chironomus</i>)	4
		Simuliidae	2
		Tipulidae	1
D	Very Pollution Tolerant	Erpobdellidae	3
E	Most Pollution Tolerant	None recorded	

3.2. SITE B

The invertebrates recorded at Site B and tabulated below merit a Q-rating of Q4 indicating unpolluted conditions and Good ecological quality.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2022
A	Very Pollution Sensitive	<i>Ecdyonurus sp.</i>	25
		Heptageniidae (small/damaged)	8
		<i>Rhithrogena sp.</i>	1
B	Moderately Pollution Sensitive	<i>Leuctra sp.</i>	1
		<i>Baetis muticus</i>	2
		<i>Agapetus sp.</i>	2
		Goeridae	8
C	Moderately Pollution Tolerant	<i>Ancylus fluviatilis</i>	2
		<i>Potamopyrgus antipodarum</i>	4
		<i>Gammarus duebeni</i>	155
		<i>Baetis rhodani</i> agg.	1
		<i>Serratella ignita</i>	3
		<i>Hydropsyche sp.</i>	31
		Polycentropodidae	1
		<i>Polycentropus sp.</i>	1
		Elmidae	44
		<i>Hydraena sp.</i>	1
		Chironomidae	1
		Simuliidae	3
		Pediciidae	7
D	Very Pollution Tolerant	Erpobdellidae	1
E	Most Pollution Tolerant	None recorded	
-	Not assigned to an indicator group	Nematomorpha	1
		Lumbriculidae	1

3.3. SITE C

The invertebrates recorded at Site C are tabulated below. The site is given a Q-rating of Q4 indicating unpolluted conditions and Good ecological quality.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2022
A	Very Pollution Sensitive	<i>Protonemura sp.</i>	1
		<i>Ecdyonurus sp.</i>	19
		Heptageniidae (small/damaged)	4
B	Moderately Pollution Sensitive	<i>Leuctra sp.</i>	10
		<i>Baetis muticus</i>	7
		<i>Agapetus sp.</i>	8
		Goeridae	2
		Limnephilidae	1
		<i>Sericostoma personatum</i>	7
C	Moderately Pollution Tolerant	<i>Ancylus fluviatilis</i>	8
		<i>Potamopyrgus antipodarum</i>	36
		<i>Gammarus duebeni</i>	33
		<i>Baetis rhodani</i> agg.	15
		<i>Serratella ignita</i>	33
		<i>Hydropsyche sp.</i>	107
		Polycentropodidae	3
		<i>Polycentropus sp.</i>	4
		<i>Rhyacophila sp.</i>	2
		Dytiscidae	6
		Elmidae	45
		<i>Hydraena sp.</i>	1
		Chironomidae	80
		Pediciidae	2
		Simuliidae	2
Tipulidae	1		
D	Very Pollution Tolerant	Erpobdellidae	2
		Sphaeriidae	1
E	Most Pollution Tolerant	Tubificidae	2
-	Not assigned to an indicator group	Lumbricidae	1
		<i>Stagnicola sp.</i>	1

3.4. SITE D

The invertebrates recorded at Site D are tabulated below. The site is given a Q-rating of Q3-4 indicating slightly polluted conditions and Moderate ecological quality.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2022
A	Very Pollution Sensitive	<i>Ecdyonurus sp.</i>	7
B	Moderately Pollution Sensitive	<i>Leuctra sp.</i>	1
		<i>Baetis muticus</i>	4
		<i>Agapetus sp.</i>	5
C	Moderately Pollution Tolerant	<i>Ancyclus fluviatilis</i>	4
		<i>Gammarus duebeni</i>	43
		Hydracarina	1
		<i>Baetis rhodani</i>	33
		<i>Serratella ignita</i>	21
		<i>Hydropsyche sp.</i>	51
		<i>Polycentropus sp.</i>	14
		<i>Rhyacophila sp.</i>	7
		Elmidae	11
		Haliplidae	1
		Ceratopogonidae	1
		Chironomidae (ex. <i>Chironomus</i>)	c.900
		Pediciidae	3
		Simuliidae	77
D	Very Pollution Tolerant	Erpobdellidae	1
E	Most Pollution Tolerant	None recorded	

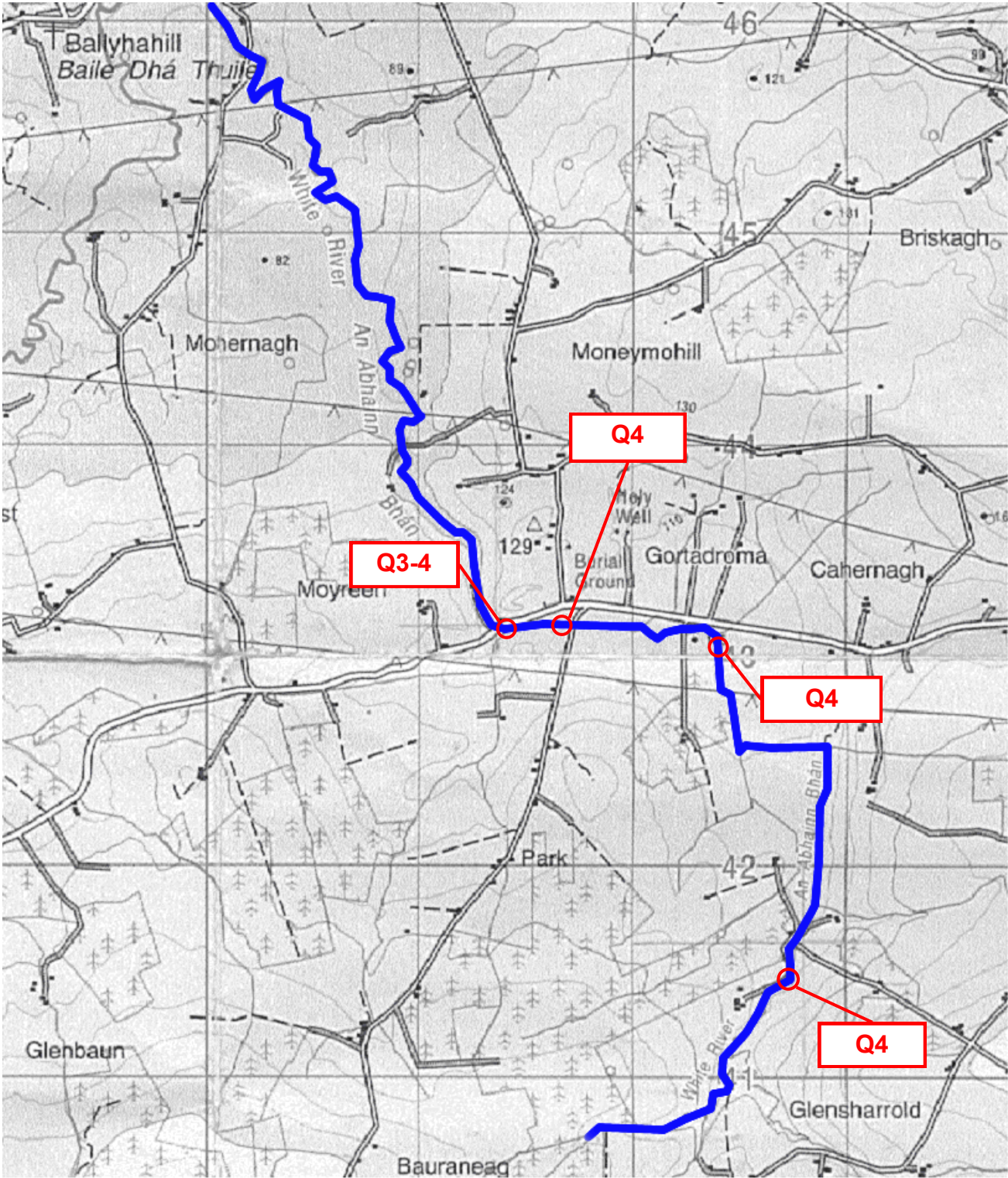
3.5. SUMMARY OF MONITORING RESULTS 1996 – 2022

SITE	A (2km u/s landfill)	B* (just u/s landfill)	C (just d/s landfill)	D (c.800m d/s landfill)
EPA 1996	-	-	3-4	-
CS 1997	4	4	4	4
EPA 1999	-	4-5	4	-
EPA 2002	-	4	4	-
CS May 2003	4-5	4-5	4	4-5
CS Sep. 2003	3-4	4	4	4
CS Sep. 2004	4	4-5	4	4
CS Oct. 2005	4	4	4	4
EPA 2006	-	4	4	-
CS Nov. 2006	4	4	4	4
CS Aug. 2007	4	4	4	4
CS Aug. 2008	3-4	4	4	4
EPA Sep. 2008	-	4	4	-
CS Sep. 2009	3	3	3	3
CS Jul. 2010	4	4	4	4
EPA Aug. 2011	-	4-5	4	-
CS Sep. 2011	4	4	4	4
CS Sep. 2012	4	4	4	4
CS Aug. 2013	3-4	3-4	3-4	3-4
EPA Aug. 2014	-	4	4	-
CS Sep. 2014	4	4	4	4
CS Sep. 2015	4	4	4	4
CS Sep. 2016	3	3-4	3-4	3-4

SITE	A (2km u/s landfill)	B* (just u/s landfill)	C (just d/s landfill)	D (c.800m d/s landfill)
EPA Aug. 2017	-	4	4	-
CS Sep. 2017	4	4	4	4
CS Sep. 2018	4	4	4	4
CS Sep. 2019	4	4	4	4
CS Sep. 2020	4	4	4	4
CS Aug. 2021	4	4	4	4
CS Aug. 2022	4	4	4	3-4

*There are minor differences between the location of Site B in the present study and the location of EPA Site 24O020070. Since May 2003 Conservation Services has sampled c.200m upstream of the EPA site in order to remain upstream of a small tributary entering the river from the vicinity of the landfill extension. The data tabulated above for Site B all apply to the White River immediately upstream of the landfill.

MAP 2 Q-RATINGS AT BIOLOGICAL MONITORING SITES

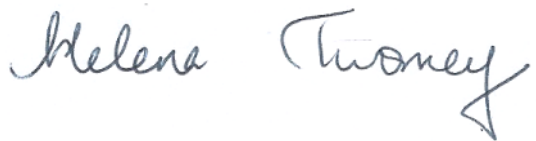


4. CONCLUSIONS

Site B located upstream of the landfill and Site C downstream of the landfill both merited a rating of Q4 indicating unpolluted conditions and Good ecological quality. Therefore the present biological water quality assessment does not indicate an adverse impact on the Owvane River from the landfill at Gortadroma.

A Q-rating of Q3-4 (Moderate ecological quality) was recorded at Site D which is a further c.300m downstream of the landfill. Give the Good ecological quality (Q4) recorded at Site C immediately downstream of the landfill, the lower rating of Q3-4 cannot be driven by the landfill. As a significant tributary flows to the White River just upstream of Site D, the lower Q-rating at the site is most likely due to a change in water quality in this tributary. Future inclusion of a Q-rating site on this tributary just upstream of the confluence would be useful to clarify the factors driving the Q-rating at Site D, and is therefore recommended.

Signed on behalf of Conservation Services



Helena Twomey BA(Mod.) PhD

5 September 2022


5. REFERENCES


Conservation Services (2021) Biological monitoring of surface water quality in the vicinity of Gortadroma Landfill, County Limerick. Report to Limerick City and Council.


McGarrigle et al (2002) *Water Quality in Ireland 1998-2000*. Environmental Protection Agency.


APPENDIX 1

HABITAT ASSESSMENT

Site Code	A
Grid reference	R 22744 41572
Site Location	Upstream of bridge north of Glensharold
Site Photograph	
Width	4-5 m
Depth	8-15 cm
Substrate	Cobble, Gravel, Sand, Large Rocks (Heavy silt plume)
Flow Type	Riffle 45% Glide 55%
Instream Vegetation	Filamentous algae 20%; Bryophyta <5%
Dominant Bankside Vegetation	Gorse, Himalayan Balsam, Bramble, Blackthorn, Montbretia, Willow
Estimated % summer Cover of Stream by Bankside Vegetation	5%
Trout Adult Habitat	Poor
Trout Nursery Habitat	Good
Trout Spawning Habitat	Fair
Comments	Water slightly coloured

Site Code	B
Grid Reference	R 22403 43089
Site Location	Upstream of landfill and upstream of small stream/drain flowing from landfill extension area.
Site Photograph	
Width	3-4 m
Depth	5-12 cm
Substrate	Gravel, Cobble, Sand, Mud (Heavy silt plume)
Flow Type	Riffle 40% Glide 60%
Instream Vegetation	Bryophyta <1%
Dominant Bankside Vegetation	Bramble, Grass, Himalayan Balsam, Alder, Oak, Willow
Estimated % summer Cover of Stream by Bankside Vegetation	20%
Trout Adult Habitat	Poor
Trout Nursery Habitat	Fair - Good
Trout Spawning Habitat	Fair – Good
Comments	Water slightly coloured

Site Code	C
Grid Reference	R 21715 43154
Site Location	Just downstream of landfill and just downstream of bridge
Site Photograph	
Width	4-5 m
Depth	6-12 cm
Substrate	Cobble, Gravel, Mud, Sand, Large Rocks; Heavy silt plume
Flow Type	Riffle 45% Glide 55%
Instream Vegetation	Filamentous algae (silty) 50%; <i>Phalaris arundinacea</i> 5%; Bryophyta <1%
Dominant Bankside Vegetation	Hawthorn, Conifer, Ash, Nettle, Grass, Bramble, Montbretia, Himalayan Balsam
Estimated % summer Cover of Stream by Bankside Vegetation	5%
Trout Adult Habitat	Poor
Trout Nursery Habitat	Fair-Good
Trout Spawning Habitat	Fair
Comments	Water slightly coloured

Site Code	D
Grid Reference	R 21387 43129
Site Location	Upstream of bridge, downstream of tributary.
Site Photograph	
Width	6-7 m
Depth	6-12 cm
Substrate	Cobble, Large Rocks, Gravel, Mud (Heavy silt plume)
Flow Type	Riffle 30% Glide 70%
Instream Vegetation	Filamentous algae (silted) 60%; Bryophyta 5%
Dominant Bankside Vegetation	Grass, Bramble, Rush
Estimated % summer Cover of Stream by Bankside Vegetation	5%
Trout Adult Habitat	Poor-Fair
Trout Nursery Habitat	Fair-Good
Trout Spawning Habitat	Poor-Fair