Kilsaran

Biological Q Value Assessment

Ballinclare Quarry

Co. Wicklow

Prepared for:

Kilsaran

Piercetown

Co. Meath

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May 2023

Client: Kilsaran

Biological Q Value Assessment

Document Stage	Document Version	Prepared by	Approved by
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STATEMENT OF AUTHORITY

This report is written Katie Neary. She is a Senior Ecologist with JKW Environmental. Katie has completed an honours B.Sc.. in Environmental Science. She is an Associate member of the Institution of Environmental Sciences (IES). She regularly carries out reporting on Ecological Impact Assessment and to inform Natura Impact Assessments / Appropriate Assessments carried out by statutory authorities. Furthermore, she has several years' experience in habitat surveys, mammal surveys, bird and bat surveys for a number of large infrastructure schemes, commercial and residential projects. Katie is an experienced Ecological Clerk of Works (ECoW).

This report was reviewed by Jamie Wood. Jamie holds a Degree in Environmental Science and a Masters Degree in Environmental Management, Health and Safety. Jamie is a full member of the Institute of Environmental Science and the Association of Ecological and Environmental Clerk of Works. Jamie is also Chartered with the Society for the Environment holding the postnominal C.Env. Over the past 20 years, working as an Environmental / Ecological Consultant, Jamie has gained extensive experience in a range of ecological surveys and assessment techniques including bird surveys, bat surveys and Ecological Clerk of Works.

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1. Introduction

Kilsaran are required to carry out a Biological Q Value Assessment of the Potter's River north of the Ballinclare site monthly to assess potential impacts of dewatering activities at the site. JKW Environmental have been commissioned by Kilsaran to conduct this assessment.

Sampling was carried out at upstream and downstream locations which were selected by Kilsaran, taking into account safe and available access, and agreed upon by Wicklow County Council. Sampling was carried out on the 11th May 2023.

The locations of each monitoring point surveyed are provided in Figure 2.1. Biological water quality was assessed through kick-sampling each of these monitoring points. Macroinvertebrate samples were converted to Q-ratings as per Toner et al. (2005)[1] . The applied Q ratings followed the EPA water quality classes and Water Framework Directive status categories. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present. The results of the surveys at all sites are provided below

[1] Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C.,. & MacGarthaigh, M. (2005). Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.

2. Methodology

The Biological Water Quality Assessment took place in accordance with Biological monitoring based on Q- Value assessments which conforms to prescribed EPA methodology on Biological Assessments laid out in the Water Framework Directive.

Treated dewatering discharge from the Ballinclare site flows under gravity along a channel to the outflow point located along the Ballinclare stream. The Ballinclare steam joins with the Potter's River approximately 400m downstream of the discharge point. Two sampling locations situated on the Potter's River were sampled as part of this assessment; one sampling location upstream of the site discharge point and one downstream of the discharge point. The assessment will measure any changes in aquatic ecology downstream of the point at which site outflow enters the river system.

The assessment will determine if there has been any discernible deterioration in water quality downstream of the development when compared to upstream water quality.

Certain organisms which have a sensitivity or a tolerance to physio-chemical changes in their aquatic environment can be used as water quality indicators. The assessment comprised of: kick sampling at each monitoring location, followed by an examination of macroinvertebrates collected during sampling. The relative abundance of key groups of macroinvertebrates was assessed to determine a water quality 'Q' value at each monitoring location. This system divides macroinvertebrates into five indicator groups based on their sensitivity to pollution. The groups range from Group A, the sensitive forms, Group B the less sensitive forms, Group C, the tolerant forms, Group D, the very tolerant forms and Group E, the most tolerant forms.

Other relevant factors such as the intensity of algal and/or weed development, water turbidity, bottom siltation, substratum, water depth and dissolved oxygen content were also taken into account during the assessment procedure.

The relationship between community composition and water quality are as follows.

Table 2.1: Relationship between community composition and water quality.

Q Value	WFD Status	Pollution Status	Condition
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2. Q1	Bad	Seriously polluted	Unsatisfactory

Prescribed methodology outlines a number of relative abundance level approaches. Abundance levels can be determined with reference to one or more of the tables below.

Table 2.2: Abundance categories and relationships to percentage frequency of occurrence

Abundance Category	Approximate percentage frequency of occurrence
Absent	No specimens
Present	1 or 2 individuals
Scare/few	<1% of total fauna
Small numbers	<5%
Fair numbers	5-10%
Common	10-20%
Numerous	25-50%
Dominant	50-75%
Excessive	>75%

Table 2.3: Macroinvertebrates grouped according to their sensitivity to organic pollution ((McGarrigle et al., 2002).

Macroinvertebrates grouped according to their sensitivity to organic pollution					
TAXA	**Group A**	**Group B**	**Group C**	**Group D**	**Group E**
	Sensitive	*Less Sensitive*	*Tolerant*	*Very Tolerant*	*Most Tolerant*
Plecoptera	All except L*euctra* spp.	*Leuctra* spp.			
Ephemeroptera	Heptageniidae Siphlonuriidae *Ephemera dancia*	Baetidae (excl. *Baetis rhondani*) Leptophlebidae	*Baetis rhodani* Caenidae Ephemerellidae		
Trichoptera		Cased spp.	Uncased spp.		
Odonata		All taxa			
Megaloptera				Sialidae	
Hemiptera		*Aphelocheirus aestivalis*	All except *A. aestivalis*		
Coleoptera			Coleoptera		
Diptera			Chironomidae (excl. *Chironomus* spp.) Simuliidae Tipulidae		*Chironomus* spp. *Eristalis* sp.
Hydracarina			Hydracarina		
Crustacea			*Gammarus* spp. *Austropotamobius pallipes*	*Asellus* spp. *Crangonyx* spp.	
Gastropoda			Gatropoda (excl. *Lymnaea peregra* & *Physa* sp.)	*Lymnaea peregra* *Physa* sp.	
Lamellibranchiata	*Margaritifera margaritifera*		*Anodonata* spp.	Sphaeriidae	
Hirudinea			*Piscicola* sp.	All except *Piscicola* sp.	
Oligochaeta					Tubificidae
Platyhelminths			All		

Table 2.4: Macroinvertebrates and other environmental parameters grouped according to their sensitivity to organic pollution (McGarrigle et al., 2002).

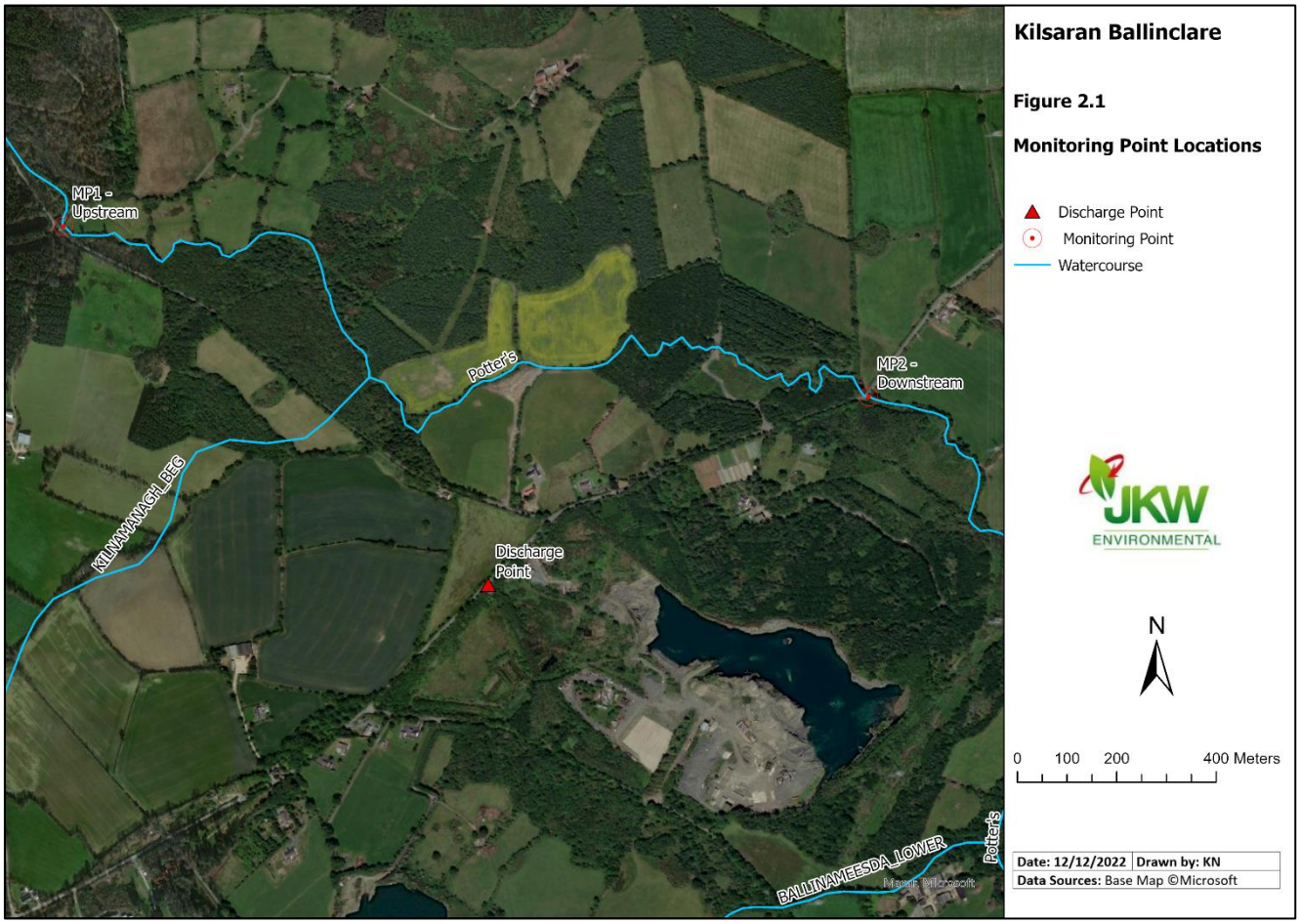
Biological Assessment of Water Quality in Eroding Reaches (Riffles & Glides) of Rivers and Streams*						
Biotic Indices (Q Values) and typical associated macroinvertebrate community structure						
Macroinvertebrate Faunal Groups	**Q5**	**Q4**	**Q3-4**	**Q3**	**Q2**	**Q1**
Group A	At least 3 taxa well represented	At least 1 taxon in reasonable numbers	At least 1 taxon Few - Common	Absent	Absent	Absent
Group B	Few to Numerous	Few to Numerous	Few/Absent to Numerous	Few/Absent	Absent	Absent
Group C	Few	Common to Numerous Baetis rhondani often abundant Others: never Excessive	Common to Excessive (usually Dominant or Excessive)	Dominant to Excessive	Few or Absent	Absent
Group D	Few or Absent	Few or Absent	Few/Absent to Common	Few/Absent to Common	Dominant to Excessive	Few/Absent
Group E	Few or Absent	Few or Absent	Few or Absent	Few or Absent	Few/Absent to Common	Dominant
Additional Qualifying Criteria						
Cladophora spp. Abundance	Trace only or None	Moderate growths (if present)	May be Abundant to Excessive growths	May be Excessive growths	Few or Absent	None
Macrophytes (Typical abundance)	Normal growths or absent	Enhanced growths	May be Luxuriant growths	May be Excessive growth	Absent to Abundant	Present/ Absent
Slime Growths (Sewage Fungus)	Never	Never	Trace or None	May be Abundant	May be Abundant	None
Dissolved Oxygen Saturation	Close to 100% at all times	80% - 120%	Fluctuates from <80% to >120%	Very unstable. Potential fish-kills	Low (but >20%)	Very low, sometimes zero
Substratum Siltation	None	May be light	May be light	May be considerable	Usually heavy	Usually very heavy and anaerobic

Note occurrence/abundance of groups in above table refers to some but not necessarily all of the constituents of the group. The Additional Qualifying Criteria apply in virtually all circumstances. Single specimens may be ignored. Seasonal and other relevant factors (i.e., drought, floods) must be taken into account.

*Mactoinvertebrate criteria do not apply to rivers with mud, bedrock or sand substrata, very sluggish or torrential flow, head-water or high altitude streams and those affected by significant ground water input, excessive calcification, drainage, canalisation, culverting, marked shading etc.

2.1 Sampling Locations

The discharge point is located along the Ballinclare stream. The downstream monitoring point (MP2) is located at the confluence of the Ballinclare stream and the Potter's River, c. 685m downstream from the discharge point. The upstream monitoring point (MP1) is located along Potter's River. The location of MP1 was chosen to facilitate the assessment of any potential impacts on water quality within Potter's River. MP1 is located c. 1.8km upstream of Potter's bridge and MP2. Figure 2.1 shows the location of MP1, MP2 and the discharge point.



3. Results

3.1 MP1

The Q rating assigned to MP1 was **Q3-4**. It was assigned this value as two taxon of Group A macroinvertebrates were present. Two Group B taxon present in small numbers. Group C macroinvertebrates were dominant in terms of the diversity of taxa, however, were present in small numbers; Group D and Group E macroinvertebrates were present. The water was clear and there was a moderate flow. The substrate was comprised of bedrock, boulders, gravel and fine gravel. Siltation was low.

Table 3.1 – Macroinvertebrates recorded at MP1

Indicator Group	Taxon	Dominance
Group A - Sensitive	Heptageniidae	Numerous
	Plectoptera	Scare/few
Group B - Less Sensitive	Trichoptera (cased spp.)	Scarce/Few
	Odonata	Present
Group C - Tolerant	Trichoptera (uncased spp.)	Small numbers
	Coleoptera	Scare/few
	Piscicola sp.	Present
	Gammarus spp.	Present
	Hydracarnia	Scare/few
	Simuliidae	Present
Group D – Very Tolerant	*Asellus* spp	Present
Group E - Most Tolerant	*Chironomus* spp.	Present

Figure 3.1 – MP1 (Upstream)

3.2 MP2

The Q rating assigned to MP2 was **Q3-4.** It was assigned this value as two Group A taxon were present and Group B macroinvertebrates were present in small numbers; Group C macroinvertebrates were dominant in terms of the diversity of taxa present in fair to small numbers; Group E macroinvertebrates were present. The water was clear and there was a moderate flow. The substrate was comprised of bedrock, boulders and fine gravel. Siltation was low. This monitoring location was downstream of an area of access for livestock to the river.

Macroinvertebrates present in the sample collected at this location are shown in the table below.

Table 3.2 – Macroinvertebrates recorded at MP2

Indicator Group	Taxon	Dominance
Group A - Sensitive	Heptageniidae	Numerous
	Plecoptera	Scare/few
Group B - Less Sensitive	Trichoptera (cased)	Small numbers
Group C - Tolerant	*Baetis rhodani*	Scare/few
	Trichoptera (uncased spp.)	Small numbers
	Gammarus spp.	Present
	Coleoptera	Present
	Piscicola sp.	Present
	Simuliidae	Scare/few
Group D - Very Tolerant	None	
Group E - Most Tolerant	*Chironomus* spp.	Scarce/few

Figure 3.2 – MP2 (Downstream)

4. Conclusion

Based on the groups present and their relative abundance a Q Value rating of Q3-4 'Moderate' water quality was assigned to MP1. MP2 was classified as Q3-4 'Moderate' water quality as per Water Framework Directive.

Monthly biological Q Value sampling has been carried out at MP1 and MP2 since December 2022. Upstream Q Values have been recorded as fluctuating between Q 3-4 and Q4. Downstream Q Values have been consistently recorded as Q 3-4.

Based on the conducted kick sampling and using a direct comparison of samples taken upstream and downstream from December 2022 to May 2023 it can be concluded that discharges from dewatering at Ballinclare Quarry have not had any notable adverse impact on the aquatic ecosystem of the Potter's River.