

Water Chemistry Group
Water Management Unit



Our reference: **DAERA/22-78**

[REDACTED]
[REDACTED]

Water Management Unit
17 Antrim Road
Lisburn
BT28 3AL

Email: WMU.FOI@daera-ni.gov.uk

21 March 2022

Dear [REDACTED]

Environmental Information Regulations 2004

I refer to your request for information about AMR/Antibiotics environmental testing in Northern Ireland received by the Department on 28 February 2022.

I can advise that the Department has completed its search and can confirm that it holds the information outlined below:

Please supply details of all testing (sampling) of Northern Ireland's waterways / aquatic environments / other environments e.g. farm waste or slurry that has taken place since 2015 looking at antibiotic resistant bacteria and/or antibiotic residues. For example the NIEA Antimicrobial Baseline study(s) and the DAERA Marine Assessment Team studies carried out by Queens University?

A baseline study of the occurrence of antibiotics in the aquatic environment in Northern Ireland commenced in the summer of 2019. This survey targeted selected Waste Water Treatment Works (WWTW) outfalls spanning a range of Population Equivalents (PE) and associated receiving waters, downstream of a number of pig and poultry farms and farms to which pig and poultry litter had been exported, downstream of several fish farms and a number of consented discharges from care homes. It was intended that this survey be replicated during the winter months of 2020, specifically targeting the period towards the end of the first quarter, however this study had to be abandoned as a result of the Covid-19 pandemic.

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A total of 35 antibiotics were tested:

Ampicillin	Chlortetracycline	Erythromycin	Rifaximin	Sulfamethazine
Azithromycin	Ciprofloxacin	Josamycin	Roxithromycin	Tetracycline
Cefapirin	Clarithromycin	Lincomycin	Spectinomycin	Tilmicosin
Cefazolin	Cloxacillin	Marbofloxacin	Spiramycin I	Trimethoprim
Cefoperazone	Demeclocycline	Minocyclin	Sulfamerazine	Tylosin
Cefotaxime	Dicloxacillin	Nafcillin	Sulfamethoxazole	Virginiamycin M1
Ceftiofur	Doxycycline	Oxacillin	Sulfanilamide	Penicillin G

8 of the 35 antibiotics screened were detected in WWTWs outfalls, see table below:

WWTW & rec. water	Antibiotic (Results ug/l)							
	Azithromycin	Clarithromycin	Erythromycin	Sulfamethoxazole	Trimethoprim	Tilmicosin	Roxithromycin	Lincomycin
Belfast [discharge to sea]	0.023	0.069		0.054	0.51	11.0		
Lisburn	0.013	0.049		0.013	0.25			
F10519	0.0006	0.01			0.022			
Dunmurry	0.0025	0.064		0.042	0.20			
F10512	0.0005	0.015			0.032			
Newtownbr eda	0.02	1.9		0.034	0.25			
F10511	0.001	0.023			0.043			
Omagh	0.034	0.21	0.59	0.081	0.43			
F10087	0.0005	0.0088			0.008			
Enniskillen	0.039	0.33	0.34	0.12	0.38		0.0075	
F10688		0.001						
Coalisland	0.006	0.20	0.15	0.024	0.17			
F11540	0.0002	0.016			0.01			0.006
Banbridge	0.004	0.16		0.086	0.24			
F10273		0.008			0.013			
Cookstown	0.027	0.081		0.091	0.14			
F11451		0.008			0.01			
Downpatrick	0.018	0.33	0.30	0.077	0.29			
F10541	0.004	0.022			0.017			
Magherafelt	0.019	0.34		0.10	0.20			
F10380	0.0004	0.016		0.0082	0.008			
Armagh	0.023	0.061		0.084	0.40			
F10343		0.012		0.0093	0.03			
Glenstall	0.062	0.59	0.95	0.067	0.48			
F10427		0.002						
PNEC-ENV	0.02	0.08	0.50	0.60	100	NA	NA	1.8
PNEC-MIC	0.25	0.25	1.0	16.0	0.50	NA	1.0	2.0
F10020 River Control No detections against 34 screened antibiotics								

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The locations of downstream sample sites, all of which were approximately 2km or more downstream of the associated WWTW, are identified in the table below as indeed is the Population Equivalent (PE) of each of each of the works sampled:

Works	Downstream Site	PE
Belfast	No Downstream Site - discharges to the sea	circa 365,000
Lisburn	F10519 Lagan at Wolfendens Bridge	circa 69,750
Dunmurry	F10512 Lagan at Shaws Bridge	circa 46,250
Newtownbreda	F10511 Lagan above Stranmillis Weir	circa 34,500
Omagh	F10087 Strule R at Stone Bridge	circa 33,250
Enniskillen	Disc to Lough Erne - west of F10668 at Portora	circa 24,750
Coalisland	F11450 Tall River at Moor Bridge	circa 10,250
Banbridge	F10273 Upper Bann at Lawrencetown	circa 22,750
Cookstown	F11451 Ballinderry River at Ardtrea Bridge	circa 19,750
Downpatrick	F10541 Quoile River at Quoile Bridge	circa 17,750
Magherafelt	F10380 Moyola River at Moyola New Bridge	circa 17,000
Armagh	F10343 Callan River	circa 18,000
Glenstall	F10427 Lower Bann at the Cutts	circa 21,000

Data for water bodies proximal to a number of pig and poultry farms and farms to which pig and poultry manure had been exported, downstream of a number of fish farms and from septic tank discharges from 2 care homes is recorded in the tables below which list positive detections:

All results are in µg/l

Downstream of Pig Farms and Farms Importing Pig Manure:

Location	Azithromycin	Clarithromycin	Lincomycin	Sulfamethazine	Trimethoprim
Dibney River A		0.0017	0.013		
Dibney River B		0.0016	0.01		
Cor River		0.0065			
Cloughmills River					0.0021
River Lagan		0.0022			
Lough-a-Hache River		0.0009			
Creve/Hollybrook River		0.0007			

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Downstream of Poultry Farms and Farms Importing Poultry Manure:

Location	Azithromycin	Clarithromycin	Lincomycin	Sulfamethazine	Trimethoprim
River Blackwater		0.0022			
Colebrooke River	0.0002	0.0013			
Lough-a-Hache River		0.001			
Boveagh River		0.0008			
Aghadowey River		0.001	0.0058	0.0099	

Downstream of Fish Farms:

Location	Azithromycin	Clarithromycin	Lincomycin	Sulfamethazine	Trimethoprim
River Bush		0.0012			0.003
Strule River		0.0058			0.004
Lower River Bann		0.001			
Ballinderry River A		0.0017			
Ballinderry River B		0.0014			

Care Home Discharges:

Location	Azithromycin	Clarithromycin	Lincomycin	Sulfamethazine	Trimethoprim
Care Home A		0.083			1.3
Care Home B		0.013			0.95

PNECs:

PNEC	Azithromycin	Clarithromycin	Lincomycin	Sulfamethazine	Trimethoprim
PNEC-ENV*	0.02	0.08	1.8	N/A	100.0
PNEC-MIC**	0.25	0.25	2.0	N/A	0.5

PNECs Predicted No Effect Concentration values sourced from the AMR Industry Alliance (discharge targets) September 2018.

PNEC-ENV: Predicted No Effect Concentration (Environmental)

PNEC-MIC: Predicted No Effect Concentration (AMR)

Initial Observations

Azithromycin, Clarithromycin, Sulfamethoxazole and Trimethoprim were detected in all of the WWTWs outfalls and in a number of the receiving water sites sampled. Although there was a number of breaches of PNECs for Azithromycin and Clarithromycin in the outfalls there were no failures in the receiving waters.

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Clarithromycin was also detected in all but one of the sample stations located downstream of Pig and Poultry farms and farms to which this type of manure had been exported, although in all cases at concentrations well below PNEC-ENV and PNEC-MIC.

Clarithromycin was detected downstream of all of the fish farms included in this study, once again at concentrations below PNEC values.

Azithromycin, Lincomycin, Sulfamethazine and Trimethoprim were also detected at some of these sample stations, again at concentrations well below PNECs. Clarithromycin and Trimethoprim were detected in the discharges from both care homes. Although the concentrations of Clarithromycin detected were higher, as might be expected in a discharge, they were nevertheless at or below PNEC values. The concentrations of Trimethoprim detected were well below the PNEC-ENV value but exceeded PNEC-MIC. It's important to note however that these discharges will have been diluted by the receiving water thereby alleviating this condition.

During this initial baseline survey a number of bathing water sites and rivers feeding these sites were also analysed for the presence of antibiotic residues:

All results are in µg/l				
Location	Clarithromycin	Lincomycin	Penicillin G	Virginiamycin M1
Waterfoot				
Waterfoot River				
Browns Bay				
Browns Bay River			0.33	0.003
Carnlough				
Carnlough River 1				
Carnlough River 2				
Portrush Curran				
Portrush Curran River	0.001	0.002		
Newcastle				
Newcastle River	0.001			

PNEC	Clarithromycin	Lincomycin	Penicillin G	Virginiamycin M1
PNEC-ENV*	0.08	1.8	N/A	N/A
PNEC-MIC**	0.25	2	0.25	2

As can be seen from the above table only one PNEC value was breached, Penicillin G in the Brown's Bay River Sample.

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As this survey was essentially conducted in the marine environment the DAERA Marine Assessment Team (MAT) completed a small scale investigation of the presence of AMR bacteria at a number of sites. *Escherichia coli* was isolated from water samples and tested for resistance to Amoxicillin, Ciprofloxacin and Tetracycline using disk diffusion. The results of this survey are contained in the EXCEL workbook included as an appendix to this response. Further work was curtailed as a result of the pandemic.

In a previous FOI response (REF: DAERA/2019-0376) in relation to one of the above studies, it was disclosed that "*Belfast WWTW had a significant concentration detection for Tilmicosin, AB intended for veterinary use only, at 11ug/l concentration detected at over 11 times the concentration of next highest concentration for an AB (Erythromycin 0.95ug/l)*"

I am interested in what was done - if anything - to ascertain the source of these veterinary only antibiotics following this discovery, and what investigations followed?

As mentioned above further investigation of the occurrence of antibiotic residues in the aquatic environment were curtailed by the pandemic. This situation was compounded by the fact that when staff returned to the Lisburn labs the primary instrument employed for this type of analysis, an accurate mass liquid chromatographic time of flight mass spectrometer, became unserviceable as a result of age. Funding was subsequently sought for a new, more capable replacement and a lengthy tendering process completed. This system is now in place, however the method of analysis must be redeveloped for use with this new instrumentation and subsequently revalidated. Given the complexity of both the instrumentation and the method of analysis this process of redevelopment and revalidation will take time to complete.

It is hoped that this new, more capable, method of analysis will be available towards the end of 2022, resources permitting. If so this will enable survey work to be restarted and further investigation into the Tilmicosin detection to be undertaken.

If you require any clarification, believe that any part of your request has been overlooked, misunderstood or misinterpreted, please contact me in the first instance to see if it is a matter that can be resolved.

If you are unhappy with the manner in which your request for information has been handled or the decision to release/withhold information, you have the right to request a formal review by the Department. If you wish to do so, please contact The Review Section either by e-mailing daera.informationmanager@daera-ni.gov.uk or by post at The Department of Agriculture, Environment and Rural Affairs, Data Protection & Information Management Branch, Floor 2, Ballykelly House, 111 Ballykelly Road, Ballykelly, Limavady BT49 9HP, within two months from the date of this letter.

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If after such an internal review you are still unhappy with the response, you have the right to appeal to the Information Commissioner at Wycliffe House, Water Lane, Wilmslow, CHESHIRE, SK9 5AF, who will undertake an independent review of the Department's decision.

Yours sincerely,

[Redacted signature]

[Redacted name]

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