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APPENDIX A7B-4
Aquatic Survey

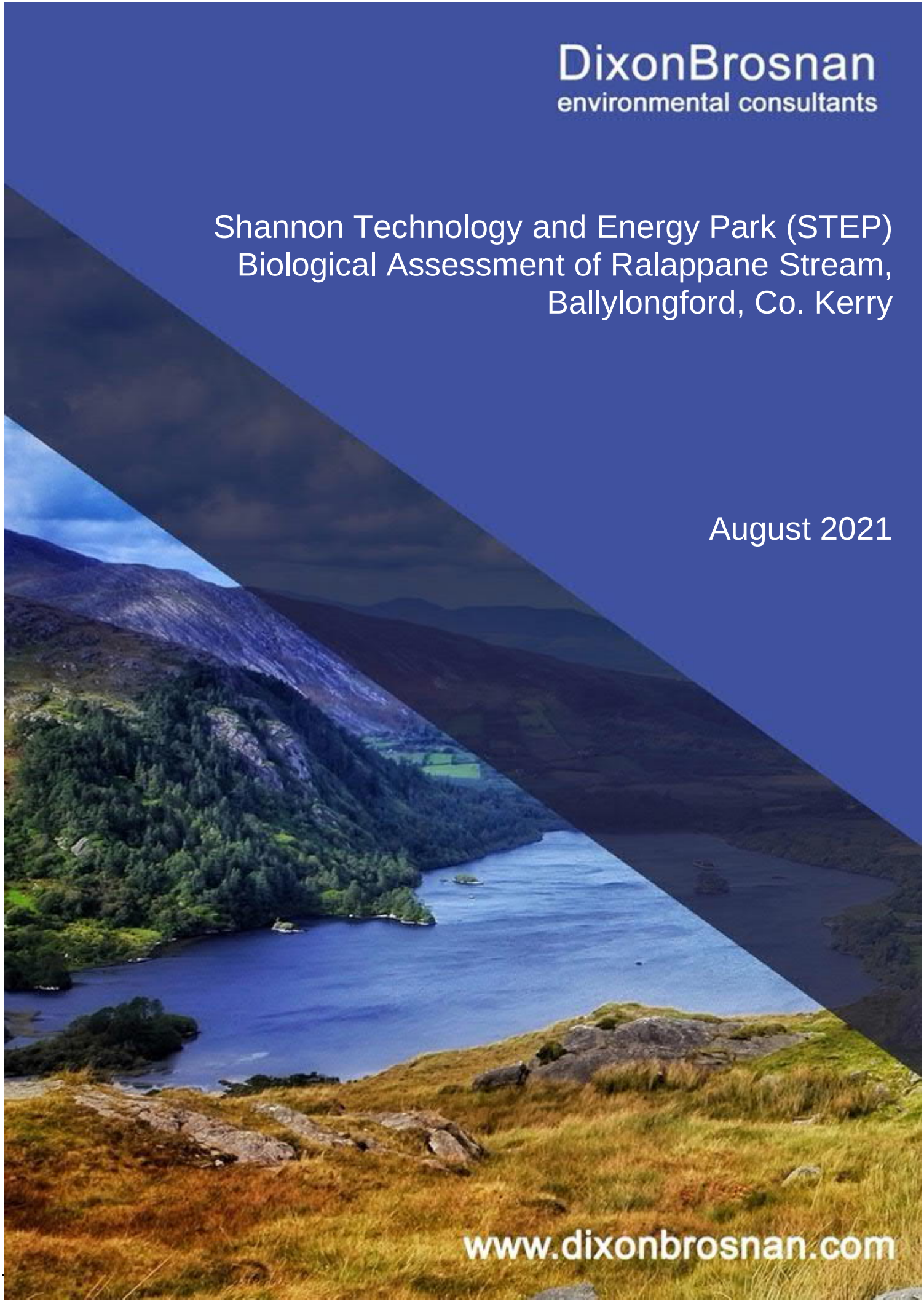
Shannon LNG Limited
August 2021

Shannon Technology and Energy Park
Environmental Impact Assessment Report

DixonBrosnan
environmental consultants

Shannon Technology and Energy Park (STEP)
Biological Assessment of Ralappane Stream, Ballylongford, Co. Kerry

August 2021



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1. Introduction

DixonBrosnan were commissioned to carry out an aquatic survey of the Ralappane Stream as part of the ecological assessment for the Shannon Energy Park. The survey, which consisted of chemical and biological analyses at three sampling stations was carried out to assess current water quality and to determine the ecological value of the stream. The survey was carried out by Carl Dixon MSc. (Ecological Monitoring) who has over 20 years of experience in carrying out biological and chemical surveys of streams and rivers for a range of projects including quarries, industrial facilities, housing projects and landfills.

2. Location and description of watercourse

The Ralappane Stream is a small watercourse which discharges to the Shannon Estuary close to the western boundary of the proposed development. It supports a permanent flow of water but is of insufficient size to be included in the EPA biological monitoring programme and has a status of "unassigned" under the Water Framework Directive. The stream arises approximately 3.5 km south-east of the proposed development site and passes through a landscape dominated by intensive agriculture with blocks of planted woodland, before discharging to the estuary. Although there are sections with a natural riffle-glide flow pattern sections of the stream have straightened and deepened leading to sluggish flows and a soft substrate.

3. Sampling methodology

Three sampling stations were selected within the applicant's land ownership boundary as shown below on **Figure 1.**

Figure 1. Sampling locations.

3. Survey methodology

The field survey was undertaken on the 22 April 2021. Water chemistry samples were taken at each location and transported to ELS Cork for analysis. Biological sampling was carried out at each station using the kick-sampling technique as described by the Clabby *et al.* (2001) The kick-sampling technique involved using a 'D' shaped hand net (mesh size 0.5 mm; 350 mm diameter) which was submerged in the river with its mouth directed upstream. Where available, riffle habitat is utilised. The substrate immediately upstream of the net was kicked for two minutes to dislodge invertebrates. Stone washing was also undertaken to ensure a representative sample of the fauna present at each site is collected. Samples were transferred to plastic bags and preserved using 70% alcohol. Samples were subsequently sieved and sorted using a white sorting tray. Identification was undertaken in the laboratory using a high-powered binocular microscope and using standard identification keys.

To establish the water quality of the two samples the EPA protocol for calculating Q values was utilised (Toner *et al*. 2005). This biotic index is used by the EPA and allows river quality to be compared under standardised guidelines. This method divides macro-invertebrates into five groups, depending on their sensitivity to pollution as presented in **Table 1**.

Table 1. Macroinvertebrate sensitivity classes.

Group	Sensitivity
A	Sensitive
B	Less Sensitive
C	Tolerant
D	Very tolerant
E	Most tolerant

Having determined the relative proportions of the various organisms in a sample, water quality can be inferred by a comparison of this data with that which might be expected from unpolluted habitats of the type under investigation. The Q-value determined using the fauna collected at each station therefore provides an indication of the quality of the water at that station. The relationship between Q values and water quality is set out in **Table 2** below. The relationship between the Q-rating system and the Water Framework Directive classification as defined by the Surface Water Regulations (S.I. 77 of 2019) is shown in **Table 3**.

Table 2. Q-value and water quality.

Q-value	Water quality	Status
5	Good	Satisfactory
4	Fair	Satisfactory
3	Doubtful	Unsatisfactory
2	Poor	Unsatisfactory
1	Bad	Unsatisfactory

Table 3. Correlation between the WFD classification and Q values

Ecological status WFD	Q Values
High	Q5, Q4-5
Good	Q4
Moderate	Q3-4
Poor	Q3, Q2-3
Bad	Q2, Q1

4. Characteristics of sampling stations

General descriptions of each sampling location are provided below in **Table 4**.

Table 4. Characteristics of sampling locations

Site	Stream name	Stream characteristics	Instream vegetation	Riparian vegetation	Flow type	Flow width m	Channel depth cm
SW1	Ralappane	20% gravel, 80% mud Deep glide with mud substrate. Shade 80%	Common Starwort	Willow, Bramble	Glide	1m	20
SW2	Ralappane	60% cobbles, 40% gravel Riffle adjoining intensive pasture with cattle. Upstream of cattle drinking point. Siltation evident. Stickleback noted.	Water Parsnip, Fools Watercress. Common Starwort	Willow, Bramble, Gorse	Riffle	1m	15
SW3	Ralappane	40% cobbles, 60% gravel; Silt levels high. Riffle adjoining wet grassland. Siltation evident. European Eel noted.	Water Parsnip, Fools Watercress.	Willow, Horsetail, Bramble, Yellow Flag, Remote Sedge	Riffle	1m	10

5. Results- Water Chemistry

Water samples were obtained from each survey location and analysed for a range of standard water quality parameters. Results from water chemistry samples are detailed below in **Table 5.**

Table 5. Water chemistry

PARAMETER	S1	S2	S3
pH	6.9	7.4	7.4
BOD (mg/l)	1	1	<1.0
Suspended solids (mg/l)	<5	<5	<5
Nitrite as N (mg/l)	0.005	<0.005	<0.005
Nitrate (N) (mg/l)	0.15	0.15	2.1
Ammonia as N (mg/l)	0.016	0.005	0.012
Total Nitrogen (mg/l)	5.2	5.9	8.5
Orthophosphate (Ortho/MRP) as P (mg/l)	0.009	0.005	0.014
Total phosphorus -mg/l P	0.03	0.03	0.04
Conductivity µs/cm	296	295	294

The water chemistry results are generally indicative of satisfactory water quality. In particular Orthophosphate levels, which is often a limiting factor in freshwater were relatively low. The Surface Water Regulations (S.I. 77 of 2019) specify requirements for key physio-chemical parameters at 95% and mean flows with respect to high or good status for rivers as detailed below in **Table 6**. Although samples were taken on a one-off basis, results obtained in respect of BOD, Orthophosphate and Total Ammonia would be indicative of High Status.

Table 6. Limits for high and good status at mean and 95% flows

	Mean flow		95%ile flow	
Parameter	**High status**	**Good status**	**High status**	**Good status**
BOD (mg O2/l)	≤1.3	≤1.5	≤2.2	≤2.6
Total Ammonia (mg N/l)	≤0.040	≤0.065	≤0.090	≤0.140
Ortho-phosphate (mg P/l)	≤0.025	≤0.035	≤0.045	≤0.075

6. Results- Biological survey

Macro-invertebrates found at each site were identified down to the lowest taxon required for the determination of Q value, using the rating systems described above. The results of the biological survey are presented in **Table 7**.

Table 7. Macroinvertebrate identification and Q values

Taxa	SW1	SW2	SW3
Group A			
None recorded			
GROUP B			
Glossosomatidae		1	3
Limnephilidae	4		3
Seracostoma personatum	2	5	12
GROUP C			
Baetis rhodani			2
Rhyacophila dorsalis	1		
Hydropsyche siltalai		1	2
Elmis aenea		11	9
Limnius volkmari	3	2	1
Gammarus duebeni	2	7	8
Potamopyrgus jenkinsi	9	6	15
Ancylus fluviatilis		1	
Simuliidae		2	2
Chironomidae			1
GROUP D			
Lymnaeidae			1
Glossiphonia			2
Planorbiidae		1	
Group E			
Chironomous sp.			3
OTHER			
Oligochaeta	4	6	1
Q values	Q3	Q3	Q3

7. Discussion & Conclusions

Site 2 and 3 were considered suitable for kick sampling surveys, however site 1 is considered sub-optimal due to sluggish flows and a soft substrate. All three sites were assigned Q values of 3 with the most sensitive species (Group A) absent from all three sites. No sites achieved the target of good status (Q4) water quality, as specified under the Water Framework Directive (2000/60/EC).

Site 1 and 2 adjoin intensive grassland with cattle drinking points evident within this section of the watercourse. Site 3 adjoins wet grassland which is less intensively managed and diversity was generally higher at site 3.

The results from chemical analysis of water samples were not indicative of significant water quality impairment; however, it is noted that cattle drinking points have the potential to cause significant localised nutrient enrichment in small streams where dilution is limited. European Eel and Stickleback were noted within the watercourse which is considered highly unlikely, given its limited size, to support salmonids. No salmonids were recorded during the fish stock assessment in 2006.

8. References

Aquatic Services Unit (2007) Shannon LNG Terminal Environmental Impact Assessment Appendix 10D- Aquatic and Fisheries Survey.

Clabby, K.J., Lucey, J. and McGarrigle, M.L. (2001) Interim report on the Biological Survey of River Quality Results of the 2000 Investigations, Environmental Protection Agency, Wexford.

Edington J.M. & A.G. Hildrew (1995) A Revised Key to the Caseless Caddis Larvae of the British Isles, with Notes on their Ecology 1995, 134pp.

Hynes H.B.N. (1977) A Key to the Adults and Nymphs of the British Stoneflies (Plecoptera), with Notes on their Ecology and Distribution. Third edition, 1977 (reprinted 1993).

Fitter, R. and Manuel, R. (1986) Collins Field Guide to Freshwater Life. Collins. London.

Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. Water Quality in Ireland 2001-2003. (2005). Environmental Protection Agency, Wexford.

Wallace, I.D., B. Wallace & G.N. Philipson (2003) Keys to the Case-bearing Caddis Larvae of Britain and Ireland 2003.