

FOI Disclosure Log

Below are some examples of Freedom of Information (FOI) and Environmental Information Regulation (EIR) requests of wider public interest that NI Water has released.

Example Requests
01 April 2013 – 31 March 2014

Reference – 1314043

Request Type – Water Quality

Applicant Type – Researcher

Query –

I am working on my Ph.D. thesis at Queens University Belfast (I did my experimental work there in 2004-2006. I am now in the USA working and trying to finish my thesis.). My research involves determining how long zero-valent iron permeable reactive barriers last under different chemical regimes. Many of my experiments utilized tap water at QUB. I was wondering if you had any chemistry data for this tap water. I am mostly interested in the major cations and anions. Any help you can provide will be greatly appreciated.

Release date – 10 May 2013

Response –

Annex A (attached) is the 2012 Water Quality Report for the ZS0105 Dunore Breda South water supply zone, which serves Queen's.

NI Water does not test for Magnesium. The Company's analysis measures the total hardness of the supply (Calcium and Magnesium), and there is no way to differentiate. Of the two minerals, water hardness is due mainly to the presence of Calcium compounds, and so this is the given parameter, i.e. mg/l Ca.

Similarly, NI Water's regulatory sampling does not include any test for Bicarbonate or Carbonate. However, estimated average Carbonate/alkalinity level of 110-120 mg/l HCO₃ or 119 mg/l CaCO₃ has been provided by an experienced member of staff.

The pH level of the water is visible under Hydrogen Ion on the attached. For ease of reference, the mean Sodium result for 2012 was 16.098 mg/l Na, Chloride was 8.794 mg/l Cl and Sulphate was 13.700 mg/l SO₄.

As detailed above, NI Water is required to test for specific chemicals and those are listed in the attached. However, Potassium is not included. A specific test for Potassium would need to be carried out upon request for that supply area in order to

supply you with that information. It is hoped, however, that the attached report serves your purposes.

WATER SUPPLY ZONE - ZS0105 - Dunore Breda South

Printed On 22-MAR-2013 : NI Water : Period 01-JAN-2012 to 31-DEC-2012 incl.

Parameter	U/A & Freq.	No. of samples planned per annum	No. of samples taken in year	PCV	No. Of samples		Concentration or value (all samples)			
					Auth Dep	ing PCV	% of samples	ing PCV	Min.	Mean
1,2 Dichloroethane	ug/l	S	8	8		0	0.000	< 0.100	< 0.100	< 0.100
2,4-D	ug/l	AS	48	48		0	0.000	0.000	< 0.007	< 0.025
2,4-DB	ug/l	AS	48	48		0	0.000	0.000	< 0.008	< 0.025
Aldrin	ug/l	AS	48	48		0	0.000	< 0.001	< 0.002	< 0.003
Aluminium	ug Al/l	S	52	52		1	1.923	< 1.000	< 38.997	397.500
Ammonium	mg NH4/l	S	52	52		0	0.000	0.006	0.012	0.057
Antimony	ug/l Sb	S	8	8		0	0.000	< 0.010	< 0.107	0.190
Arsenic	ug/l As	S	8	8		0	0.000	0.265	0.337	0.500
Asulam	ug/l	AS	48	48		0	0.000	< 0.003	< 0.006	< 0.025
Bentazone	ug/l	AS	48	48		0	0.000	< 0.002	< 0.005	< 0.010
Benzene	ug/l	S	8	8		0	0.000	< 0.020	< 0.020	< 0.020
Benzo(a)pyrene	ug/l	S	8	8		0	0.000	< 0.001	< 0.001	< 0.001
Boron	mg/l B	S	8	8		0	0.000	0.002	0.018	0.033
Bromate	ug/l	S	8	8		0	0.000	< 0.300	< 0.720	1.700
Bromoxynil	ug/l	AS	48	48		0	0.000	< 0.003	< 0.005	< 0.020
Cadmium	ug/l Cd	S	8	8		0	0.000	< 0.010	< 0.024	0.058
Carbendazim	ug/l	AS	48	48		0	0.000	< 0.001	< 0.003	< 0.010
Chloride	mg Cl/l	AS	24	24		0	0.000	7.479	8.794	10.789
Chlorothalonil	ug/l	AS	48	48		0	0.000	< 0.001	< 0.004	< 0.006
Chlorotoluron	ug/l	AS	48	48		0	0.000	< 0.002	< 0.003	< 0.004
Chlorpyrifos	ug/l	AS	48	48		0	0.000	< 0.003	< 0.006	< 0.015
Chromium	ug/l Cr	S	8	8		0	0.000	0.226	0.377	0.550
Clopyralid	ug/l	AS	48	48		0	0.000	< 0.004	< 0.012	< 0.040
Clostridium perfringens (sulph red)	No./100 ml	AS	1095	1095		3	0.273	0.000	0.003	1.000
Colony Counts 22	No./1 ml	S	52	52		0	0.000	0.000	> 10.577	>300.000
Colony Counts 37 (48hrs)	No./1 ml	S	52	52		0	0.000	0.000	2.827	93.000
Colour	mg/l Pt/Co	S	52	52		0	0.000	0.510	1.647	3.260
Conductivity	uS/cm 20 C	AS	365	365		0	0.000	62.000	76.555	94.000
Copper	mg Cu/l	S	8	8		0	0.000	< 0.001	< 0.010	0.048
Cyanide	ug/l	AS	48	48		0	0.000	< 0.200	< 1.608	2.600
Cypermethrin	ug/l	AS	48	48		0	0.000	< 0.001	< 0.005	< 0.009
Dicamba	ug/l	AS	48	48		0	0.000	< 0.004	< 0.008	< 0.040
Dichlobenil	ug/l	AS	48	48		0	0.000	< 0.000	< 0.004	< 0.007
Dichlorprop	ug/l	AS	48	48		0	0.000	< 0.001	< 0.005	< 0.020
Dieldrin	ug/l	AS	48	48		0	0.000	< 0.002	< 0.002	< 0.002
E. coli	No./100 ml	S	132	132		0	0.000	0.000	0.000	0.000
Enterococci	No./100ml	S	8	8		0	0.000	0.000	0.000	0.000
Epoxiconazole	ug/l	AS	48	48		0	0.000	< 0.002	< 0.008	0.016
Fenpropimorph	ug/l	AS	48	48		0	0.000	< 0.002	< 0.004	< 0.020
Fluoride	mg F/l	AS	24	24		0	0.000	0.066	0.098	0.198
Fluroxypyr	ug/l	AS	48	48		0	0.000	< 0.006	< 0.011	< 0.030
Free - Residual disinfectant	mg Cl/l	S	132	132		0	0.000	0.020	0.226	0.640
Glyphosate	ug/l	AS	48	48		0	0.000	< 0.002	< 0.006	0.023
Heptachlor	ug/l	AS	48	48		0	0.000	< 0.001	< 0.002	< 0.002
Heptachlor epoxide	ug/l	AS	48	48		0	0.000	< 0.002	< 0.002	< 0.002
Hexachlorobenzene	ug/l	AS	48	48		0	0.000	< 0.001	< 0.003	< 0.005
Hydrogen Ion	pH value	S	52	52		0	0.000	7.100	7.459	7.770
Iron	ug Fe/l	S	52	52		0	0.000	1.703	21.196	179.000
Isoproturon	ug/l	AS	48	48		0	0.000	< 0.002	< 0.003	0.007
Lead	ug Pb/l	S	8	8		0	0.000	0.217	2.189	9.448
Linuron	ug/l	AS	48	48		0	0.000	< 0.003	< 0.005	< 0.006
MCPA	ug/l	AS	48	48		0	0.000	< 0.004	< 0.014	0.062
Manganese	ug Mn/l	S	52	52		0	0.000	0.054	1.792	16.250
Mecoprop	ug/l	AS	48	48		0	0.000	0.004	< 0.012	< 0.018
Mercury	ug/l Hg	S	8	8		0	0.000	0.006	0.014	0.040
Metalaxyl	ug/l	AS	48	48		0	0.000	< 0.002	< 0.004	0.005
Metoxuron	ug/l	AS	48	48		0	0.000	< 0.002	< 0.004	< 0.006
Nickel	ug/l Ni	S	8	8		0	0.000	0.188	1.122	1.763
Nitrate	mg NO3/l	S	8	8		0	0.000	0.117	1.720	4.453
Nitrite	mg NO2/l	S	8	8		0	0.000	0.007	0.013	0.031
Odour	Diln No	S	52	53		0	0.000	0.000	0.000	0.000
PAH - Sum of four substances	ug/l	S	8	8		0	0.000	< 0.010	< 0.010	< 0.010
Pendimethalin	ug/l	AS	48	48		0	0.000	< 0.002	< 0.004	< 0.006

WATER SUPPLY ZONE - ZS0105 - Dunore Breda South

Printed On 22-MAR-2013 : NI Water : Period 01-JAN-2012 to 31-DEC-2012 incl.

Parameter	U/A & Freq.	No. of samples planned per annum	No. of samples taken in year	PCV	No. Of samples contravening PCV	% of samples contravening PCV	Concentration or value (all samples)		
							Auth	Min.	Mean
Pesticides - Total Substances	ug/l	AS	48	48	0	0.000	< 0.050	< 0.052	0.080
Phorate	ug/l	AS	48	48	0	0.000	< 0.001	< 0.005	< 0.009
Pirimicarb	ug/l	AS	48	48	0	0.000	< 0.002	< 0.004	< 0.020
Prometryn	ug/l	AS	48	48	0	0.000	< 0.002	< 0.004	< 0.010
Propachlor	ug/l	AS	48	48	0	0.000	< 0.002	< 0.004	< 0.005
Propiconazole	ug/l	AS	48	48	0	0.000	< 0.002	< 0.006	< 0.010
Propyzamide	ug/l	AS	48	48	0	0.000	< 0.002	< 0.006	< 0.010
Prothioconazole	ug/l	AS	48	48	0	0.000	< 0.002	< 0.007	< 0.009
Selenium	ug/l Se	S	8	8	0	0.000	0.186	0.271	0.583
Simazine	ug/l	AS	48	48	0	0.000	< 0.002	< 0.005	< 0.007
Sodium	mg Na/l	S	8	8	0	0.000	5.545	16.098	20.181
Sulphate	mg SO4/l	AS	24	24	0	0.000	2.906	13.700	18.014
Taste	Diln No	S	52	52	0	0.000	0.000	0.000	0.000
Tebuconazole	ug/l	AS	48	48	0	0.000	< 0.002	< 0.008	< 0.015
Tetrachloroethene/Trichloroethene - S	ug/l	S	8	8	0	0.000	< 0.200	< 0.200	< 0.200
Tetrachloromethane	ug/l	S	8	8	0	0.000	< 0.100	< 0.100	< 0.100
Total - Residual disinfectant	mg Cl/l	S	132	132	0	0.000	0.080	0.316	0.870
Total Indicative Dose	mSv/year	AS	2	2	0	0.000	< 0.100	< 0.100	< 0.100
Total Organic Carbon	mg C/l	AS	24	24	0	0.000	0.797	1.175	1.530
Total Trihalomethanes	ug/l	S	8	8	0	0.000	36.457	58.630	91.583
Total coliforms	No./100 ml	S	132	132	5	3.817	0.000	0.275	30.000
Triclopyr	ug/l	AS	48	48	0	0.000	< 0.003	< 0.008	< 0.025
Trifluralin	ug/l	AS	48	48	0	0.000	< 0.001	< 0.004	< 0.008
Tritium	Bq/l	AS	2	2	0	0.000	< 5.000	< 5.000	< 5.000
Turbidity	NTU	S	52	52	0	0.000	0.150	0.375	0.710

Commentary on Water Quality:

A: Supply point authorisation for pesticides and related products.

Population of zone = 55363

This zone has a surface water source :R3301

PCV Exceedances:

Sample failed 06-FEB-2012 (ZS0105AE) Aluminium = 398 ug Al/.
 Sample failed 22-MAR-2012 (W3301POUT) Clostridium perfringens (sulph red) = 1.00 No./1.
 Sample failed 13-MAR-2012 (W3801OUT) Clostridium perfringens (sulph red) = 1.00 No./1.
 Sample failed 19-JUL-2012 (W3801OUT) Clostridium perfringens (sulph red) = 1.00 No./1.
 Sample failed 17-AUG-2012 (ZS0105AE) Total coliforms = 30 No./100.
 Sample failed 03-SEP-2012 (ZS0105AE) Total coliforms = 1 No./100.
 Sample failed 13-SEP-2012 (ZS0105AE) Total coliforms = 1 No./100.
 Sample failed 19-SEP-2012 (ZS0105AE) Total coliforms = 1 No./100.
 Sample failed 25-OCT-2012 (ZS0105AE) Total coliforms = 3 No./100.

Notes:

PCV = Prescribed Concentration or Value

U = Undertaking

S = Standard Sampling Frequency

R = Reduced Sampling Frequency

A = Authorised Supply Point

Reference – 1314116

Request Type – Energy Generation

Applicant Type – Member of the public

Query –

Could you please supply me with details of all on-site energy generation at each of the sites within your organisation. This information would normally be held by your Estates/Facilities department but may be held elsewhere.

Please include the following details in a spreadsheet format:

1. A list of your organisation's sites/locations that have on-site generation.
2. State the type of generation at each site (or sub parts of the site if multiple generation at that site).
3. The nature of generation (e.g. Primary power source, stand-by generation, etc...).
4. The KW size of the installed generation.
5. The fuel source of the generation.

Release date – 30 August 2013

Response –

Annex A (attached) is a spreadsheet providing the list of NI Water's fixed generators and water turbines, along with the further pieces of information you had requested.

For your ease of reference, I have included a glossary of the abbreviations used in the names of the sites listed.

STW = Sewage Treatment Works

WWTW = Wastewater Treatment Works

WTW = Water Treatment Works

WPS = Water Pumping Station

WWPS = Wastewater Pumping Station

SR = Service Reservoir

BW = Bore Well

BPT = Break Pressure Tank

Annex A

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Aghagallon STW	WWTW	150		Standby Generation	Diesel
Aghalee STW	WWTW	150		Standby Generation	Diesel
Aghanaloo	WWTW	27		Standby Generation	Diesel
Alcrossagh	WTW	150		Standby Generation	Diesel
Altmore	WPS	200		Standby Generation	Diesel
Altmore	WTW	37.5		Standby Generation	Diesel
Altnagelvin Office	Depot	22		Standby Generation	Diesel
Altnahinch	WTW	200		Standby Generation / Electricity Grid AGU	Diesel
Annahilt	WWTW	180		Standby Generation	Diesel
Annesbrough WWTW	WWTW	350		Standby Generation	Diesel
Armagh	WWTW	200		Standby Generation	Diesel
Armoy	WWTW	100		Standby Generation	Diesel
Aughnacloy	WWTW	100		Standby Generation	Diesel
Avish	WPS	250		Standby Generation	Diesel
Balinliss WPS	WPS	60		Standby Generation	Diesel
Ballinamallard	WWTW	75		Standby Generation	Diesel
Ballinderry Upper	WWTW	45		Standby Generation	Diesel
Ballybarnes	Wps	200		Standby Generation	Diesel
Ballybrakes	WWPS	110		Standby Generation	Diesel
Ballycastle	WWPS	200		Standby Generation	Diesel
Ballyclare	WwTW	1000		Standby Generation	Diesel
Ballycullen High SR	SR	150		Standby Generation	Diesel
Ballyeaston	WWPS	40		Standby Generation	Diesel
Ballygomartin	SR	170		Standby Generation	Diesel
Ballyhandwood	SR	37.5		Standby Generation	Diesel
Ballyhome South	WPS	27		Standby Generation	Diesel
Ballykeel	Depot	100		Standby Generation	Diesel
Ballykelly	WWTW	135		Standby Generation	Diesel
Ballykine Lodge PS	WPS	75		Standby Generation	Diesel
Ballykine Off Take	OFF TAKE	16		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Ballymonie	WWTW	60		Standby Generation	Diesel
Ballynagard	WPS	250		Standby Generation	Diesel
Ballyregan	SR	150		Standby Generation	Diesel
Ballyrogan	Wps	150		Standby Generation	Diesel
Ballyveagh SR	SR	60		Standby Generation	Diesel
Ballywonard	WTW	250		Standby Generation	Diesel
Belfast 1	WWTW	1500		Standby Generation	Diesel
Belfast 2	WWTW	1500		Standby Generation	Diesel
Bellaghy No.3	BW	135		Standby Generation	Diesel
Belleek	WTW	150		Standby Generation	Diesel
Blackrock	WWPS	550		Standby Generation	Diesel
Blackrock	WWPS	85		Standby Generation	Diesel
Breda	SR	120	Francis	Renewable Generation to Grid	Potable water
Breda	SR	82.5		Standby Generation	Diesel
Bretland House	Depot	200		Standby Generation	Diesel
Bridge Street SPS	WWPS	450		Standby Generation	Diesel
Buckna	WPS	250		Standby Generation	Diesel
Burren River Wwps	WWPS	200		Standby Generation	Diesel
Bushmills	WWTW	250		Standby Generation	Diesel
Caledon	WWTW	80		Standby Generation	Diesel
Camlough WTW	WTW	500		Standby Generation	Diesel
Carland	SR	450		Standby Generation	Diesel
Carmoney	WTW	1320		Standby Generation / Electricity Grid AGU	Diesel
Carnbane Depot, Newry	DEPOT	110		Standby Generation	Diesel
Carnlough	WWPS	350		Standby Generation	Diesel
Carran Hill WTW New	WTW	400		Standby Generation	Diesel
Carran Hill WTW Old	WTW	60		Standby Generation	Diesel
Carrickfergus	WWTW	1250		Standby Generation	Diesel
Casheltown	SR	27		Standby Generation	Diesel
Castleberg	WWTW	200		Standby Generation	Diesel
Caugh Hill	WTW	500		Standby Generation	Diesel
Causeway Street	WWPS	150		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Church Street	WWPS	200		Standby Generation	Diesel
Clabby	WWTW	40		Standby Generation	Diesel
Claudy	WWTW	350		Standby Generation	Diesel
Clay Lake WTW	WTW	350		Standby Generation	Diesel
Clogher	WWTW	60		Standby Generation	Diesel
Cloughmills	WWTW	100		Standby Generation	Diesel
Clunto Richardson	WwTW	93.5		Standby Generation	Diesel
Coleraine Terminal	WWPS	1000		Standby Generation	Diesel
Comber Road	WWPS	400		Standby Generation	Diesel
Comber Road (Newtownards)	WWPS	500		Standby Generation	Diesel
Conlig (NEW)	Wtw	105		Standby Generation	Diesel
Cookstown	WWTW	1250		Standby Generation	Diesel
Corvanaghan	WPS	40		Standby Generation	Diesel
Cranfield STW	WWTW	85		Standby Generation	Diesel
Creagh	WWTW	160		Standby Generation	Diesel
Crocknafiola WPS	WPS	40		Standby Generation	Diesel
Cromkill	WWPS	135		Standby Generation	Diesel
Crossgar / Kilmore WWTW	WWTW	300		Standby Generation	Diesel
Crosskeenan	SR			Standby Generation	Diesel
Crumlin Town Wwps	WWPS	135		Standby Generation	Diesel
Cullybackey	WWPS	100		Standby Generation	Diesel
Cullyhanna WPS	WPS	100		Standby Generation	Diesel
Culmore	WWTW	1650		Standby Generation	Diesel
Cushendall	WwTW	300		Standby Generation	Diesel
Cushendun	WwTW	100		Standby Generation	Diesel
Derg	WTW	1750		Standby Generation / Electricity Grid AGU	Diesel
Derg Inlet	WTW	505		Standby Generation / Electricity Grid AGU	Diesel
Dervock	WwTW	100		Standby Generation	Diesel
Devenagh Burn	WWPS	165		Standby Generation	Diesel
Dhuvarren	WWTW	650		Standby Generation	Diesel
Doagh	WWPS	55		Standby Generation	Diesel
Dorisland	WTW	1000		Standby Generation / Electricity Grid AGU	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Downpatrick WWTW	WWTW	730		Standby Generation	Diesel
Downshire Road SPS	WWPS	230		Standby Generation	Diesel
Draperstown	WWTW	150		Standby Generation	Diesel
Dromara WWTW	WWTW	200		Standby Generation	Diesel
Dromore WWTW	WWTW	700		Standby Generation	Diesel
Drumahoe	WWPS	150		Standby Generation	Diesel
Drumaness	WWTW	150		Standby Generation	Diesel
Drummullan	WWTW	50		Standby Generation	Diesel
Dublin Road	WWPS			Standby Generation	Diesel
Dunaghy	WPS	12.5		Standby Generation	Diesel
Dundrum	WWTW	200		Standby Generation	Diesel
Dungonnell	WTW	300		Standby Generation / Electricity Grid AGU	Diesel
Dunloy	WWTW	125		Standby Generation	Diesel
Dunmore BPT	BPT	100		Standby Generation	Diesel
Dunmurry	WWTW	505		Standby Generation	Diesel
Faughan	WPS	1600		Standby Generation	Diesel
Fivemiletown	WWTW	75		Standby Generation	Diesel
Fofanny New WTW (NEW)	WTW	80	Turgo	Renewable Generation to Grid	Raw Water
Fofanny New WTW (NEW)	WTW	1000		Standby Generation	Diesel
Fofanny New WTW (NEW)	WTW	40		Standby Generation	Diesel
Fofannybane WTW (OLD)	WTW	165		Standby Generation	Diesel
Galgorm	WWPS	125		Standby Generation	Diesel
Garvagh	WWTW	100		Standby Generation	Diesel
Glarryford	WPS	400		Standby Generation	Diesel
Glenavey STW	WWTW	300		Standby Generation	Diesel
Glenhordial	WTW	410		Standby Generation	Diesel
Glenshane (Knocklochrim)	WPS	150		Standby Generation	Diesel
Glenstall	WWTW	440		Standby Generation	Diesel
Glynn	WWPS	40		Standby Generation	Diesel
Golf Links	WWPS	30		Standby Generation	Diesel
Gotreagh	WPS	110		Standby Generation	Diesel
Gransha	WWPS	300		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Greyabbey	WWTW	200		Standby Generation	Diesel
Greysteel	WWTW	90		Standby Generation	Diesel
Haniltonsbawn WWTW	WWTW	180		Standby Generation	Diesel
Hugenot Drive Wwps	WWPS	500		Standby Generation	Diesel
Huntley STW	WWTW	800		Standby Generation / Electricity Grid AGU	Diesel
Hydepark 1	SR	800		Standby Generation	Diesel
Hydepark 2	SR	183		Standby Generation	Diesel
Irvinestown	WwTW	350		Standby Generation	Diesel
Kells (Greenfield Road)	WWPS	160		Standby Generation	Diesel
Kesh	WWTW	300		Standby Generation	Diesel
Kilkeel	WWTW	450		Standby Generation	Diesel
Killyhevlin	DEPOT	60		Standby Generation	Diesel
Killyhevlin	WTW	1500		Standby Generation / Electricity Grid AGU	Diesel
Killylane	WTW	300		Standby Generation	Diesel
Kiltinney	WTW	135		Standby Generation	Diesel
Kinallen STW	WWTW	75		Standby Generation	Diesel
Kircubbin	WWTW	200		Standby Generation	Diesel
Knockans	SR	17.5		Standby Generation	Diesel
Knocknagore WPS	WPS	200		Standby Generation	Diesel
Larne	WWTW	1250		Standby Generation	Diesel
Limavady	WWTW	600		Standby Generation	Diesel
Lisbellaw	WWTW	75		Standby Generation	Diesel
Lisnabreeny	SR	22		Standby Generation	Diesel
Lisnabreeny	Sr	22		Standby Generation	Diesel
Lisnabreeny	Wps	650		Standby Generation / Electricity Grid AGU	Diesel
Lisnaskea	WWTW	450		Standby Generation	Diesel
Loan Command	WPS	100		Standby Generation	Diesel
Lough Bradan	WTW	450		Standby Generation	Diesel
Lough Bradan Raw	WPS	200		Standby Generation	Diesel
Lough Fea	WTW	500		Standby Generation / Electricity Grid AGU	Diesel
Lough Ross	WPS	450		Standby Generation	Diesel
Loughans Hill	SR	10		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Loughmacrory	WTW	1000		Standby Generation / Electricity Grid AGU	Diesel
Lowtown	WWPS	40		Standby Generation	Diesel
Lylehill	WTW	160		Standby Generation	Diesel
Macosquin	WwTW	45		Standby Generation	Diesel
Magherafelt	Depot	50		Standby Generation	Diesel
Magherafelt (Killyneese)	WWTW	500		Standby Generation	Diesel
Magheramenagh Gardens	WWPS	38		Standby Generation	Diesel
Market Street	WWPS	200		Standby Generation	Diesel
Martinstown	WwTW	105		Standby Generation	Diesel
Milltown	WwTW	800		Standby Generation	Diesel
Mobile (Milewater Road)	WWTW	45		Standby Generation	Diesel
Moneymore(Riverbrook)	WWPS	40		Standby Generation	Diesel
Moneyreagh	WWTW	150		Standby Generation	Diesel
Mosside	WwTW	50		Standby Generation	Diesel
Mounthill	WwTW	30		Standby Generation	Diesel
MOY	WPS	600		Standby Generation	Diesel
Moygashel	WWTW	730		Standby Generation	Diesel
Muckamore	WWPS	160		Standby Generation	Diesel
Mullaghanagh	SR	160		Standby Generation	Diesel
Mullanahoe	WWTW	45		Standby Generation	Diesel
Murrayfield	WWPS	90		Standby Generation	Diesel
New Holland	WWTW	1000		Standby Generation / Electricity Grid AGU	Diesel
New Point	WWPS	900		Standby Generation	Diesel
Newcastle	WWTW	350		Standby Generation	Diesel
Newry St, Warrenpoint	WWPS	200		Standby Generation	Diesel
Newry STW	WWTW	1250		Standby Generation / Electricity Grid AGU	Diesel
Newry STW	WWTW	800		Standby Generation	Diesel
Newry West SR	SR	150		Standby Generation	Diesel
Newtownbreda	WWTW	1000		Standby Generation / Electricity Grid AGU	Diesel
Newtownstewart	WWTW	60		Standby Generation	Diesel
North Coast	WWPS	1250		Standby Generation	Diesel
North Road	SR	575		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Oak Park	WPS	100		Standby Generation	Diesel
Oaklands	WTW	49	Pelton	Renewable Generation to Grid	Raw Water
Oaklands	WTW	106		Standby Generation	Diesel
Omagh (Radio Room)	DEPOT	8		Standby Generation	Diesel
Omagh Inlet Hunter Crescent	WWPS	450		Standby Generation	Diesel
Omagh Mountjoy	WWTW	1250		Standby Generation	Diesel
Poleglass	SR	350		Standby Generation	Diesel
Pomeroy	WWTW	150		Standby Generation	Diesel
Portaferry Wwtw	WWTW	250		Standby Generation	Diesel
Portballintrae (Caravan Park)	WWPS	145		Standby Generation	Diesel
Portglenone	WwTW	250		Standby Generation	Diesel
Pump SP1 Mobile	PUMP	500		Standby Generation	Diesel
Pump SP2 Mobile	PUMP	500		Standby Generation	Diesel
Purdysburn	WTW	87		Standby Generation	Diesel
Purdysburn	Sr	90		Standby Generation	Diesel
Rashee	SR	375		Standby Generation	Diesel
Rathfriland STW	WWTW	300		Standby Generation	Diesel
Rathlin (duty)	BW	12.5		Standby Generation	Diesel
Ringneil Wwtw	WWTW	180		Standby Generation	Diesel
Riversdale	WWTW	1000		Standby Generation	Diesel
Riverside South	WWPS	250		Standby Generation	Diesel
Russell Quarter	Sr	8.5		Standby Generation	Diesel
Ryland Bridge	WPS	80		Standby Generation	Diesel
Scarva WPS	WPS	600		Standby Generation	Diesel
Seagahan WTW	WTW	450		Standby Generation	Diesel
Seagoe Depot	DEPOT	28		Standby Generation	Diesel
Shore Road Wwps	WWPS	135		Standby Generation	Diesel
Silent Valley	WPS	435	Francis	Renewable Generation to Grid	Raw Water
Silent Valley	WPS	100		Standby Generation	Diesel
Silverhill	WWTW	600		Standby Generation	Diesel
Sion Mills	WWTW	275		Standby Generation	Diesel
Slaght	WwTW	30		Standby Generation	Diesel

Set Name	Type	Output Kva	Turbine Type	PURPOSE	FUEL
Slimero	SR	16.5		Standby Generation	Diesel
Spencestown	WWTW	575		Standby Generation / Electricity Grid AGU	Diesel
Strabane	WWTW	800		Standby Generation / Electricity Grid AGU	Diesel
Stranocum	WwTW	50		Standby Generation	Diesel
Sugar Island	WWPS	350		Standby Generation	Diesel
Tandragee STW	WWTW	600		Standby Generation	Diesel
Templepatrick	WWPS	300		Standby Generation	Diesel
The Quays Wwps	WWPS	27		Standby Generation	Diesel
Tirgan	WPS	16		Standby Generation	Diesel
Toberdoney	WPS	200		Standby Generation	Diesel
Tobermore	WWPS	40		Standby Generation	Diesel
Tobermore	WWTW	60		Standby Generation	Diesel
Toome	WWPS	100		Standby Generation	Diesel
Tullyframe SR	SR	60		Standby Generation	Diesel
Tullygarley 1	WwTW	1000		Standby Generation / Electricity Grid AGU	Diesel
Tullygarley 2	WwTW	1000		Standby Generation / Electricity Grid AGU	Diesel
Tullyhappy Scanner	SCANNER	10		Standby Generation	Diesel
Upper Falls	WWTW	505		Standby Generation	Diesel
Victoria Market	WWPS	400		Standby Generation	Diesel
Waringstown STW	WWTW	250		Standby Generation	Diesel
Warrenpoint WWTW	WWTW	350		Standby Generation	Diesel
Waterfoot	WWPS	250		Standby Generation	Diesel
Westland House 1	SCANNER	60		Standby Generation	Diesel
Westland House 2	SR	1250		Standby Generation	Diesel
Westland House 3	Depot	250		Standby Generation	Diesel
Whiteabbey	WPS	300		Standby Generation	Diesel
Whitehouse	WWTW	1250		Standby Generation	Diesel

Reference – 1314134

Request Type – Infrastructure, Sites & Assets

Applicant Type – Researcher

Query –

i) How many service reservoirs does Northern Ireland Water have?

ii) How many strategic trunk mains does Northern Ireland Water have? (this means the major trunk mains from the source to treatment plants, pumping stations etc)

If you have time, it would be helpful to know how many WTPs and pumping stations there are too, but don't worry if not.

Release date – 30 August 2013

Response –

NI Water has responded to your three information requests listed below at Annex A (attached).

- (i) How many service reservoirs does NI Water have?
- (ii) How many strategic trunk mains does NI Water have?
- (iii) How many WTPs and pumping stations does NI Water have?

You will note that the number of service reservoirs is split into categories such as PPP (Public Private Partnership), and PFI (Private Finance Initiative).

In response to question (ii), NI Water does not hold a record of the number of mains, but retains details of the length of mains. This figure has therefore been given in the second table at Annex A. For question (iii), other abbreviations used are WTW (Water Treatment Works) and PS (Pumping Station).

	Total	Abandoned	In Service	Demolished	Out of service	Planned	Data Error
Service Reservoir	532	155	341	11	25	-	-
(PFI) Service Reservoir	2	1	1	-	-	-	-

Mains Type	Length (km)
Distribution	23,175.56
Trunk	2,328.42
Distribution Trunk	1,073.60

	Total	Abandoned	In Service	Demolished	Out of service	Planned	Data Error
WTW	70	47	19	4	-	-	-
Raw Water PS	27	14	13	-	-	1	-
Treated Water PS	476	102	351	4	17	1	1
(PPP) WTW	6	1	4	-	-	-	1
(PPP) Raw Water PS	3	-	3	-	-	-	-
(PPP) Treated Water PS	6	-	6	-	-	-	-
(PFI) Raw Water PS	3	-	3	-	-	-	-
(PFI) Treated Water PS	4	1	2	1	-	-	-
Unknown Raw Water PS	10	8	2	-	-	-	-

Reference – 1314267

Request Type – Procurement

Applicant Type – Business

Query –

I'm following up on the meeting that we had on the 11th June re the above project (I appreciate that you were not at that meeting XXX as you were sick however XXXX XXXXXX attended on behalf of NIW so he will hopefully be able to bring you up to speed).

At that meeting, all partners agreed to submit details of invasive species expenditure dating from June 2012 to the current date.

Can I request that you supply this information to us by FRIDAY 22ND NOVEMBER 2013.

Release date – 14 November 2013

Response –

I understand that you were advised on 6 November 2013 that the total spend on invasive species removal in the Mourne catchment during 2012-13 by NI Water was £47,072.

Reference – 1314268

Request Type – Water Composition or Quality

Applicant Type – Researcher

Query –

I am currently studying an applied science course at St. Patrick's college, Bearnageeha in collaboration with the University of Ulster. As part of my chemistry course I must find out about how aluminium sulphate is used in water treatment and also what effects it can have if it is used in excessive quantities or if there is not enough added. Also, what would the implications be if a batch of aluminium sulphate was to be leaked into a nearby river.

Release date – 14 November 2013

Response –

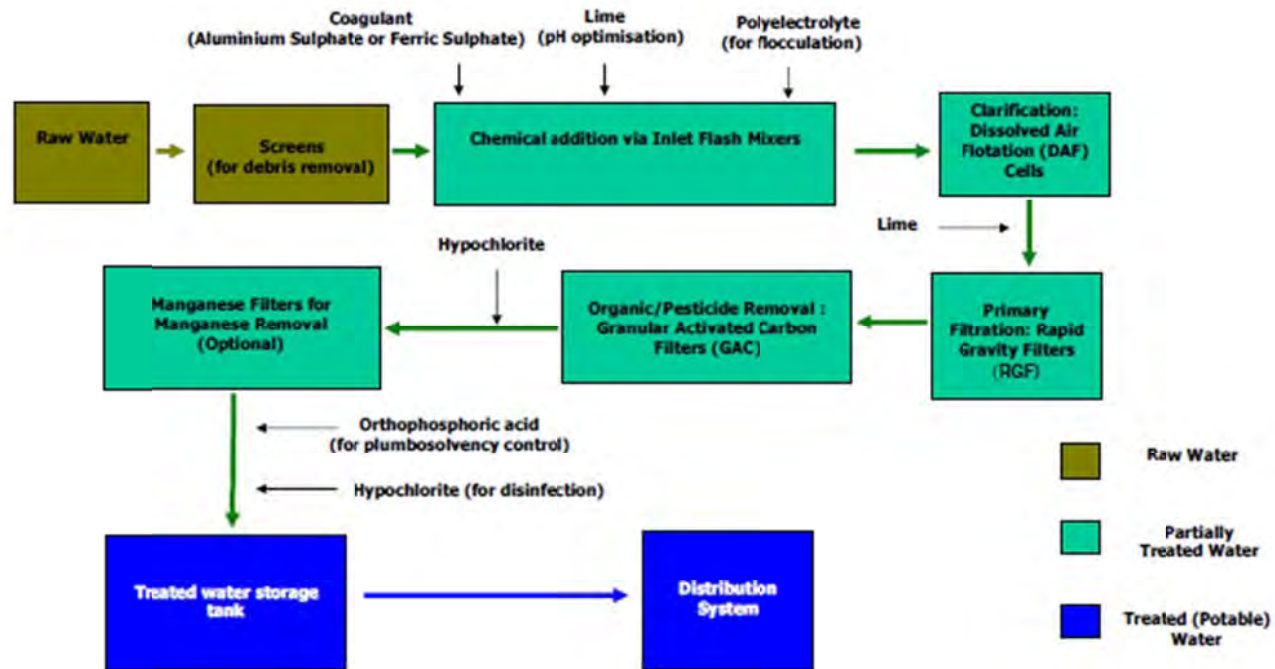
Annex A shows a typical water treatment process, where you will note Aluminium Sulphate is used as a flocculating agent. Other flocculating agents used by NI Water are Polyaluminium Chloride and Ferric Aluminium Sulphate.

The treatment processes within the Works are continuously monitored via Telemetry and there are specific 'alarms' associated with the chemical coagulation and other processes. In the case of 'contamination', there are set procedures that would ensure that final water quality was not compromised. In extremis, this could mean the pumping out and removal of the contaminated process water within the WTW.

NI Water has a specific policy to inform the public in situations when drinking water has been contaminated. This is carried out after liaison with and expert advice from the Public Health Agency (PHA) and internal procedures have been agreed with the PHA with regards to this and the notification of the Drinking Water Inspectorate.

However, in the instance of a batch being leaked into a nearby river, NI Water has a fully-accredited Environmental Management System in place to the ISO 14001 Standard. This is an ongoing and intensely-audited process which has as its central theme continuous improvement. This process ensures the Company firstly knows its significant environmental risks and then puts in place stringent control measures to mitigate them, such as appropriate chemical bunding and containment.

NI Water also trains its staff in the use of such chemicals and correct working procedures, as well as how to deal with spills and incidents if they do occur. The Company also has very close and important links with its external stakeholders (e.g. the Northern Ireland Environment Agency) who, by working together, help NI Water to develop strategies to prevent pollution incidents and to deal with them effectively if they do.



Reference – 1314292

Request Type – Infrastructure, Sites, Assets

Applicant Type – Researcher

Query –

I am a researcher at Cambridge University and I am working on UK water-energy nexus. As part of this study, I am looking at the how much water is consumed by different sectors of the UK economy. As a the main water and wastewater company in Northern Ireland, I will be most grateful if your outfit can furnish me with some information on the water supplied to industry different industries, commercial establishments, electricity sector, households and other public amenities. The base year for my research is 2010 so I am interested in data from 2010 onwards.

The second bit of information I require is the amount of energy your outfit consumes in water treatment, supply (transport), wastewater treatment and other operational use. Also do you produce part of the energy you use, and if so what percentage of the total energy usage is generated in-house?

Release date – 19 December 2013

Response –

I will be most grateful if your outfit can furnish me with some information on the water supplied to different industries, commercial establishments, electricity sector, households and other public amenities. The base year for my research is 2010 so I am interested in data from 2010 onwards.

After careful consideration, I am unable to disclose the names of specific companies in the context of their water usage. As this information is not “already in the public domain”, I have decided to exempt it in accordance with the exception provided for under Regulation (12)(5)(f) of the Environmental Information Regulations 2004 (Voluntary Supply).

This exception covers cases where the information was supplied on a voluntary basis in the expectation that it would not be disclosed to a third party and where the supplier has not consented to disclosure.

All exceptions under the Environmental Information Regulations (EIR) 2004 require the consideration of public interest. The Information Commissioner's Office considers that information requested should be released unless the public interest weighs in favour of withholding such information.

There is a public interest in the information requested being released because this may inform wider debate on the issue of commercial water usage in the Province.

The public interest is, however, also to be served by the need to preserve confidentiality and, for this reason, I have decided that the public interest favours the withholding of the identification of specific companies at this time.

To assist you in your study, I have, however, provided details of the largest water consumers and wastewater generators in Northern Ireland by their sector, as listed in 2011. Annex A refers.

Regulation 6(1)(b) of the Environmental Information Regulations permits public authorities like NI Water to provide information in a particular format, if the information is publicly available and easily accessible. Some of the information requested above may be available within NI Water's Annual Information Return (AIR) for the relevant year. These are available on the Company's Internet site at the link below.

<http://www.niwater.com/reports/>

The second bit of information I require is the amount of energy your outfit consumes in water treatment, supply (transport), wastewater treatment and other operational use. Also do you produce part of the energy you use, and if so what percentage of the total energy usage is generated in-house?

For financial period 2012/13

Waste Water Pumping: 39,067,022 kWh

Waste Water Treatment: 96,269090 kWh

Waste Water Sludge: 31,031,863 kWh

Drinking Water Pumping: 31,347,949 kWh

Drinking Water Treatment: 98,159,663 kWh

Admin: 2,699,443 kWh

Self-Generated and consumed: 443,601kWh (Note: Incinerator turbine not operational during this period due to refurbishment)

Self-Generated Sold: 1,205,663 kWh (Note: Silent Valley turbine only operational for five months due to refurbishment)

Commercial Water Users (by Sector) over 10,000m³

Textile Manufacturer	1,648,889
Power Company	604,842
Food or Drink Manufacturing Company	495,400
IT Manufacturing Company	423,041
Food or Drink Manufacturing Company	366,279
Health Trust	366,108
Food or Drink Manufacturing Company	321,432
Power Company	206,938
Health Trust	192,889
Defence	155,273
Food or Drink Manufacturing Company	151,092
Food or Drink Manufacturing Company	150,150
Food or Drink Manufacturing Company	130,176
Aerospace	116,761
Health Trust	114,300
Defence	113,133
Automobile and related Sector	98,746
Food or Drink Manufacturing Company	96,328
Food or Drink Manufacturing Company	92,669
Food or Drink Manufacturing Company	86,184
Food or Drink Manufacturing Company	78,218
IT Manufacturing Company	74,619
Defence	69,381
Food or Drink Manufacturing Company	45,692
Health Trust	38,163
Health Trust	34,381
Health Trust	32,032
Health Trust	27,541
Defence	23,148
Health Trust	10,854

Commercial Wastewater Generation (by Sector) over 10,000m³

Health Trust	347,049
Defence	217,423
Health Trust	179,705
Defence	134,085
Health Trust	108,383
Defence	65,432
Health Trust	35,754
Health Trust	32,660
Health Trust	30,430
Health Trust	23,404
Defence	21,855
Health Trust	10,309

Reference – 1314304

Request Type – Infrastructures, Sites, Assets

Applicant Type – Business

Query –

Please can you advise how I can make a freedom of information request.

I wish to know the average daily volume of private and commercial traffic, that uses the Purdysburn Service Reservoir Centre, located at Alderwood Hill, Purdysburn Road, Belfast. Ideally, can you provide averages between October and April.

This request for information is in relation to an application that has been made to Road Service Eastern Division, to consider Alderwood Hill, Purdysburn Road to be included into the Winter Salting Schedule.

Release date – 19 December 2013

Response –

The average traffic ranges from ten to fifteen vehicles per day. On a particularly busy day, there may be 20 vehicles in total.

Reference – 1314332

Request Type – Infrastructure, Sites, Assets

Applicant Type – Campaigning Group

Query –

I wish to make the following information request under the Environmental Information Regulations.

1. How many Habitats Regulations Assessments under Article 6 of the Habitats Directive were carried out by all parts of your operations in 2012 and 2013?
2. How many were stage one (test of likely significance) and how many stage two (full assessment)?
3. Details of the locations those assessments and the schemes they relate to
4. How many of these assessments were retrospective?
5. How many of these assessments have ever been carried out by your Department

Release date – 27 January 2014

Response –

NI Water replies to each of your queries in turn as follows:-

- 1. How many Habitats Regulations Assessments under Article 6 of the Habitats Directive were carried out by all parts of your operations in 2012 and 2013?*

NI Water, or agents working on its behalf, has undertaken eight assessments under Article 6 of the Habitats Directive in 2012 and 2013.

- 2. How many were stage one (test of likely significance) and how many stage two (full assessment)?*

All eight of the assessments undertaken in 2012 and 2013 were stage one assessments (test of likely significance).

- 3. Details of the locations those assessments and the schemes they relate to*

Assessments were carried out for:

- Ballymagorry Wastewater Treatment Works (WwTW)
- Dromore (Tyrone) WwTW
- Magheramason WwTW
- Nixon's Corner WwTW
- Artigarvan WwTW
- Blackwatertown Wastewater Pumping Station (WwPS)
- Brompton Road WwPS (Bangor)
- Rathlin Island (Rural Wastewater Investment Programme)

4. How many of these assessments were retrospective?

None of the assessments were carried out retrospectively in relation to proposed works being undertaken.

5. How many of these assessments have ever been carried out by your Department?

NI Water, or agents working on its behalf, has undertaken 29 assessments (including those listed above) under the Article 6 of the Habitats Directive since NI Water's formation in 2007.

Jacobs Babtie performed tests of likely significance on 1070 WwTWs and produced a report summarising the results in September 2006, prior to NI Water's formation in 2007.

With regard to water treatment works (WTWs), Mott MacDonald carried out tests of likely significance on 22 WTWs and produced a report summarising the results in February 2007.

NI Water is not required to maintain a register of this type of assessment. Therefore, I would qualify the information provided above with the caveat that this information has been gleaned from staff members' recollections and may not be a complete list of assessments completed.

Reference – 1314340

Request Type – Water Composition or Quality

Applicant Type – Member of the public

Query –

Can you tell me how much oestrogen there is in my drinking water please. I live in East Belfast.

Release date – 31 January 2014

Response –

Regulation 12(4)(a) (Information not held) provides that “*a public authority may refuse to disclose information to the extent that it does not hold that information when an applicant’s request is received*”.

All exceptions under the Regulations are qualified and so, in deciding whether or not to disclose the requested information, NI Water must consider the public interest. However, this is not possible where the information is not held.

NI Water does not test for oestrogen levels in its water supply as it is not included in the parameters the Company is required under the Water Supply (Water Quality) Regulations (Northern Ireland) 2007.

The Drinking Water Inspectorate has produced some information on the subject, which can be located at the link below:

<http://dwi.defra.gov.uk/consumers/advice-leaflets/edc.pdf>

Reference – 1314343

Request Type – Infrastructure, Sites, Assets

Applicant Type – Researcher

Query –

I am currently researching large linear infrastructure projects in Northern Ireland to aid development works for a HV buried cable route and would like to find out more about the Mourne Conduit project and associated upgrades. Do NI Water hold any data that is in the public domain regarding site selection, planning and construction work for this project? Alternatively, are you able provide a contact within Down District Council that you may have worked with who might be able to point me in the direction of some useful documents.

Release date – 4 February 2014

Response –

The Mourne Conduit was a gravity trunk aqueduct commissioned by the Belfast Water Commissioners on which construction work commenced circa 1901. It originally comprised elements including a simple pipeline, unlined rock tunnels and formed concrete aqueduct.

This conduit ran from the Annalong Valley in the southern Mourne Mountains, around the Mournes, through a tunnel into the Newcastle area, then made its way northward to supply Belfast with water, terminating in an open storage reservoir at Knockbracken.

The source moved to be fed from what is now known as the Silent Valley reservoir. Silent Valley was constructed (over a 10 year period) between 1923 and 1933. Through the subsequent years, as demand increased, this mostly gravity conduit was supplemented with additional pipeline duplications (and triplications) on the pressurised pipeline elements. Pipeline augmentation was carried out in the 1930s, the late 1940s and the 1950's. Pipeline replacement of some of the early parts (in the Mourne Mountains area) was undertaken in the 1970s.

Investigative studies undertaken in the 1990s determined that there was a need to work on the old gravity conduit to ensure water quality and safeguard the supply

delivering water to almost a fifth of Northern Ireland's population. This involved replacement of a significant proportion of the old conduit. This became known as the Aquarius pipeline which was constructed between 1999 and 2003 using pressurised pipelines.

In respect of researching the choice of the route of the pipeline, I would direct the question to local civil engineer of the time, a Luke Livingstone McCassey, who was appointed to the task of finding a source of water large enough to sustain Belfast. There are various publications on this matter. In addition, the land acquisition and the route selection for the pipeline involved Acts of Parliament to be passed.

NI Water has no records of the early contracts on the conduit, commissioned by Belfast Water Commissioners. However, it is known that there is some information held in the Public Record Office of Northern Ireland (PRONI), whose contact details are below.

Public Record Office of Northern Ireland
2 Titanic Boulevard
Titanic Quarter
Belfast
BT3 9HQ
Email: proni@dcalni.gov.uk
Tel: (+44) 028 90 534800

In respect of documentation on the most recent replacement, the Aquarius Project, NI Water policy is to retain documents for six years post-contract completion and then dispose of them in line with its disposal policy. As such, NI Water no longer holds the requested information. However, please find attached a document from 1959 about the Mourne Scheme, which may be of interest to you.

Regulation 12(4)(a) (Information not held) provides that "*a public authority may refuse to disclose information to the extent that it does not hold that information when an applicant's request is received*".

All exceptions under the Regulations are qualified and so, in deciding whether or not to disclose the requested information, NI Water must consider the public interest. However, this is not possible where the information is not held.

NI Water's Head of Wastewater Capital Procurement, Dermott McCurdy, is willing to give some time to discuss the Aquarius Project and its evolution with you, if this is of use. He can be contacted via Waterline on 0845 7440088.



THE
MOURNE SCHEME



DEVELOPMENT OF THE
SILENT VALLEY
AND
ANNALONG VALLEY
CATCHMENTS

THE
MOURNE SCHEME



DEVELOPMENT OF THE
SILENT VALLEY
AND
ANNALONG VALLEY
CATCHMENTS

Commemorative Plaques unveiled by

MR. ERNEST REA, J. P.

Chairman of the Board

WEDNESDAY, THE 27TH. MAY,

1959



Mr. Ernest Rea, J.P.

FOREWORD

THIS brief history has been compiled to afford information to the guests who accepted the invitation of the Belfast City and District Water Commissioners on the historic occasion when Plaques were formally unveiled by the Chairman of the Board, Mr. Ernest Rea, J.P., to commemorate the completion of the Mourne Development Scheme. The story is also intended to bear tribute to the late Mr. Richard Hamilton, the late Mr. W. I. Quinn, O.B.E., and Mr. Dysart McGarrigle, O.B.E., J.P., former Secretaries to the Board, and to the late Mr. F. W. McCullough, J.P., M.I.C.E., from whose design the Silent Valley Reservoir was constructed; to the Board of Engineers who succeeded Mr. McCullough and completed the work he had commenced; also to the Consulting Engineers, Messrs. Binnie, Deacon & Gourley, London, who designed and supervised the construction of the Slieve Bignian Tunnel and the Ben Crom Reservoir, and particularly to those Members of the Water Board from 1891 until the present day who, with a wisdom and courage beyond all praise, inaugurated and, in the face of many unexpected difficulties, carried the Scheme to a successful completion. Nor should we forget the skilled craftsmen and labourers, drawn mainly from the Mourne Area, who by the work of their hands made their dreams and aspirations come true. To all these the citizens owe a great debt of gratitude.



Board in Session

BELFAST CITY AND DISTRICT
WATER COMMISSIONERS
1959

WARDS	ELECTED COMMISSIONERS
Clifton	SIR WILLIAM NEILL, D.L., J.P.
Court	JOHN N. ROBINSON, F.I.A.C.
Cromac	WILLIAM J. LAWTHOR, J.P.
Dock	JOSEPH McNEILL
Duncairn	WILLIAM KEITH, F.C.A.
Falls	CRONAN F. HUGHES
Ormeau	ERNEST REA, J.P., (<i>Chairman</i>)
Pottinger	WALTER J. WHITE, J.P.
St. Anne's	WILLIAM SWEENEY, C.B.E., J.P.
St. George's	KENNEDY LEACOCK, O.B.E., J.P.
Shankill	JAMES N. W. RITCHIE, M.B., J.P.
Smithfield	PATRICK J. FLOOD
Victoria	WILLIAM COWAN, B.A., H.DIP.ED., (<i>Deputy Chairman</i>)
Windsor	H. TREVOR MONTGOMERY, F.C.A.
Woodvale	WALLACE LINTON, M.B.

Alderman The Rt. Hon. WILLIAM CECIL McKEE, E.R.D., J.P.

Lord Mayor of Belfast

Sir KENNETH SINCLAIR, D.L.

Chairman of the Belfast Harbour Commissioners

Officers

SECRETARY

NORMAN AGNEW

M.A., M.SC., PH.D., F.R.I.C.S., F.A.I., M.I.STRUCT.E., F.R.SAN.I.

CHIEF ENGINEER

R. E. D. BAIN

B.A., B.A.I., M.I.C.E., M.I.W.E., A.M.T.P.I., A.M.I.C.E.I.

ACCOUNTANT AND ASSISTANT SECRETARY

S. J. HARVEY

SOLICITOR

JAMES MACAULEY



Silent Valley at the commencement of the Mourne Development Schemes

PHOTO BY J. E. BAINBRIDGE

BELFAST WATER SUPPLY

THE Belfast City and District Water Commissioners, a Board established by Statute as the Water Authority for Belfast and District, is composed of 15 elected Commissioners—one Commissioner for each of the Wards into which the City of Belfast and District area of supply is divided—together with the Lord Mayor of the City and the Chairman of the Belfast Harbour Board.

Five of the elected Commissioners go out of office each year, and vacancies so caused are filled by election for a period of three years. The Electorate is the Local Government Electors for each Ward of the Statutory area.

A casual vacancy in the Board, caused by death, resignation or otherwise is filled by a vote of the Electors in the Ward in which such vacancy occurs.

The Statute provides for the appointment, on a fixed day in each year, of a Chairman and a Deputy Chairman, to hold office for one year only.

For many years past it has been the custom of the Commissioners to appoint annually, Standing Committees of Works, Finance and Law, each of these Committees consisting of the fifteen elected Commissioners.

The business of the Commissioners is in large measure conducted by these Committees, subject to confirmation or otherwise by the Board on submitted reports.



Silent Valley Reservoir

PHOTO BY BELFAST NEWS-LETTER

INTRODUCTION

A BRIEF HISTORY OF BELFAST WATER UNDERTAKING

BELFAST was created a Municipal Borough by Charter, granted by King James the First in the year 1613, and was then controlled by a Sovereign and Twelve Burgesses.

In 1637 the Earl of Stafford, the Lord Deputy, purchased from the Corporation of the ancient Borough of Carrickfergus the right to import into, and through, the Port of Belfast, commodities at reduced rates.

Prior to the year 1678, when the population was probably about 600 to 700, there does not appear to have been any well regulated water supply for the Borough, the inhabitants having to depend on wells and water carried from the rivers, but in that year a Mr. George McCartney organised a supply which was brought in from the Tuck Mill Dam, in the Divis Street area, through wooden pipes, to the Great Bridge of the Town, near the site of the present Boyne Bridge, a distance of about 200 perches.

In 1688 the Burgesses of the Borough were increased in number from 12 to 35, and in the year 1700 the Borough contained about a dozen streets and lanes, with some 200 thatched cottages and a population not greatly exceeding 1,000.

About 30 years later a Lease was granted to William Johnston (commonly known as "Pipe Water" Johnston) of all waters, rivers brooks, wells and water streams adjacent and contiguous to the Town, except such watercourses and mill dams as were granted to George McCartney. The sources of water for this supply were wells to the south of Belfast in the Fountainville and Sandy Row areas.

This undertaking, which met difficult financial circumstances, was sub-let to James Hall, in 1762, but he, too, could not collect enough money to keep the wooden pipes in repair. By 1790 the population was about 18,000 and the Town's water supply was so poor and precarious that the Belfast Charitable Society decided to sell its own pure well water in the streets as a measure of relief at the rate of a halfpenny per measure of four gallons.

In the year 1795, the Belfast Charitable Society took over responsibility for supplying the Town with water, and, in order to further augment the existing supply, obtained a lease of certain springs. Pipes were laid in the principal streets, with the result that in the year 1800 water was distributed throughout the Town and public fountains were erected for the gratuitous supply of water to the poor. In the same year an Act was passed in the Parliament of Ireland providing for improvement in the administration of Waterworks, the regulation of expenditure and the levying of rates to meet expenditure and to provide remuneration for the Society.

In another few years leases of additional springs were obtained and between the years 1807 and 1837 such wooden pipes as had not been abandoned were lifted and replaced with metal pipes. To cope with increasing demand, the Belfast Charitable Society, in 1837, found other sources from which water could be obtained and extended the area of supply outside the Town's existing limits, but demand for water was now rising sharply and it became obvious that a public body, with no other functions than the provision of water supplies, was necessary.

So by virtue of the provisions of the Belfast Water Act 1840, a board designated The Belfast Water Commissioners was constituted to control and administer the water supply. Under this Act all the existing Waterworks, leases and rights, owned by the Charitable Society, passed from that Society into the hands of the new Commissioners. For this transfer of property and rights the Society was compensated by a lump sum payment and an annual amount of £800 payable for ever by the Commissioners, together with a supply of water free of charge for all time.

Demands for new and increased supplies of water were greater than ever. The Commissioners were obliged to discover new sources from which additional water could be obtained. To give an indication of the state of affairs pertaining in 1854, it may be stated that water had to be pumped from the River Lagan, as a temporary expedient, to meet the prevailing shortage.

In the year 1855 Mr. J. F. Bateman, a well-known Engineer, reported to the Commissioners on a number of sources from which an increased and abundant supply might be obtained, and he recommended the Woodburn Catchment, near Carrickfergus, as being the most suitable.

Under the powers conferred by an Act passed in 1865, Mr. Bateman's recommendation was given effect to and, between that year and 1890, the Woodburn Catchment was gradually developed by the construction of seven Storage Reservoirs and a Service Reservoir for these waters in the Borough at Oldpark, with a top water level of 180 feet O.D.

In the year 1880, the Town had greatly extended, and buildings were being erected on lands at higher levels than could be supplied by gravitation from the Service Reservoir at Oldpark.

In 1883 further Catchments were acquired at Stonyford and Leathemstown, in the County of Antrim, and a Storage Reservoir was constructed in each of these Catchments with a Service Reservoir at Lagmore, the top water level of the latter being 340 feet O.D. The supply from these Catchments was first introduced to the Town in 1890.

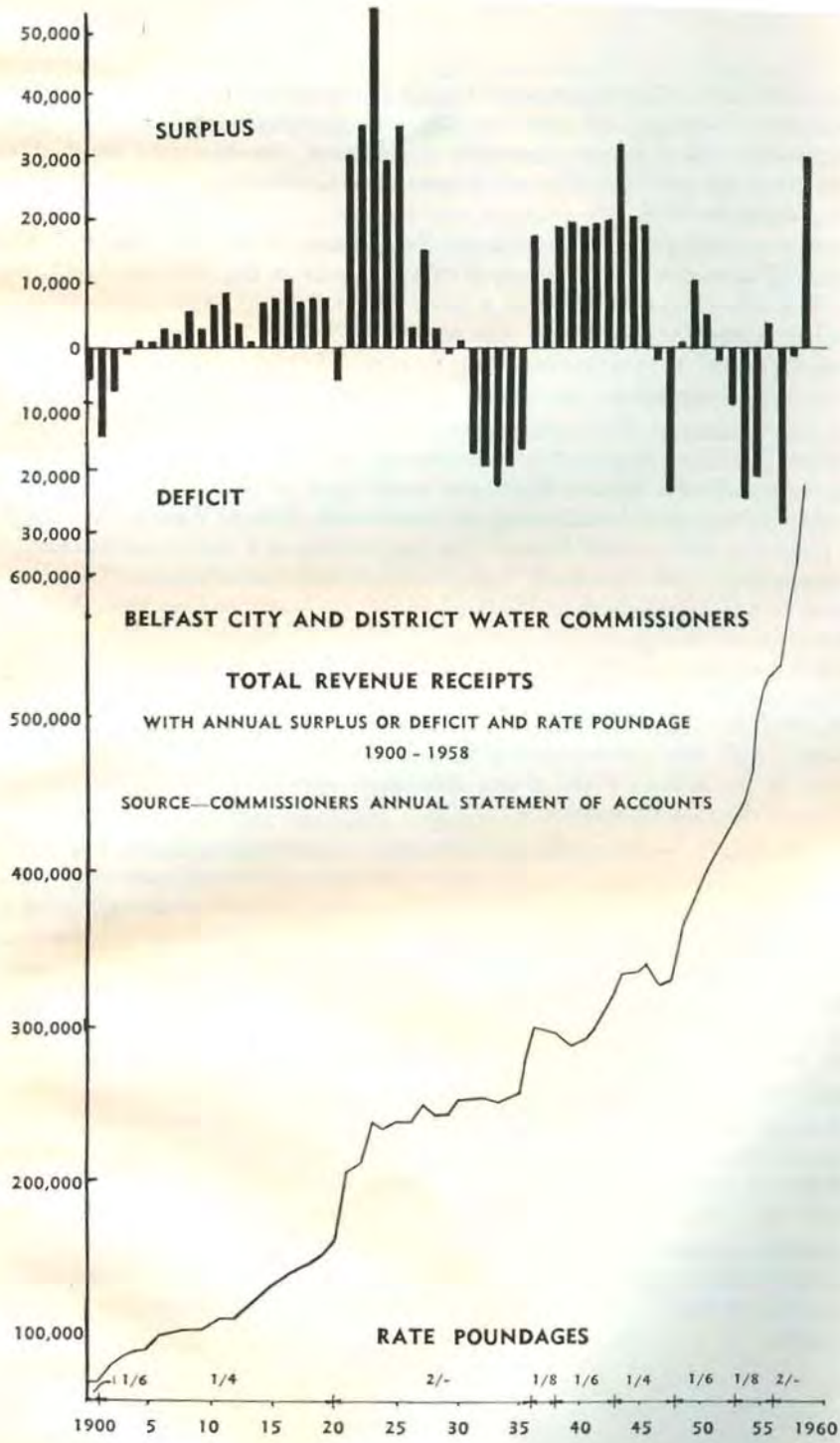
The year 1888 was a memorable one for Belfast. In that year Queen Victoria conferred on the Borough the title of "City" due to its importance as an industrial and commercial centre and a port. The following year, the designation "Belfast Water Commissioners" was altered to "Belfast City and District Water Commissioners" in consequence of the area, which was then being supplied with water, having extended to several districts outside the boundary of the City.

It was evident to the Commissioners that further greatly increased supplies would be necessary. Exhaustive investigations revealed that the Kilkeel and Annalong Valleys in the Mourne Mountains would give an abundant yield of highly satisfactory water, and accordingly the catchments of these Valleys were acquired. Contracts were entered into for the construction of a main conduit from the southern end of the Annalong Valley, with branch connections to take in the waters from the Annalong and Kilkeel Rivers, to a service reservoir at Knockbreckan, near Belfast, the construction of which was started at the same time. On the completion of this work in 1901 the waters from the Kilkeel and Annalong Rivers were introduced to the supply. The question of water storage at Mourne had still to be dealt with, but the 1914-18 War caused a major delay. However, in 1923 work was commenced on the Silent Valley Reservoir to impound the waters of the Kilkeel River. Great difficulties were encountered, but the year 1932 saw the task completed.

Originally, in order to take full advantage of the catchments in the Kilkeel and Annalong Valleys, it was planned to construct a storage reservoir in each Valley. Later an effective alternative to the construction of a storage reservoir in the Annalong Valley was decided upon—namely, a diversion of the water from the Annalong River into the Silent Valley Reservoir by means of a tunnel about $2\frac{1}{4}$ miles in length through Slieve Bignian. This project was completed in 1953. A necessary adjunct to the scheme—duplication of the branch aqueduct between the Silent Valley and the Annalong Valley, about five miles in length—was completed in 1950.

A third and final phase of this scheme to be put in hand was the construction of an additional storage reservoir in the Upper Silent Valley, slightly more than a half-mile above the tail end of the existing Silent Valley Reservoir. This reservoir was completed in 1957.

Boundary extensions of Belfast took effect in 1853 and 1896 as a result of which the area of the County Borough of Belfast is now some 23 square miles, exclusive of tidal waters, and the population in this area is approximately 455,000.



Since 1896, due to the influence of the City and the availability of services, large areas outside, but convenient to the City boundary, have been developed until we have now what might be termed a Greater Belfast. Under the Belfast Water Act 1938, there was a large extension of the Belfast water boundary, the line of which now surrounds an area of about 64 square miles and includes and extends beyond what has been referred to as Greater Belfast. In addition to the City of Belfast, areas which are within the statutory district of supply of the Belfast City and District Water Commissioners are lands between the City boundary and Holywood, and districts at Dundonald, Gilnahirk, Castlereagh, Cregagh, Newtownbreda, Upper Malone, Finaghy, Dunmurry, Derriagh, Lambeg, and the complete Urban District of Newtownabbey.

Partly arising from conditions imposed and agreements made when certain water rights were acquired and partly because of the readiness of the Commissioners to share their supplies, which were abundant on completion of the Silent Valley Reservoir, water in bulk is supplied outside the statutory area. The chief supplies are to local and other authorities in respect of the districts and towns of Ballycarry, Carrickfergus, Greenisland, Saintfield, Ballynahinch, Newcastle, Annalong, Kilkeel, North Down and the Rural Districts of Downpatrick, Hillsborough and Lisburn. As a result of the agreement with the North Down Waterworks Joint Board, the supply of water for the Borough of Newtownards has been considerably augmented, and large areas in the Rural Districts of Newtownards and Castlereagh, including most of the Ards Peninsula and Comber, and the area along the south side of Belfast Lough have now a regulated supply for the first time.

Mention should also be made of the arrangement for a supply to Messrs. Courtaulds Ltd., who have very extensive industrial premises at Carrickfergus.

Another important service of the Commissioners is the supply of water to the shipping using the port and harbour of Belfast.

The total capital expenditure on works and properties of the Belfast City and District Water Commissioners now approaches seven million pounds. The revenue income of the Commissioners for the year ended 31st October, 1958, derived from rates (domestic rate 2/0d. and public rate 6d. in the pound) amounted to approximately £343,000; from sales of water for trade and shipping about £244,000; from interest on invested sums £53,000 and from sundry other sources about £16,000 making up an approximate total of £656,000.



SILENT VALLEY RESERVOIR

IN the year 1891 the late Mr. L. L. Macassey, M.I.C.E., was the Board's Consulting Engineer and, acting on his advice, it was decided that immediate investigations should be made with the object of discovering a new and suitable area from which a plentiful additional supply of good and pure water might be obtained at a cost which would not be prohibitive. Exhaustive searches having been made, several areas were found with catchments at reasonable distances from the town, all with one exception situate at levels suitable for a gravitation supply.

After ascertaining the approximate quantity, as well as the quality of the water obtainable from each of these areas, the Commissioners had no difficulty in deciding that the catchments of two deep valleys in the southern section of the Mourne Mountains, which were drained by rivers flowing into the sea at the towns of Kilkeel and Annalong, were without question the most favourable, the waters from which were of a high degree of purity and excellence, and sufficient in quantity to satisfy the greatest demand likely to arise for many years. The distance of these two catchments from the town, although considerable, was not regarded as prohibitive, whilst the cost of acquiring full control over the lands and waters, and providing all necessary works, was considered to be well within the Board's resources. Surveys were made and an estimate prepared by Mr. Macassey of the probable cost of constructing suitable works and acquiring the ownership of these lands and waters. Steps were also taken to obtain Parliamentary powers to effect these objects.

In the years 1893, 1897 and 1899 Acts were passed by the Imperial Parliament, under which the Board was empowered to acquire by purchase the owners' rights in the lands and waters of these valleys, the acquisition of way-leaves, and to construct reservoirs and other necessary works.

The Board found no difficulty in deciding that a reservoir, in one or other of these valleys, would afford sufficient storage for years to come, and that its construction could be deferred for a considerable time, as the flow from the two rivers, diverted by weirs into a conduit, and conveyed to the city, would provide sufficient water to meet immediate requirements. Plans were prepared by Mr. Macassey, and contracts entered into for the construction of a main conduit, commencing in the Silent Valley, the more distant of the two, passing thence towards the city through the mountain slope in the townland of Brackney by a tunnel, three-quarters of a mile in length, thence by syphon to within a short distance from the entrance to Annalong Valley, the conduit being designed

at a point to admit into it the water from the river which flowed from that valley.

This conduit is constructed in cut-and-cover, from the point where the water from the Annalong River enters into it, for about $4\frac{1}{4}$ miles, where it becomes a tunnel 2 miles in length, constructed through the base of Slieve Donard, directly above the town of Newcastle, proceeding thence, partly in cut-and-cover and partly in pipes, to the entrance of another tunnel, 3 miles in length, which commences about 4 miles south of the service reservoir at Knockbreckan, into which the water is discharged. This reservoir is situate roughly about 5 miles south of the city boundary. The conduit is 35 miles in length, of which $15\frac{2}{3}$ miles is in cut-and-cover, $6\frac{2}{3}$ miles in tunnelling, and originally $12\frac{2}{3}$ miles in a single line of 36 inch steel and cast iron pipes.

The cut-and-cover and tunnel portions of the conduit between Annalong Valley and Knockbreckan were of sufficient size to convey thirty million gallons of water per day and between Silent and Annalong Valleys twenty million gallons of water per day and the single line of pipes ten million gallons of water per day. The plans for the construction of the service reservoir at Knockbreckan were also prepared by Mr. Macassey. This reservoir is constructed with an earthen embankment and is capable of containing one hundred million gallons of water.

On completion, in the year 1901, of the conduit and this service reservoir the waters from the Silent Valley and Annalong Valley rivers were diverted into the conduit, and Belfast obtained an additional supply from these new catchments, which enabled the city to be well supplied, except during a few short periods of exceptional summer drought.

In the year 1910 it became apparent that, with the continually increasing demands for water, a time was again not far distant when provision must be made for a more uniformly constant supply than was being afforded by the varying flow from the rivers by the construction of a suitable reservoir in one or other of the valleys.

At this period, the services of Mr Macassey being no longer available, Mr. F. W. McCullough, M.I.C.E., the Board's Chief Engineer, was instructed to report generally on the probable cost of constructing a reservoir of sufficient capacity in one or other of the valleys, and in due course he submitted a report on the estimated cost of constructing a reservoir in the Silent Valley, and alternatively of one in Annalong Valley. After prolonged consideration by the Commissioners they eventually decided on the construction of a reservoir in the Silent Valley to impound the waters of that catchment. Mr. McCullough was thereupon instructed to prepare plans and estimates accordingly, and the preparation of these plans was in a forward condition when war broke out in 1914. In consequence of the difficulties, which at that time existed, in respect of expending money on large works, other than those which were considered to be immediately necessary, further action was deferred and, as a result of this delay, the plans were not completed until the year 1922. The plans and specification for a reservoir capable of storing three thousand million gallons of water, and the Engineer's

estimate of the cost having been approved, tenders were invited for its construction.

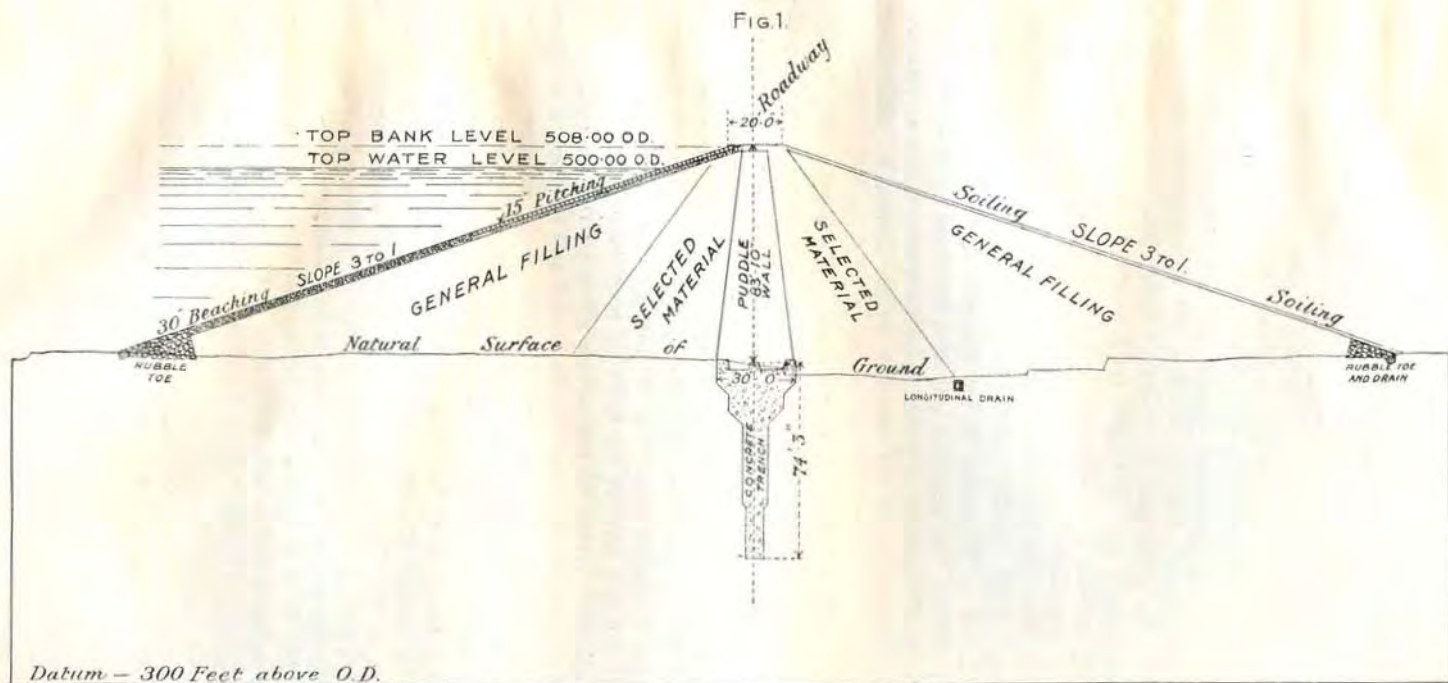
Several tenders for carrying out this work were received, but owing to the large sum required by some of the contracting firms who submitted offers, and to various suggestions by others for modifications of the plans and specification, the placing of a contract was delayed until May, 1923. In that month terms were finally arranged and an agreement entered into with Messrs. S. Pearson & Son (Contracting Department), Ltd., of London, for carrying out the work in strict accordance with the plans and specification which had been prepared by the Engineer. The agreement provided for a lump sum payment to the Contractors, such sum being subject to adjustment according to the amount of work actually carried out, calculated at the prices contained in a schedule to the agreement. Contracts were also placed with other firms for certain ironwork.

On the 10th October, 1923, the first sod for the foundation of the embankment was cut by Lord Carson of Duncairn in the presence of the members of the Board and its chief officers. The function was also favoured by the presence of a large and distinguished company of guests, who were entertained to luncheon by the Contractors, represented on the occasion by Sir Ernest W. Moir, Bart., M.I.C.E.

In June of that year the Contractors had commenced operations, and within a short time the work of construction was in full swing, and continued to make rapid progress until the year 1925, when they began to complain that they were finding it impracticable to de-water the ground to enable a trench to be excavated for the construction of a concrete cut-off wall, in the manner provided by the plans and specification. Early in 1926 the Contractors definitely informed the Engineer and the Commissioners that it was impossible to open up that trench and to carry out this part of the work in accordance with the contract plans. The Commissioners, acting on the advice given by the Engineer that it was not impossible to open up the trench as intended and relying on the terms of the agreement, insisted on the Contractors fulfilling the contract they had entered into. The Contractors thereupon lodged formal notice requiring arbitration in respect of the dispute which had thus arisen.

Arbitration having been called for, the Commissioners, (their Chairman at that time being Mr. George Condell, J.P.), found themselves in considerable difficulty, by reason of Mr. McCullough being laid aside with a serious, and what soon afterwards proved a fatal illness, thus depriving them of his assistance and technical knowledge at the arbitration, which followed in December of that year, and in which Mr. W. J. E. Binnie, M.I.C.E., an Engineer of great experience in reservoir construction, acted as sole arbitrator.

The arbitration was held in the Slieve Donard Hotel, Newcastle, and after an opening statement by Sir Lynden Macassey, K.C., Senior Counsel for the Contractors, the parties, acting on a suggestion made by the Arbitrator, entered into negotiations. On the advice of Sir Lynden and the Attorney-General for



**CROSS SECTION OF EMBANKMENT
OF SILENT VALLEY RESERVOIR**



Northern Ireland (Mr. A. B. Babington, K.C., M.P.), leading Counsel for the Commissioners, the existing contract was annulled and a new agreement made whereby terms were settled. Under these the Contractors were to do work of an exploratory nature for the purpose of ascertaining whether a suitable trench could be excavated to enable a cut-off wall to be constructed in the ground under the embankment of sufficient depth to enable its foundation to be embedded in solid rock.

The Arbitrator's award, in which were embodied the terms of this agreement, also provided for the appointment of a Board of Engineers, consisting of three members, to take over the engineering control of this work, Mr. Binnie to act as Chairman of such Board, the other members being Mr. Edward Sandeman, M.I.C.E., of London, and Mr. H. P. Hill, M.I.C.E., of Manchester, both being Engineers of considerable experience in waterworks construction.

In accordance with this agreement the Contractors at once commenced and, with commendable energy, proceeded with this investigatory work, in the course of which many serious engineering difficulties were encountered and overcome.

The embankment rests on an ancient moraine in the lower part of the valley, which is filled by glacial deposits consisting of silt, running sand, gravel and boulders, many of the latter being of immense size.

Borings, which were made prior to the placing of the original contract, indicated that underlying rock would be found at a depth of about 50 feet below the valley surface, but later on, and after the work of construction had been commenced, it was found from the sinking of additional bore holes that across the entrance to the valley, under the site of the embankment, the surface of the underlying rock sloped downwards from the hills on both sides more rapidly than was disclosed by the original borings, and that in the deepest part the rock surface was not less than 180 feet below the valley surface. These additional borings were sunk with difficulty and at considerable expense owing to the numerous boulders which were encountered. It is probable that the original bore holes, which there was reason to believe had penetrated well into the rock, must have terminated in some of these immense boulders.

To overcome the inflow of water and silt in the excavating of this trench an endeavour was made to sink a timber-lined shaft, for the purpose of de-watering the ground by pumping, but it was found impossible to do so owing to the material penetrated being of such nature as to mix and run freely with the water which entered into the shaft as rapidly as it was excavated, consequently this work had to be abandoned. An attempt was then made to drive down a circular ring of interlocking steel piles, to form a sump from which the water could be pumped, but this work also had to be abandoned, as owing to the boulders which were encountered the piles could not be driven.

At this stage it became evident that the sinking of the trench to such a depth, through water-charged material, presented difficulties which could not be overcome by the methods provided by the original plans. The construction of an

embankment and ancillary works presented no special problems, but it was impossible to construct a reservoir which would be watertight unless the percolation of the water through such permeable material as underlay the embankment could be prevented. To effect this object it was imperative to excavate a trench, within which there could be constructed a concrete cut-off wall, with a foundation resting in the solid rock, rising upwards through the heavily water-charged silt and boulders to some feet above the valley surface, and projecting into the base of the embankment, and it was believed that if the silt and silty sand material, which ran so freely when mixed with the water, could be made to part with some of its moisture, that material would become sufficiently stable to be excavated.

To attain this object drainage shafts, lined with cast iron, were sunk under compressed air, with an air pressure sufficient to drive the moisture out of the silt and silty sand, thereby preventing a run of the material into the shaft. As it was not advisable or, indeed, practicable for men to work under compressed air at a greater pressure than 30 to 35 lbs. per square inch above that of the atmosphere, when the first shaft had been sunk to a depth limited by the air pressure, the work of sinking it was suspended and a strainer fixed in the bottom of the shaft to minimise the entry of sand with the water. Pumping from the shaft was then commenced, and by that means a large quantity of water was withdrawn from the surrounding strata. An adjacent shaft was then sunk by similar means to a level considerably lower than the bottom of the first one until the air pressure became too great for the workmen. When the greatest attainable depth had been similarly reached in this second shaft, and a strainer fitted to the bottom, the pumps were transferred to it from the first shaft, and by this means the water was drawn at still greater depth from the surrounding ground.

By the adoption of this means it was found that the ground could be de-watered to a sufficient extent to enable the trench to be excavated, and six more of these shafts, eleven to twelve feet in diameter, were sunk on the line of the trench in suitable positions to form part of the excavation for the cut-off wall. A portion of the cast iron lining of the shafts was afterwards removed to enable the concrete, with which the shafts were afterwards filled, to become a continuous part of the cut-off wall. The pressure of the surrounding silty material was so great that it was necessary to line the trench, where it is over 100 feet in depth, with strong cast iron segmental plates, which were connected in due course to the lining of the shafts at each end, thus providing for the formation of a continuous wall.

The work of sinking these shafts was completed in June, 1929, the last and deepest shaft having been sunk to a depth of 211 feet, the last 30 feet of which penetrated into sound and solid rock. Meanwhile the work of sinking the trench proceeded, and was completed in October, 1929, a good rock foundation for the cut-off wall having been secured right across the valley.

On the 11th December, 1929, the first bucketful of concrete for the foundation of the cut-off wall was laid in position by Mr. Robert Scott, J.P., the Deputy Chairman of the Board, in the absence, through illness, of Mr. William Courtney, the Chairman, after which the filling of the trench with concrete to form the cut-off wall was proceeded with and carried out expeditiously.

Ample precautions of a special nature were taken for the safety of the workmen who were engaged in the air shafts. All the men engaged in this work were passed through an air lock for the purpose of gradual compression before entering, and de-compression before leaving, the shafts. It was entirely due to the precautionary measures adopted by the Contractors and the personal attention of Sir Ernest W. Moir for the protection of the workmen that no accident or injury occurred during this dangerous portion of the work.

In June, 1930, for family reasons connected with the death of Lord Cowdray, Messrs. S. Pearson & Son (Contracting Department), Limited, were, at their request, relieved from their agreement, and the completion of the work was taken over by Sir Ernest W. Moir & Co., Ltd., under an agreement, the terms of which were similar to those contained in the agreement with the previous Contractors. In view of the fact that Sir Ernest W. Moir had been in personal control of the work from its commencement by Messrs. Pearson, and had continued to control the work by his new firm, no delay occurred in consequence of this change of Contractors.

As the work of filling and pitching of the embankment progressed water was allowed to accumulate gradually in the reservoir to such an extent that, at seven o'clock on the morning of the 8th of September, 1932, top water had been reached, and for the first time was found to be overflowing into the waste channel. The construction of the reservoir and ancillary works was, for all practical purposes, completed in the late autumn of 1932.

The reservoir, almost surrounded as it is by heather-clad hills, forms a beautiful mountain lake, in extent capable of storing three thousand million gallons. The embankment is about 1,500 feet long, tied at both ends into the rock slopes of the mountains east and west of the narrow entrance to the valley. The height of the embankment is 88 feet above the level of the old river bed and about 700 feet wide at the base, gradually sloping on both sides to 15 feet in width on top. Under the base, and for the full length of the embankment, the cut-off wall, some six feet six inches in thickness, is projected down into the solid rock, the deepest part of which is 211 feet below the old river bed. This wall prevents water from percolating under the structure of the embankment. Running through the centre of the embankment, from its base on the valley surface to its top, a core of varying thicknesses, formed of carefully prepared clay puddle, is inserted to prevent any percolation of water through the structure of the embankment, thus ensuring a perfectly watertight reservoir. The reservoir is roughly a half mile wide and two and a quarter miles long. An

excellent roadway, suitable for motor traffic, runs all the way along the eastern side of the reservoir.

The heavy part of the work having been completed, and only "touching up" required, a request was made by Messrs. Sir Ernest W. Moir & Co., Ltd., to be released from their agreement on 31st January, 1933, and this request having been granted, the works were placed in the hands of Mr. C. F. Wheeler, A.M.I.C.E., the Board's Engineer, for completion and future administration.

On the 24th May, 1933, the opening ceremony was performed by His Grace The Duke of Abercorn, K.G., K.P., Governor of Northern Ireland, in the presence of members of the Board and its chief officials.

The opening ceremony was preceded by a religious service in which the Right Rev. J. J. Macaulay, D.D., Moderator of the General Assembly of the Presbyterian Church in Ireland; the Bishop of Down and Connor and Dromore; the Rev. John A. Duke, President of the Methodist Church in Ireland and the Rev. Alexander Cairns, M.A., Chairman of the Congregational Union of Ireland participated.

A large and representative company of guests was present and they were later entertained to luncheon at the Valley by the Board.

FORESTRY

ABOUT the year 1925 the Commissioners decided to carry out some afforestation in the Annalong Valley and at that time some fifty five acres were planted out with mixed conifers. This planting was done for amenity purposes and the area was mainly restricted to the margins along the entrance road. An approach was made by the Ministry of Agriculture to the Commissioners in 1954 suggesting that the Mourne area was a suitable one for further afforestation. In view of the successful extensive planting out of the Woodburn area from 1944 to the present time and to the considerable planting grants offered by the Ministry of Agriculture, interest was renewed in the possibilities of more extensive planting in the Annalong Valley.

A programme was drawn up with the help of the Ministry's technical officers for planting some 485 acres, with a possibility of extending this to approximately 700 acres. At the same time, a programme of maintenance for the existing forests was arranged to work in with a planting rate of some 50 acres per year, so as to give continuous work for a forestry squad. An integral part of this programme was the extension of the nursery where young plants are brought on from seed. The work has been proceeding smoothly over the past few years and some 170 acres have now been planted.

DUPLICATION OF MOURNE SYPHON PIPES

MORE water now being available at the Silent Valley the next step in the development scheme as envisaged by Mr. Macassey was to increase the carrying capacity of the conduit to Belfast. As mentioned earlier in this account, the tunnel and cut-and-cover section had been constructed to carry 30 million gallons of water per day, but the portions of the conduit which consisted of cast iron steel pipes were made to carry only one-third of this amount.

The decision to start work on the duplication of the 12 $\frac{2}{3}$ miles of syphon pipes was influenced not only by the City's growing need for more water, but also by the unfortunately high incidence of unemployment at this period.

It was decided to use direct labour methods for the shorter lengths and staff was recruited and work began in 1934 under the direction of the Chief Engineer, Mr. C. F. Wheeler, A.M.I.C.E. By 1935 three sections were under way, at Ballynahinch, Bow Lough and Knockbreckan.

About this time bitumen-lined and sheathed steel pipes were being introduced for large diameter mains and it is interesting to note that the Commissioners were among the first of the Water Authorities to adopt this type of pipe on a



Tunnel Intake Annalong Valley

PHOTO BY J. R. RAINBRIDGE

large scale. The contract for the supply of the 38 inch diameter pipes was placed with the South Durham Steel & Iron Co. Ltd. and laying began at Ballynahinch under Mr. George McIlldowie, A.M.I.C.E., and at Bow Lough and Knockbreckan under Mr. J. S. Jackson, A.M.I.C.E.

It was not possible to do the complete job by direct labour so a contract was made with the Holborn Construction Co. Ltd. in 1935 for the work involved in the 7½ mile long Newcastle section. Mr. McIlldowie was transferred to supervise this work and his place at Ballynahinch was taken over by Mr. R. D. Duncan, B.Sc., M.I.C.E.

The original scheme envisaged a supply of twenty million gallons per day from Silent Valley and two million gallons per day from Annalong Valley. Thus the cut-and-cover aqueduct between the Valleys was constructed to carry twenty million gallons per day. However, the three quarter mile long Annalong syphon and one other short length, as in the case of Newcastle, Ballynahinch and Bow Lough, consisted of single 36 inch diameter syphon pipes.

It was therefore necessary to duplicate these and this work was undertaken by the direct labour force under Mr. R. H. McCullough, B.Sc., A.M.I.C.E., as soon as the duplication at Ballynahinch was finished.

The duplication work was completed in the autumn of 1937.

SLIEVE BIGNIAN TUNNEL

ON completion of the Silent Valley Reservoir in the late autumn of 1932 it was intended, in accordance with the original plans for the development of the Mourne catchment areas, to follow with the construction of an impounding reservoir in the Annalong Valley. In 1945, however, after consideration of past reports in conjunction with the results of more recent geological investigations, the Commissioners were advised that the embankment to form the proposed reservoir could only be constructed at very heavy and yet problematical cost. In consequence, it was decided, as part of an alternative scheme, that the water from the Annalong River should be diverted into the Silent Valley Reservoir by means of a tunnel through Slieve Bignian.

To effect this diversion of water from the Annalong River it was necessary in addition to making the tunnel, to construct two intakes in the Annalong Valley, a small one to turn the flow of one of the streams through the Valley into the main Annalong River, at a point higher up the Valley than its natural junction, and a large one to divert the water of the River into the tunnel. These and other ancillary works took over four years to complete. In driving the tunnel, which was worked simultaneously from both ends, a delay of some seven months was caused by encountering in the rock a fissure filled with water-logged gravel, sand and silt, the product of decomposed granite. The difficulty was overcome by pressure cement grouting.



Ben Crom Reservoir Dam

PHOTO BY J. W. L. SAVAGE, COLERAINE

The tunnel is some 3,700 yards in length, about 7 feet 6 inches high and approximately 8 feet in width. In places where the roof is weak steel ribs embedded in concrete were used to provide the necessary support. The water channel in the tunnel has a concrete invert with prefabricated concrete post and slab side walls 6 feet 6 inches apart carried up to a height of 4 feet. The invert of the water channel has a fall from the Annalong Valley of about 18 feet over its full length. The channel is designed to take a maximum flow of 90 million gallons per day and it is estimated that even in the driest years an average of five million gallons per day will flow through the tunnel from the Annalong Valley catchment to add to the 17 million gallons or thereabouts available from the Silent Valley Reservoir.

The intakes or diversion works in the Annalong Valley are such that all flows up to tunnel capacity are diverted and those in excess pass over a weir at one or other of the intakes. Recorders are provided for measuring both the flow into the tunnel and the flow passing the main intake.

At the Silent Valley end, the water discharged is carried under the high level road through a 6 feet 6 inches diameter culvert to enter the reservoir approximately 1,100 yards upstream of the embankment.

The work was carried out by Messrs. A. M. Carmichael, Ltd., of Edinburgh, under the supervision of Messrs. Binnie, Deacon & Gourley, Consulting Engineers, of Westminster, London.

INCREASE IN CAPACITY OF CONDUIT BETWEEN SILENT VALLEY AND ANNALONG VALLEY

As stated earlier, the original plans envisaged ten million gallons of water per day entering the conduit at Annalong Valley but, in view of the alterations in the scheme by the construction of the Slieve Bignian tunnel, it was necessary to increase the carrying capacity of the conduit between the Silent and Annalong Valleys. In 1950 the conduit on this line consisted of tunnel, cut-and-cover sections and duplicate pressure pipes.

The desired increase in capacity of the conduit was achieved by adopting a novel type of construction. 54 inch diameter thin steel shells, fabricated by Messrs. Harland & Wolff, Ltd., Belfast, were lined with cement mortar on the site. These were then laid in a trench and surrounded with concrete. This work was carried out by Messrs. McLaughlin & Harvey, Limited, under the supervision of Messrs. Binnie, Deacon & Gourley.

On the 28th August, 1952, the opening ceremony of the tunnel was performed by the Prime Minister of Northern Ireland, Captain The Right Honourable The



Viscount Brookeborough of Colebrooke, C.B.E., M.C., D.L., M.P., in the presence of the members of the Board and its chief officers.

The function was also attended by a large number of guests including representatives of the Consulting Engineers and the Contractors, who were afterwards entertained to luncheon by the Commissioners in the Silent Valley.

TRIPLICATION OF MOURNE SYPHON PIPES

BY 1949 it was evident, due to the increasing demand for water in Belfast, that the time had come for the siphon pipe sections of the Mourne Conduit to be triplicated to bring them up to the full carrying capacity of the tunnel and cut-and-cover sections.

It is rather interesting to note the various changes in design and methods of construction which were adopted for the triplication work. Although only a comparatively short number of years had elapsed since the duplication had been completed, a major war had intervened and had introduced important changes. The duplication work could be considered as the last of the "pick and shovel" jobs, whereas the triplication work made great use of machinery—excavators, bulldozers, dumpers and tractors were now in vogue. Basic labour rates had rocketed from 9d. per hour in 1934 to 2/3¹/₂d. in 1951. Even the pipes had altered slightly. Bitumen-lined steel was no longer an innovation but standards had been introduced and 39 inch diameter pipes were used as 38 inch (similar to those used in the duplication work) would have been non-standard and much more costly.

In view of the introduction of mechanical plant it was more economical to have all the work done by contractors. The design was carried out in the Commissioners' Drawing Office mainly by Mr. M. C. Sloane, B.Sc., A.M.I.C.E. and the contract for the Bow Lough and Ballynahinch sections was let to Messrs. McLaughlin & Harvey, Ltd., and on completion of these, the Newcastle Sections were ready to commence and the contracts were awarded to Messrs. Farrans, Ltd., of Dunmurry. This work was successfully completed in 1956.

BEN CROM RESERVOIR

TO make up the storage capacity necessary to take advantage of the full yield of the Silent and Annalong Valley catchments, and in lieu of the impounding reservoir originally planned for construction in the Annalong Valley, it was decided to provide a new storage reservoir in the Upper Silent Valley.



Ben Crom Reservoir

PHOTO BY J. W. L. SAVAGE, COLERAINE

On the 8th October, 1954, the ceremony of laying the Foundation Stone of the new dam was carried out by His Excellency The Lord Wakehurst, K.C.M.G., Governor of Northern Ireland, in the presence of members of the Board, chief officials and a large and distinguished company, who were afterwards entertained to luncheon in the Slieve Donard Hotel, Newcastle, by the Commissioners.

The new reservoir, known as Ben Crom, with a capacity of 1,700 million gallons, increases the yield of the Mourne scheme by about 5 million gallons per day, giving a total average supply throughout the year of approximately thirty million gallons per day.

The question as to whether an earth embankment or a concrete dam is the more economic at any particular site is decided, primarily, by the depth of the bedrock below the surface of the ground. A concrete dam has to be founded, over its whole base in rock, therefore its costs increase greatly as the depth to rock increases.

At the Ben Crom Reservoir site the rock was exposed in the river bed in contrast to the great depth at which it was found at the lower Silent Valley Reservoir.

The dam itself is what is known as a "Gravity Section," that is, it depends on its weight for stability. The mode of construction differs from the lower reservoir for various reasons. It is higher than the original reservoir bank, and the quantity of earth which would have been required if the same method of construction had been chosen would have been excessive and would have been difficult to procure.

The dam is faced with pre-cast concrete blocks with a hearting of mass concrete containing "plums" of granite, some of which are over 5 tons in weight. These were cheaper than concrete and, at the same time, were an advantage inasmuch as they cut down the heat developed in the setting of the cement. Underneath the dam there is a cut-off trench which goes down to rock level and into the rock varying distances up to 30 feet. In addition, and below this cut-off trench, holes were drilled for a further 20 feet and pressures were applied to test the watertightness of the rock.

In view of the fact that as the water discharged from Ben Crom Reservoir must flow into the Silent Valley Reservoir, it is unnecessary to draw off water at different levels, hence the absence of a valve tower as incorporated in the Silent Valley Reservoir. A single outlet pipe fitted with control valves is therefore all that is required. This pipe is 27 inches in diameter and at its downstream side a jet disperser is inserted to break the velocity of the water being discharged and causing it to be discharged in the form of a spray, dissipating its energy, and so preventing the scouring of the overflow channel.

The top water level of the dam is 320 feet O.D. When the water reaches this level it overflows through four outlets at the top of the dam and discharges into the overflow channel to the lower reservoir.



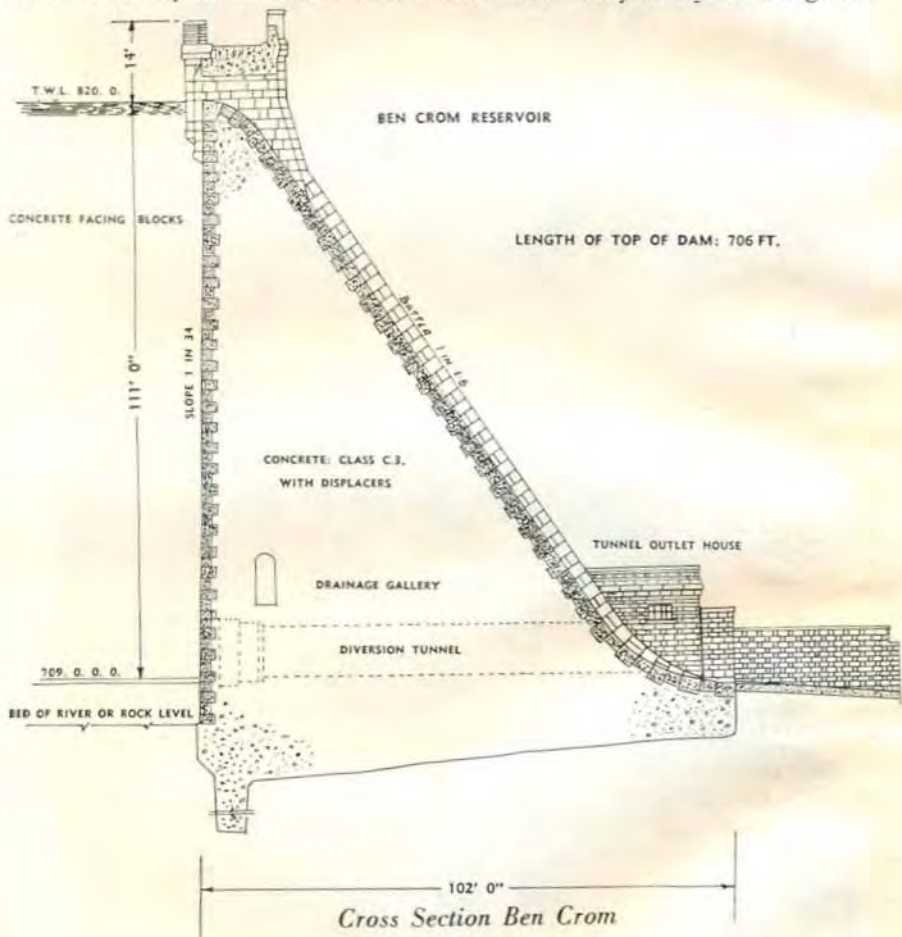
Ben Crom Reservoir

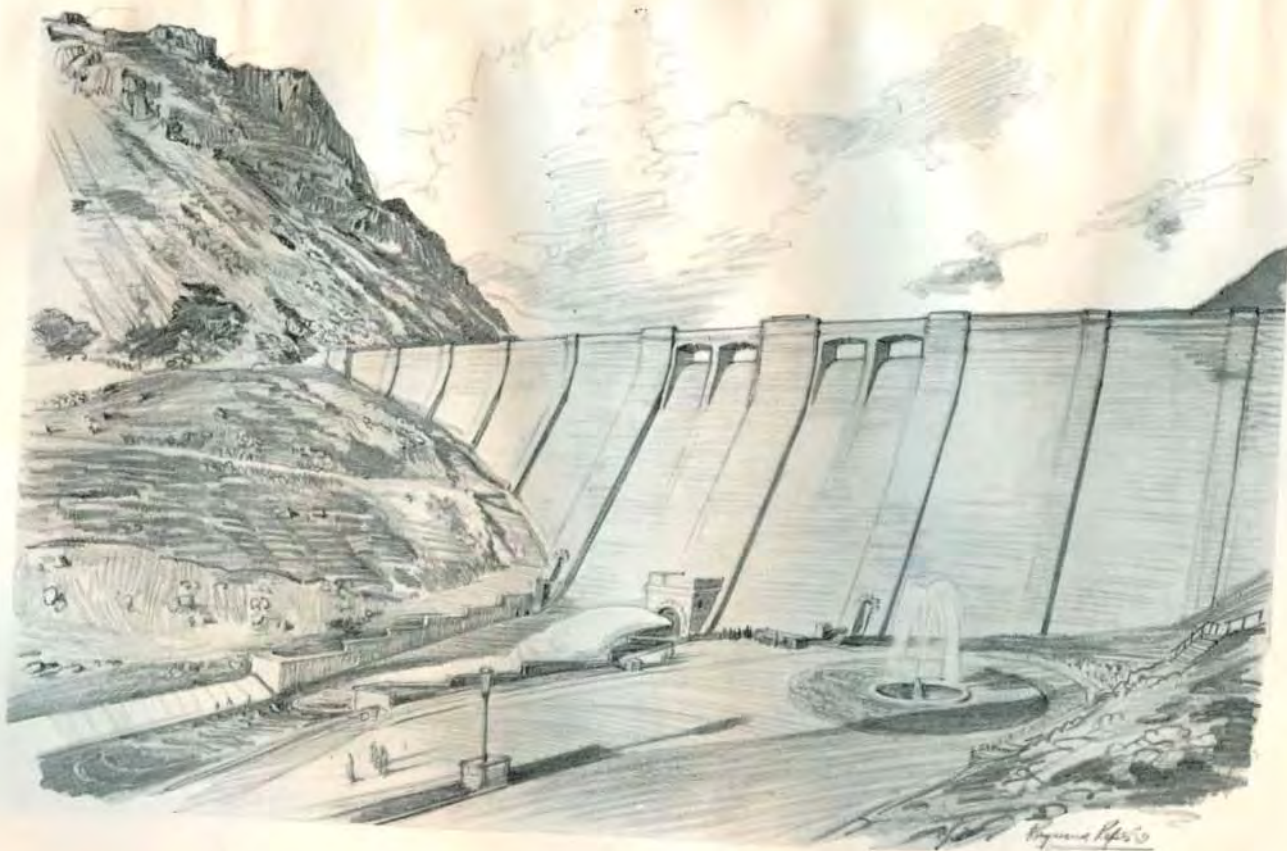
PHOTO BY J. W. L. SAVAGE, COLERAINE

Another point of interest is the fact that inside the heart of the dam is situated a drainage gallery. The purpose of this is to provide for an outlet for water that might collect underneath the foundations of the dam. Beside the outlet pipe is situated a small generator to provide electricity to light the drainage gallery.

The work was carried out by Messrs. Charles Brand & Son Ltd., London, under the supervision of Messrs. Binnie, Deacon & Gourley, Consulting Engineers, of Westminster, London.

On the 2nd October, 1957, the opening ceremony was performed by the Chairman of the Board, Dr. Wallace Linton, in the presence of members of the Board and its chief officers, and a large company which included representatives of the Consulting Engineers and Contractors, who were afterwards entertained to luncheon by the Commissioners in the Silent Valley Reception Bungalow.





Ben Crom Dam

DRAWING BY RAYMOND PIPER

STRAINING EQUIPMENT

THE Mourne water carries such a small quantity of suspended solids that it does not require filtration, but in order to remove heavy particles, leaves, etc., it is passed through screens before entering the conduit to Belfast. These screens were of copper mesh on timber frames and had to be cleaned by hand.

When the water was diverted into the Silent Valley from the Annalong Valley it was necessary to construct a second aqueduct to provide for the additional flow. Rotary straining equipment manufactured by Messrs. Glenfield & Kennedy Ltd., Kilmarnock, was installed in the new screening chamber. The civil engineering work was carried out by Messrs. McLaughlin & Harvey, Ltd., Belfast, and completed in 1952.

The equipment consists of cylindrical drums covered with a stainless steel-woven fabric with a mesh of 6,400 apertures to a square inch. As the drums revolve they are washed by a series of jets of water impinging on the surface of the mesh which automatically cleanses them at each revolution. The motive power to drive the equipment is provided by Pelton Wheels operated by water drawn from the reservoir itself.

In 1957 a contract was placed with Messrs. D. R. Martin & Sons Ltd. for the renovation of the old screening chamber and for the installation of new Rotary screens in place of the existing hand-operated screens. These screens are similar to those installed in 1952 and referred to above, except that the fabric used is of a finer weave and has 100,000 apertures per square inch.

MOURNE SCHEME

Capital Cost Since Inception.

The cost of the Mourne Scheme including the purchase of a catchment area of approximately 9,000 acres and lands in fee; legal fees; compensation for easements; development of afforestation area; construction of roads, buildings (Superintendent's House, lodges, valve and screening chambers); Silent Valley Reservoir; Slieve Bignian Tunnel and intake works; Ben Crom Reservoir and aqueducts between Annalong Valley, Silent Valley and Belfast; the installation in triplicate of the syphon pipes between the Mournes and Belfast and of rotary screens, amounted to approximately £4,000,000.



This Plaque was unveiled by Mr. ERNEST REA, J.P., Chairman of the Board, on 27th May, 1959, to commemorate the completion of the Mourne Scheme.

The completion of the Ben Crom Reservoir marks the final stage in the development of the Mourne catchment of approximately 9,000 acres acquired under the Belfast Water Act of 1893. The various steps involved in the entire scheme were as follows:—

SECTION I: 1893 — 1901.

The construction of intercepting weirs across the Annalong and Kilkeel Rivers; an aqueduct tunnelled through the mountain-side between the two valleys connecting the waters of these rivers; a conduit 35 miles in length conveying the water into a service reservoir with a capacity of 100 million gallons constructed at Knockbreckan, about 5 miles from Belfast, and the laying of pressure mains from this reservoir into the city.

SECTION II: 1923 — 1938.

The construction of a storage reservoir, with a capacity of 3,000 million gallons, on the Kilkeel River in the Silent Valley and the laying of a second line of 38 inch syphon pipes in the Valleys along the route of the conduit to Knockbreckan. After unforeseen difficulties had been overcome, the Silent Valley Reservoir was completed and officially opened in 1933.

SECTION III: 1949 — 1958.

The original plans envisaged another storage reservoir in the Annalong Valley, but, in view of the difficulties experienced in the Silent Valley, it was decided to drive a tunnel $2\frac{1}{4}$ miles in length through Slieve Bignian to divert the water of the Annalong River into the Silent Valley Reservoir. Commenced in 1950, this tunnel was completed in 1952.

A second storage reservoir of 1,700 million gallons capacity was constructed in the Upper Silent Valley and this reservoir, named Ben Crom, commenced in 1953, was officially opened in 1957. The duplication of the aqueduct between the two valleys and the triplication of the syphon pipes along the conduit to Knockbreckan were carried out concurrently with the construction of the reservoir, providing for a supply of 30 million gallons of water per day to the City of Belfast and surrounding district.

SILENT VALLEY RESERVOIR

CUTTING OF THE FIRST SOD FOR THE FOUNDATION OF THE EMBANKMENT BY LORD CARSON OF DUNCAIRN 10th OCTOBER 1923

MEMBERS OF THE BOARD

WILLIAM J. SCARLETT, J.P., (*Chairman*)

EBENEZER McILROY, (*Deputy Chairman*).

DAVID ADAMS, J.P.	ROBERT ARMSTRONG
GEORGE CONDELL	WILLIAM COURTNEY
ALEXANDER P. DALZELL, J.P.	WILLIAM DOWLING
JAMES MISKIMMIN, J.P.	HUGH McALEAVEY
WILLIAM McCALLA	SAMUEL REA, J.P.
ROBERT SCOTT, J.P.	JOSEPH SHAW, J.P.

AND

Capt. A. G. McKENNA, J.P., R.A.M.C.

Chief Officials

SECRETARY

W. I. QUINN

ENGINEER FOR THE SCHEME

F. W. McCULLOUGH, J.P., M.I.C.E.

WATERWORKS ENGINEER

C. F. WHEELER, B.E., A.M.I.C.E.

ACCOUNTANT

D. McGARRIGLE

SOLICITOR

Major R. E. McLEAN

SILENT VALLEY RESERVOIR

OPENING CEREMONY

BY

HIS GRACE THE DUKE OF ABERCORN, K.G., K.P.
GOVERNOR OF NORTHERN IRELAND

24th MAY

1933

MEMBERS OF THE BOARD

SAMUEL REA, J.P., (*Chairman*)

J. GERALD KENNEDY, (*Deputy Chairman*)

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ALEXANDER DALZELL	WILLIAM DOWLING
WALLACE LINTON	HUGH McALEAVEY
W. J. SCARLETT, J.P.	JOSEPH SHAW, J.P.
ROBERT SCOTT, J.P.	JOHN WILSON, J.P.
HUGH R. WALSH	J. WHITEFORD RITCHIE, M.B., J.P.

AND

Capt. R. LILBURN HENDERSON

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SECRETARY

W. I. QUINN, O.B.E.

ENGINEER

C. F. WHEELER, B.E., A.M.I.C.E.

ACCOUNTANT

D. McGARRIGLE

SOLICITOR

Major R. E. McLEAN

WATER EXAMINER

Professor W. JAMES WILSON, M.D.

SLIEVE BIGNIAN TUNNEL

OPENING CEREMONY

BY

CAPTAIN THE RIGHT HONOURABLE
THE VISCOUNT BROOKEBOROUGH OF COLEBROOKE

C.B.E., M.C., D.L., M.P.

PRIME MINISTER OF NORTHERN IRELAND

28th AUGUST

1952

MEMBERS OF THE BOARD

WILLIAM SWEENEY, J.P., (*Chairman*)

JAMES N. W. RITCHIE, M.B., J.P., (*Deputy Chairman*)

WILLIAM COWAN, B.A., H.DIP.ED. W. K. FITZSIMMONS, J.P., M.R.SAN.I.

WILLIAM GIRVAN

CRONAN F. HUGHES

T. COURTLAND HUNTER, J.P.

KENNEDY LEACOCK, O.B.E., J.P.

MALCOLM MERCER

H. TREVOR MONTGOMERY, F.C.A.

PATRICK McKEEFREY

ERNEST REA

JOHN WILKINSON

WALLACE LINTON M.B.

AND

Sir WILLIAM NEILL, D.L., J.P.

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DEPUTY SECRETARY

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CHIEF ENGINEER

R. E. D. BAIN

B.A., B.A.I., M.I.C.E., M.I.W.E.

ACCOUNTANT

JOHN L. PIRRET, A.C.I.S.

SOLICITOR

JAMES MACAULAY

BEN CROM RESERVOIR

LAYING OF THE FOUNDATION STONE

BY

HIS EXCELLENCY THE LORD WAKEHURST, K.C.M.G.

GOVERNOR OF NORTHERN IRELAND

8th OCTOBER

1954

MEMBERS OF THE BOARD

WILLIAM K. FITZSIMMONS, J.P., M.R.SAN.I., (*Chairman*)

ERNEST REA, (*Deputy Chairman*)

THOMAS A. CARRAGHER

WILLIAM COWAN, B.A., H.DIP.ED.

WILLIAM GIRVAN

CRONAN F. HUGHES

WILLIAM J. LAWTHER, J.P.

KENNEDY LEACOCK, O.B.E., J.P.

MALCOLM MERCER

H. TREVOR MONTGOMERY, F.C.A.

WILLIAM SWEENEY, J.P.

JOHN WILKINSON, J.P.

WALLACE LINTON, M.B.

JAMES N. W. RITCHIE, M.B., J.P.

AND

Sir WILLIAM NEILL, D.L., J.P.

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SECRETARY

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M.A., M.SC., PH.D., F.R.I.C.S., F.A.I., M.L.STRUCT.E., F.R.SAN.I.

CHIEF ENGINEER

R. E. D. BAIN

B.A., B.A.I., M.I.C.E., M.I.W.E., A.M.T.P.I., A.M.I.C.E.I.

ACCOUNTANT

JOHN L. PIRRET, A.C.I.S.

SOLICITOR

JAMES MACAULAY

BEN CROM RESERVOIR

OPENING CEREMONY

BY

Dr. WALLACE LINTON
CHAIRMAN OF THE BOARD
2nd OCTOBER
1957

MEMBERS OF THE BOARD

ERNEST REA, J.P., (*Deputy Chairman*)

THOMAS A. CARRAGHER	WILLIAM COWAN, B.A., H.DIP.ED.
WILLIAM GIRVAN	CRONAN F. HUGHES
WILLIAM KEITH, F.S.A.A.	WILLIAM J. LAWTHOR, J.P.
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WALTER J. WHITE, J.P.	JAMES N. W. RITCHIE, M.B., J.P.

AND

Sir WILLIAM NEILL, D.L., J.P.

Chief Officials

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ACCOUNTANT AND ASSISTANT SECRETARY

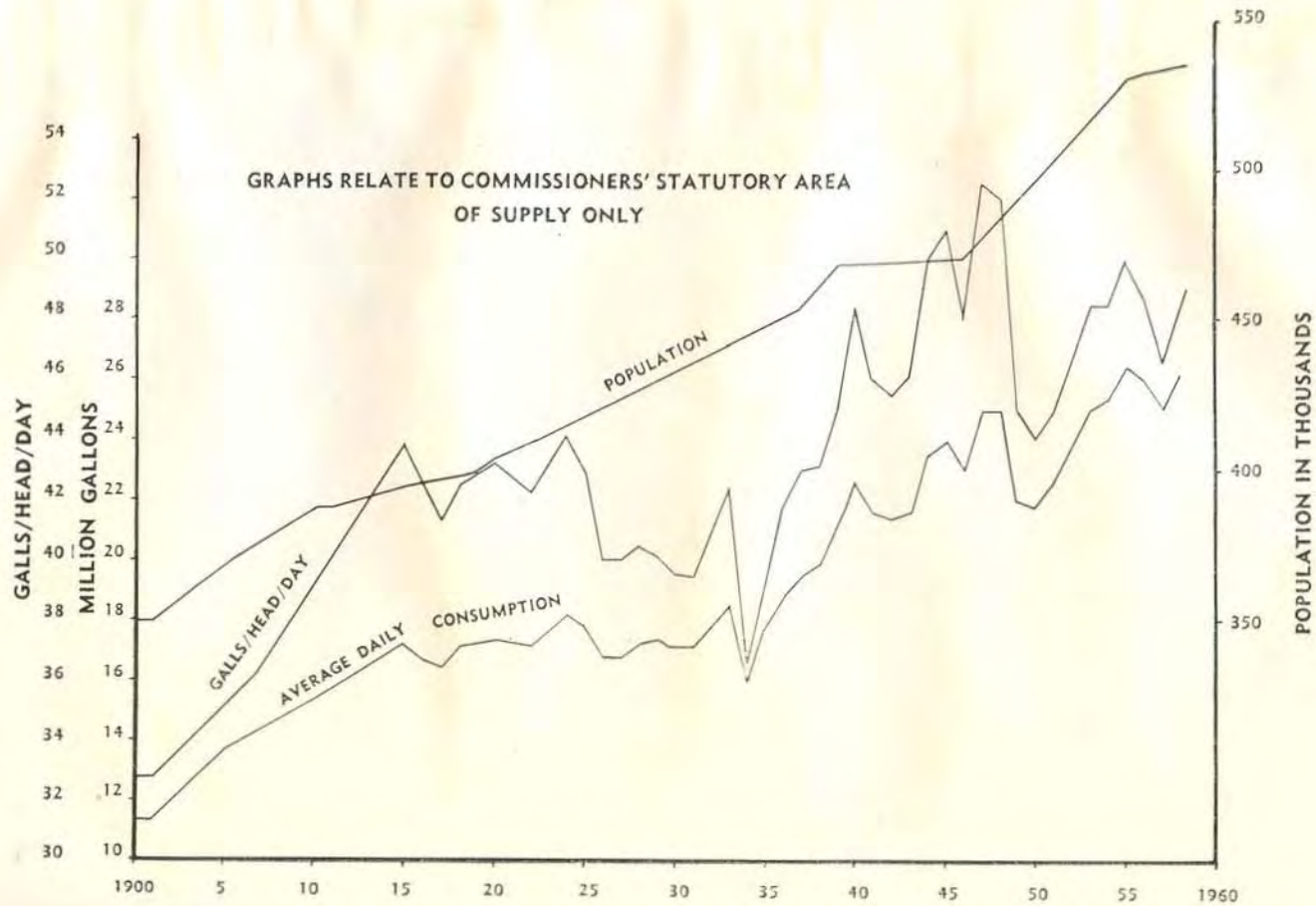
S. J. HARVEY

SOLICITOR

JAMES MACAULAY

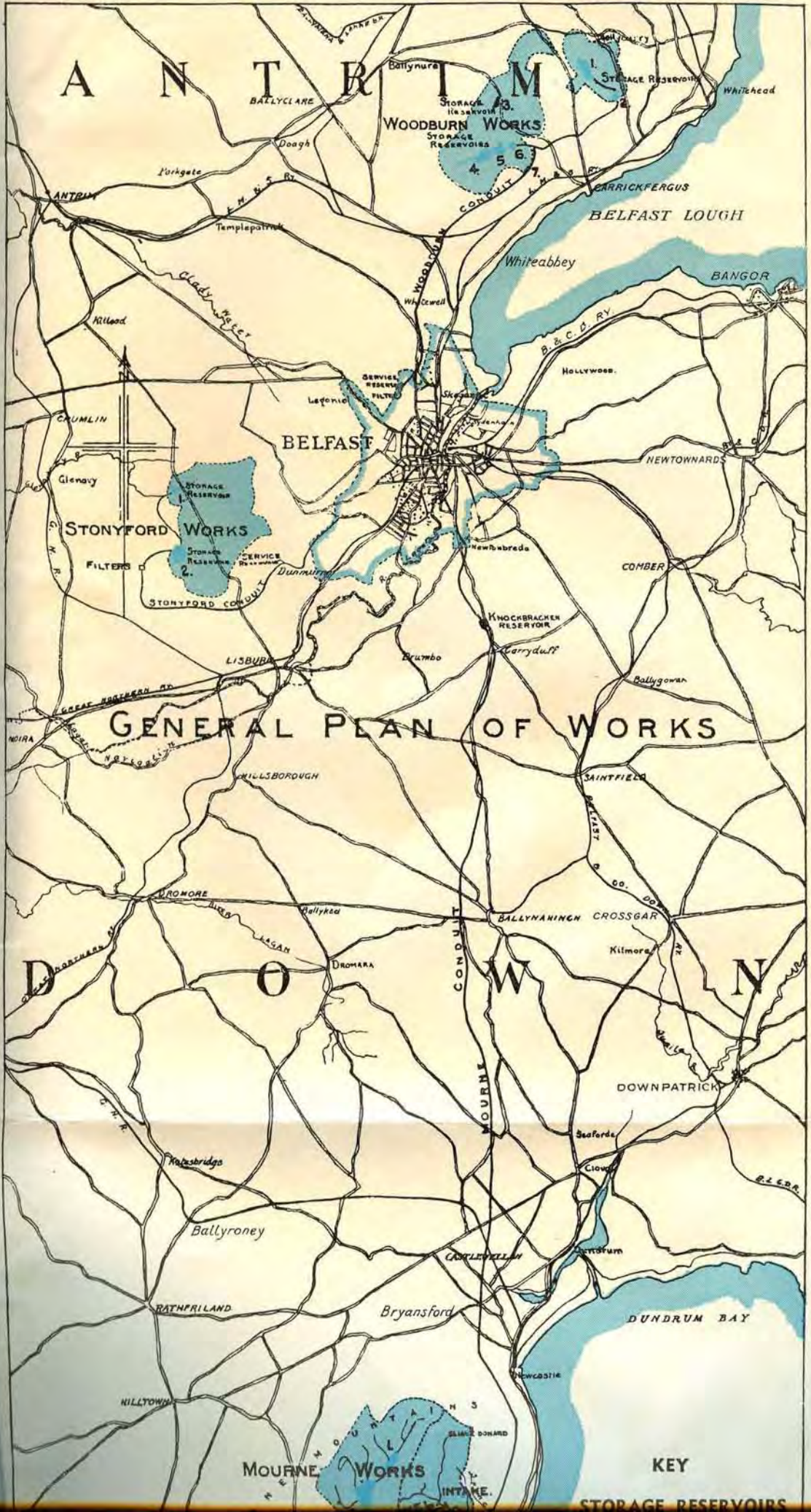
CHAIRMEN OF THE
BELFAST CITY AND DISTRICT WATER COMMISSIONERS
SINCE THE APPOINTMENT OF THE FIRST ANNUAL
CHAIRMAN UNDER SECTION 19 OF THE
BELFAST WATER ACT, 1865.

1865	Robert Lindsay appointed Chairman on 3rd August, 1865.	1915	Robert Wilson
1866	Robert Lindsay	1916	Robert Wilson
1867	Joseph J. Murphy	1917	John Courtney
1868	R. T. McGeagh	1918	John Courtney
1869	Baldwin M. Mulligan	1919	James Miskimmin
1870	Joseph G. Bigger	1920	James Miskimmin
1871	Joseph G. Bigger	1921	William McCalla
1872	John Moffett	1922	William McCalla
1873	John Moffett	1923	William J. Scarlett
1874	John Moffett	1924	William J. Scarlett
1875	John Moffett	1925	Ebenezer McLroy
1876	Robert Dunlop	1926	George Condell
1877	Robert Dunlop	1927	Joseph Shaw
1878	Robert Carswell	1928	William Dowling
1879	John Suffern	1929	William Courtney
1880	Thomas Gaffikin	1930	Robert Scott
1881	Thomas Gaffikin	1931	David Adams
1882	William McCammond, J.P.	1932	Wallace Linton
1883	William McCammond, J.P.	1933	Samuel Rea
1884	William McCammond, J.P.	1934	Alexander Dalzell
1885	William Trelford Coates	1935	John Wilson
1886	William Trelford Coates	1936	Hugh R. Walsh
1887	Samuel Keatley	1937	Samuel W. Allworthy, M.B.
1888	Samuel Keatley	1938	T. Courtland Hunter
1889	William S. Carlile	1939	William F. Neill
1890	William S. Carlile	1940	William F. Neill
1891	Robert Corry	1941	William F. Neill
1892	Robert Corry	1942	Herbert A. Porter
1893	Robert J. McConnell	1943	William J. Chambers (died 30th May, 1943).
1894	Robert J. McConnell	1943	Thaddeus Lynch, J.P. (from 10th June for remainder of year).
1895	Robert J. McConnell	1944	James N. W. Ritchie, M.B.
1896	Robert J. McConnell	1945	Edward Purvis
1897	John Laird	1946	Thomas Hendron
1898	E. Wakefield Pim, J.P.	1947	H. Trevor Montgomery, F.C.A.
1899	E. Wakefield Pim, J.P.	1948	H. Trevor Montgomery, F.C.A.
1900	E. Wakefield Pim, J.P.	1949	Thaddeus Lynch, J.P.
1901	William Ross	1950	Thaddeus Lynch, J.P.
1902	William Ross	1951	William Sweeney, J.P.
1903	Alexander P. Dalzell	1952	William Sweeney, J.P.
1904	Alexander P. Dalzell	1953	James N. W. Ritchie, M.B.
1905	John H. Gault	1954	William K. Fitzsimmons, J.P., M.R.SAN.I.
1906	John H. Gault	1955	William K. Fitzsimmons, J.P., M.R.SAN.I.
1907	William Kerr	1956	Wallace Linton, M.B.
1908	Samuel Rea	1957	Wallace Linton, M.B.
1909	Samuel Rea	1958	Ernest Rea, J.P.
1910	James Hollywood	1959	Ernest Rea, J.P.
1911	James Hollywood		
1912	James Hollywood		
1913	William T. Braithwaite		
1914	William T. Braithwaite		



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BELFAST WATER WORKS





- 2 COPELAND
- 3 NORTH WOODBURN
- 4 UPPER SOUTH WOODBURN
- 5 MIDDLE SOUTH WOODBURN
- 6 LOWER SOUTH WOODBURN
- 7 DORISLAND

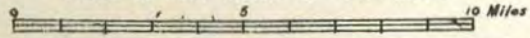
STONYFORD WORKS

- 1 LEATHMSTOWN
- 2 STONYFORD

MOURNE WORKS

- 1 BEN CROM
- 2 SILENT VALLEY

Scale of Four Miles to One Inch.



Example Requests

01 April 2012 – 31 March 2013

Reference – 1213007

Request Type – Infrastructure

Applicant Type – Researcher

Query –

I would like to have a list for wastewater treatment works in Belfast and relative website to get some educational information about process scheme adopted.

Date of release – 19 April 2012

Response –

Please find below a table of WwTWs in Belfast and one in Newtownards, along with the type of treatment process used at each site.

Name of Works	Area	Population Equivalent 2012	Process Type
Belfast (WWTW)	Belfast	358525	Process 1
Whitehouse WwTW	Belfast	87947	Process 1
Seahill (WWTW)	Belfast	6795	Process 1
Newtownbreda (WWTW)	Belfast	40011	Process 2
Dunmurry WwTW	Ards	53605	Process 2

Process 1 involves preliminary treatment by means of screenings and grit removal, primary settlement, biological treatment (activated sludge – more information below) and final settlement.

Activated Sludge involves a process that uses dissolved oxygen to promote the growth of biological floc that removes organic material.

Process 2 is as Process 1, plus tertiary micro strainers.

More information about NI Water's wastewater treatment is available on the Company's Internet site at

<http://www.niwater.com/siteFiles/resources/pdf/household/Water%20&%20Wastewater%2012pp%20A5%20V7.pdf>

Reference – 1213028

Request Type – Procurement

Applicant Type – Member of the public

Query –

I write to request an up to date list of subcontractors, suppliers and consultants involved in phase 1 of the Ballydougan to Newry Strategic Trunk Mains. Works will include detailed design and construction of 28km of trunk water main, at a 4.5MI service reservoir, a 2MI/day water pumping station, a 3.2MI/day water pumping station and associated M&E control, chlorination and flow monitoring works.

Please may I request the information under the Freedom of Information Act 2000?

Date of release – 1 May 2012

Response –

The Project Management Consultants are as follows:

Capita Symonds – Project Managers

Hyder Consulting – M&E Advisors

CCS – Civil Supervisors

The main contractor for Phase 1 of the scheme is Graham Construction. The subcontractors for Graham Construction are Aecom (Designers) and Gahon and Long (Archaeologist).

In order to deliver the works, Graham Construction has appointed the following subcontractors, listed here alongside their role in the scheme:

- Campbell Quinn – Earthworks and pipe line installation
- TES – Mechanical and electrical installation
- Whiteford Geoservices Ltd – Site investigation, Tullyhappy
- F McParland & Co Ltd – Excavation, Tullyhappy Service Reservoir (SR)
- Hillfoot Construction – Formwork, Tullyhappy SR
- Radius Systems, U-Plus – Branch saddle installation, Scarva trunk main

- Northern Tree Services – Removal of tree at Tullylish Pumping Station (PS) site
- Glover Site Investigations – Site investigation at River Bann Crossing
- Mattest – Concrete cube testing
- Dunne Drilling – Directional drill Armagh Road
- F&B Trenchless Solutions – Auger bore under Railway and Newry Canal
- Coates Engineering – Metalwork at Tullylish PS
- Maghera Fencing – Fencing at Tullylish PS
- R&M Green Keeping – Tree removal at Belleeks PS
- Watson McDermott Engineering – Metalwork at Tullyhappy SR

Please find below a list of the suppliers appointed by Graham Construction for the purposes of delivering the works, subcategorised into materials suppliers and plant suppliers:

Materials

- Radius Plastics – Polyethylene (PE) pipe
- Northstone – Concrete
- Walter Watson – Rebar
- APP – Ductile iron and PE pipe fittings
- Collins – Supply of aggregate
- Acheson and Glover – Concrete blocks
- FP McCann – Pre-cast concrete drainage products
- Tracey Concrete Products – Jacking pipes for river crossing

Plant

- Balloo – Small plant and tools
- CP Hire – Small plant and hire

Reference – 1213035

Request Type – Procurement

Applicant Type – Commercial

Query –

A list of the contractors that we use to carry out repairs to our sewerage system

Date of release – 18 May 2012

Response –

All work relating to sewer maintenance within NI Water is carried out under one contract, C309. Meridian Utilities Ltd is the current contract holder.

Reference – 1213060

Request Type – Lands

Applicant Type – Council

Query –

At a recent meeting of the Joint North Down and Ards Portavo Working Group, it was agreed that a complete copy of the Title Deed documentation relating to Portavo Reservoir be requested under the FOIA 2000.

Release date – 25 May 2012

Response –

Regulation 6(1)(b) of the Environmental Information Regulations 2004 provides that, where an applicant requests that information is made available in a particular form or format, a public authority shall comply with that request unless the information is already publicly available and easily accessible to the applicant in another form or format.. The information you have requested is available to the public, upon payment of the appropriate fee, through the Land Registry, which can be contacted at the address below.

Land Registry folios and maps are Crown copyright and may not be copied. The relevant folio numbers are Co. Down 19330, 19470, 20285 and 21972.

Land Registry

Customer Information Centre

1st Floor, Lincoln Building

27-45 Great Victoria Street

Malone Lower

Belfast

BT2 7SL

Reference – 1213071

Request Type – Water distribution

Applicant Type – Commercial

Query –

"What is the breakdown of water consumption/loos after leaving the purification plants? Please include percentages for System loss, Industrial Usage, Agriculture/Farming and domestic Use. Please further break down the estimated actual human consumption domestically after cleaning and personal hygiene use."

Release date – 13 June 2012

Response –

Regulation 6(1)(b) of the Environmental Information Regulations 2004 states that "where an applicant requests that the information be made available in a particular form or format, a public authority shall make it so available, unless the information is already publicly available and easily accessible to the applicant in another form or format."

The information you seek is already available on the Utility Regulator's Internet Site for the financial years 2009-2011 and is therefore considered to be in the public domain. The same information for the financial year 2011-2012 will also be published by the Regulator.

To assist you, NI Water has identified the relevant information.

http://www.uregni.gov.uk/uploads/publications/AIR10_Public_Domain_version_-_FINAL.pdf

http://www.uregni.gov.uk/uploads/publications/AIR11_Public_Domain_Submission.pdf

The Annual Information Return provides the information in relation to domestic households (volume and average consumption) and non-domestic households (measured and unmeasured), as well as water used outside these areas.

The information to carry out the calculation to determine the percentage of system losses, commercial and domestic usage can be found within the AIR tables and

commentary. Please note that NI Water does not determine specifically the volumes associated with agriculture/farming and these are included in an aggregate figure under commercial usage.

A typical breakdown of domestic consumption is as per the information contained on the Company's Internet site at the link below.

<http://www.niwater.com/waterefficiency.asp>

The Environmental Information Regulations 2004 specify that the right of access is restricted to information held by the organisation; NI Water is therefore not required to create information it does not hold. NI Water does not hold statistics on annual water consumption data for Northern Ireland by economic sector (domestic/non-domestic).

The average volume of water consumed is normally expressed as a volume in litres per person per day; typically this is taken as 150 litres / person / day by Northern Ireland Water. This could be extrapolated to an average volume per property per annum by factoring in average property occupancy rates and then multiplying by the number of days. This will give a large figure in litres so it is normal practice to convert the resultant figure to cubic metres (1 metre³ = 1000 litres).

The table below draws on population statistics from the Northern Ireland Statistics Research Agency (NISRA). It can be seen from this that the average population per property for 2011 is 2.47 when taken across the whole of Northern Ireland. Assuming 150 l /head/day and assuming an average occupancy of 2.47 head / prop would give an average water consumption of 135m³ per domestic property per annum.

http://www.nisra.gov.uk/archive/demography/population/household/NI06_House_Projs.pdf

Table 1: Projected households by size, Northern Ireland, 2006-2031

Household Size	2006	2011	2021	2031
1 person	199000	225100	272000	319900

2 persons	195400	216500	248400	272200
3 persons	107000	110300	109800	107000
4 persons	94200	93800	92800	90100
5+ persons	77000	75400	75300	74000
All households	672600	721100	798300	863200
Average household size	2.55	2.47	2.37	2.27

There are approximately 795,000 domestic, agricultural, commercial and business properties in Northern Ireland connected to the public water supply. NI Water supplies approximately 619 million litres of water every day. You may be interested in the Facts and Figures section of the Company's Internet Site. Please see the link below.

<http://www.niwater.com/factsandfigures.asp>

Reference – 1213087

Request Type – Reservoirs

Applicant Type – Member of the public

Query –

I was interested to know the design outflow capacity of the sinkhole at the Silent Valley reservoir.

On a recent visit a friend from the States said that the "Glory Hole" at Monticello Dam was the largest in the world of this type of spillway, its size enabling it to consume 14,400 cubic feet of water every second. I would be interested to have any information on Silent Valley to send to him.

Release date – 9 July 2012

Response –

The Monticello overflow in California is approximately 30% larger than that at Silent Valley. The outflow capacity of the Bell Mouth Overflow at Silent Valley is 11,000 cubic feet per second.

NI Water's Internet Site includes further information on Silent Valley.

<http://www.niwater.com/thesilentvalley.asp>

Photographs of Silent Valley's Bell Mouth Overflow are also available online including:-

- <http://flatrock.org.nz/fancybox/2475/>
- <http://www.flickr.com/photos/16544095@N00/page5/>

Reference – 1213121

Request Type – Metal theft

Applicant Type – Journalist

Query –

1. How many metal or related thefts have there been at NI Water in the last 12 months?
2. How much metal or related items have been stolen from NI Water in the last 12 months?
3. How much will it/has it cost NI Water to replace these items?

Release date – 17 August 2012

Response –

NI Water replies to each of your queries in turn as follows:

1. How many metal or related thefts have there been at NI Water in the last 12 months?

There have been 22 individual incidents of metal or related thefts at NI Water facilities reported to Corporate Governance since 3 July 2011.

2. How many metal or related items have been stolen from NI Water in the last 12 months?

There have been in excess of 120 metal or related items stolen in the last 12 months. Items stolen include manhole covers, fire hydrants covers, steel pipe fittings, copper pipes, electric cables, earthing material, metal detectors, pressure gauges, motors, equipment used for the treatment of sewerage, roofing lead and fencing.

3. How much will it/has it cost NI Water to replace these items?

It is estimated that these thefts have or will cost NI Water in excess of £45,000 to replace or repair. In addition, NI Water has spent approximately £50,000 so far to

secure copper protection earthing materials in concrete, in an ongoing project to prevent future theft.

These types of thefts have increased in Northern Ireland over recent years, with the price of metal rising considerably, driven by various global economies and increased demand.

The Company is concerned that such crimes have the potential to interfere with its ability to provide potable water to its customers and to increase the risk of a pollution incident beyond the Company's control.

NI Water is an active member of the NI Utilities Group on Metal Theft, which met with the NI Assembly's Environment Committee on 5 July 2012 to lobby for effective legislation for dealing with metal theft to be introduced in Northern Ireland. Members of this group include British Telecom (BT), Northern Ireland Electricity (NIE), Translink and NI Water, and they regularly meet with the Police Service of Northern Ireland's (PSNI) Crime Prevention Unit.

Currently, there is no specific legislation within Northern Ireland for regulating the scrap metal industry. Waste legislation can be used to prosecute individuals who are transporting metals without the necessary transfer notes or registrations, but penalties are financial, and generally at the lower end of the scale.

The 1964 Scrap Metal Dealers Act is applicable only in England and Wales and gives police powers of entry to scrap dealers. It also requires records of all transactions to be held. However, this Act is deemed ineffective in dealing with metal theft.

The NI Utilities were seeking to encourage the Environment Committee to support:

- The early adoption of any new legislation introduced in England and Wales, including the licensing of scrap metal dealers;

- The provision of additional Northern Ireland Environment Agency resources to assist in the investigation and prosecution of environmental crime associated with metal theft; and
- The application of more stringent penalties for environmental crime associates with metal theft.

NI Water is also part of a Crimestoppers campaign to tackle metal theft in Northern Ireland, launched on 27 March 2012 by Justice Minister David Ford. Other partners in the campaign include the PSNI, NIE and the Northern Ireland Housing Executive (NIHE).

NI Water's internal measures taken include the concreting of earthing protection project previously mentioned, internal communications about vigilance in relation to metal theft, and reporting metal theft to the PSNI so they can consider further investigation. Training on measures to prevent metal theft is also scheduled for all key staff later in the summer.

Reference – 1213184

Request Type – Wastewater Treatment

Applicant Type – Member of the public

Query –

I would be grateful if you could provide me with the following information regarding SewageWaste/Treatment here in Northern Ireland.

- How many Sewage Treatment Plants/Facilities are there currently operating in NI?
- What age are these plants, and what plans are there for new ones?
- Do they all meet EU standards in regard to discharge?
- What is the estimated annual quantity of sewage treated in these plants?
- Do NI Water treat the slurry from farms, if not who does?

Release date – 24 September 2012

Response –

NI Water replies to each of your queries in turn as follows:

How many Sewage Treatment Plants/Facilities are there currently operating in NI?

NI Water currently operates 1055 Wastewater Treatment Works (WwTW), including eight operated through Private Public Partnership (PPP), which are listed below.

Armagh WwTW

Ballynacor Sludge Treatment Works

Ballynacor WwTW

Kinnegar WwTW

Newtownards (Ballyrickard) WwTW

North Down WwTW

Richhill

Seagoe WwTW

What age are these plants, and what plans are there for new ones?

Some of the Works are up to 40 years old and still operating effectively. The remainder are in a varying age range and some are new, or relatively new, Works as NI Water is continually upgrading Works through a Capital Works Programme, which is designed to keep step with population growth and Regulatory requirements.

Do they all meet EU standards in regard to discharge?

Compliance is assessed by the Environmental Regulator, NIEA, on all WWTW with numeric standards. In 2011, the number of compliant works was 93%.

What is the estimated annual quantity of sewage treated in these plants?

The Annual Information Return (AIR) 11/12 return recorded 39,000 tons of dried solids (tds) (31,400 tds NI Water and 7,600 tds PPP).

Does NI Water treat the slurry from farms, if not who does?

NI Water does not treat slurry from farms and does not hold information about whatever body, if any, does treat slurry. You may wish to contact the Department of Agriculture and Rural Development (contact details below) for assistance on this matter. It is possible, however, that slurry is disposed of to agricultural land as fertiliser.

Department of Agriculture and Rural Development
Dundonald House
Upper Newtownards Road
Ballyniscaw
Belfast
BT4 3SB
Tel: 0300 200 7852
Email: dardhelpline@dardni.gov.uk

Reference – 1213358

Request Type – Budget

Applicant Type – Member of the public

Query –

How much of your budget is spent in Crumlin Town

Release date – 25 February 2013

Response –

Regulation 12(4)(a) of the Environmental Information Regulations 2004 provides an exception where the information requested is not held. Although all exceptions are subject to the public interest test, it is not possible to consider the public interest where the requested data is not retained. NI Water does not hold data on its expenditure by town, but by Council area.

The Company will complete its current Price Control period (PC10) at the end of March 2013. In the course of PC10 (April 2010 to March 2013), NI Water's expenditure in the Lisburn City Council area, which encapsulates Crumlin, has so far been approximately £26,254,000.

Reference – 1213359

Request Type – Energy Emissions

Applicant Type – Commercial

Query –

I am currently carrying out a review of energy usage and carbon emissions for water treatment within the UK water industry. My colleague contacted you last year and you were able to supply him with information on the energy usage (MWh) and CO2 emissions (tCO2e) by Northern Ireland Water for water treatment in 2010/11. I would be grateful if you could provide similar information for 2011/12 as follows:

1. Energy usage for water treatment (MWh)
2. CO2 emissions due to water treatment (tCO2e)
3. Volume of treated water produced for the above energy usage and CO2 emissions (MI)

Release date – 22 February 2013

Response –

In response to each of your queries and based upon figures for the financial year 2011/2012, NI Water replies as follows:-

- *Energy usage for water treatment (MWh)*
139,853MWH per Annum
- *CO2 emissions due to water treatment (tCO2e)*
73,202,941 tCO2e
- *Volume of treated water produced for the above energy usage and CO2 emissions (MI)*
213,134ML

NI Water strives to reduce its energy consumption through both investing in energy efficient technology and efficient operation of its assets. NI Water also continues to manage water demand through the reduction of leakage from the water distribution system and water efficiency education in the community.

Reference – 1213381

Request Type – Lead

Applicant Type – Member of the public

Query –

I'm looking for information on when all lead pipes supplying public water were removed/replaced in Belfast. When and where the process started and finished if the info is available please.

Release date – 28 February 2013

Response –

There are a few members of staff currently employed within NI Water who commenced employment as plumbers within the former Water Service in the late 1970s. Water Service was established as an organisation in October 1973. Prior to this, the Belfast Water Commissioner managed the provision of water services within the Belfast Area.

These staff commenced their apprenticeships (within private companies) in the early 1970s. They have commented that, in general, the transition from lead piping to underground copper piping occurred in the early 1970s. They also state that any stocks of lead piping held within central stores were used up, rather than being wasted.

There are still a number of lead service pipes within the Belfast Area which are upgraded on a conditional and reactive basis via NI Water's Lead Pipe Replacement Programme. Others are upgraded by the Engineering & Procurement section within Water Main Rehabilitation Projects. Given the current water quality requirements regarding "Lead in Water", NI Water takes pro-active steps in controlling and monitoring the lead levels within its water supplies.

The Water Supply (Water Quality) Regulations 1989 provided that there should not be a higher concentration than 50 micrograms (μg) of lead per litre (Pb/l) of drinking water at the consumer's tap. This was lowered to 25 μg Pb/l in the Water Supply (Water Quality) Regulations (Northern Ireland) 2002, and is required to be lowered further to 10 μg Pb/l by the end of 2013 (Schedule 1, Table B, Part I, 15(b)).

NI Water has, for some time, been treating drinking water with Orthophosphoric acid, which forms a coating on lead pipes and minimises levels of lead in the drinking water supply. The use of Orthophosphoric acid in the treatment of drinking water has been approved by the Northern Ireland Drinking Water Inspectorate and the Medical Authorities. In Northern Ireland and Britain, corrective treatment has been promoted, as opposed to the widespread replacement of lead pipes, as an appropriate first stage in achieving the European Standard for lead in drinking water.

Water leaving the Company's Water Treatment Works and travelling through the water mains contains only tiny traces of lead. If lead is present in a customer's drinking water, almost all of it will have been dissolved from lead pipes and fittings between the mains and the customer's tap (i.e. the Communication Pipe and the Supply Pipe).

The Communication Pipe

Some properties built before 1970 may be connected to the public water mains by a lead 'communication' pipe. This work would have been carried out under the control of local Councils and, as such, NI Water has no record of this information.

The Supply Pipe

The part of the Service Pipe from the customer's tap to the property boundary is known as the supply pipe and this is the responsibility of the customer, as it is considered part of the property's internal plumbing. Again, NI Water holds no record of this information.

Regulation 12(4)(a) (Information not held) provides that "*a public authority may refuse to disclose information to the extent that it does not hold that information when an applicant's request is received*".

All exceptions under the Regulations are qualified and so, in deciding whether or not to disclose the requested information, NI Water must consider the public interest. However, this is not possible where the information is not held.

Under its current policy, NI Water will, at the request of a customer, replace the communication pipe free of charge provided that the customer replaces the supply pipe.

For more information on the responsibility for pipes, please see the following page on NI Water's Internet Site.

<http://www.niwater.com/responsibilityforpipes.asp>

NI Water carries out regular water sampling and will let you know if your drinking water has more than the permitted levels of lead. Customers can also contact their local Environmental Health Officer if they have concerns about lead pipes and lead levels in their water.

Example Requests

01 April 2011 – 31 March 2012

Subject – Fat, Oil and Grease (FOG) –

Disclosed – May 2011

Queries/Responses

1. *What are the approximate clean up costs of the FOG problem incurred by the utility company?*

The blockages that occur as a result of FOG blockages solidifying in the sewerage system cost NI Water approximately £300,000 per year to clear.

2. *To how many premises do you supply sewerage facilities?*

659,264

3. *What is the ratio of domestic premises supply to commercial premises supply?*

612,130 domestic & 47,134 non-domestic – which is approximately 12:1

Subject – The treatment of raw potable waters

Disclosed – April 2011

Queries/Responses

- *The specific chemicals and treatment processes that NI Water has in place for raw water.*
- *The annual throughput of the raw water that is treated at all the treatment facilities within Northern Ireland.*
- *Finally, any information available on the waste products/volume produced from the treatment process would be really helpful*

Water treatment processes utilised by NI Water are designed to ensure that NI Water fully comply with the Drinking Water Directive (Council Directive 98/83/EC), namely that water must be wholesome when supplied.

For your information I have included a Generic Water Treatment Works Process Schematic as Annex A, which covers all the significant treatment stages in use at NI Water sites, albeit there are minor variations across sites based on design parameters incorporated to deliver optimum performance.

In general water treatment requires a range of different chemicals such as coagulants, disinfectants, those used for pH correction within the process and other specific ancillary chemicals to deal with issues such as taste and odour control.

All chemicals used by NI Water in the treatment process are approved by the NI Drinking Water Inspectorate.

Details on the usage of the most significant categories at a generic level across NI Water for the period April 2010 – March 2011 are also provided below for your perusal.

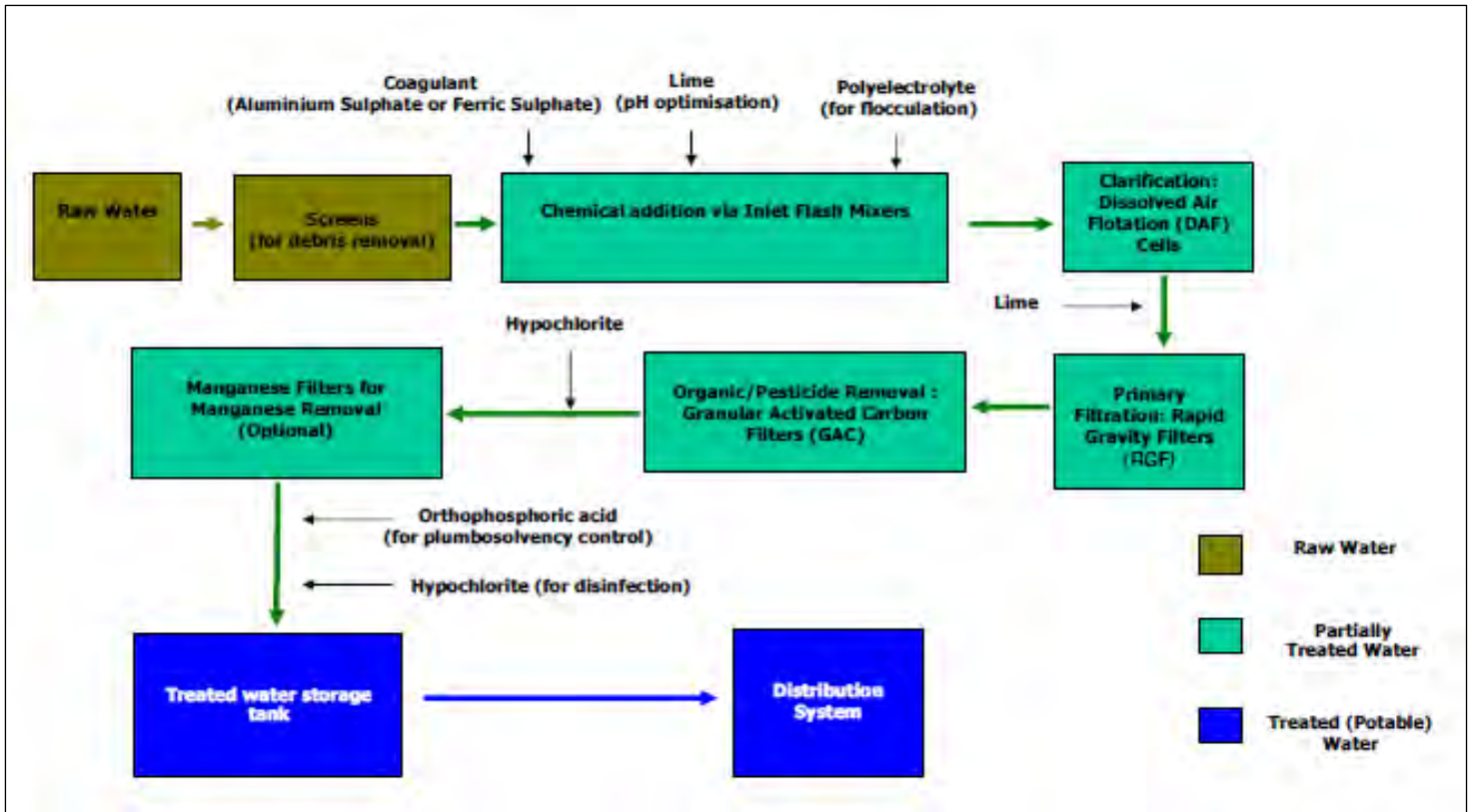
- Coagulant 15, 319 tonne
- pH correction 4,352 tonne
- Disinfectant 2,317 tonne

For the period April 2010- March 2011, NI Water treated 134, 067 mega litres of raw water.

Water treatment processes by their very nature give rise to waste streams in terms of discharges and sludge cake. All waste products from NI Water sites are regulated by Northern Ireland Environment Agency.

With respect to sludge cake for the period April 2010 – March 2011, NI Water produced a total volume of circa 18,151 tonne.

Generic Water Treatment Works Process Schematic



Subject – Smells at Rodgers Bay in Carrickfergus
Disclosed – May 2011
Query – How many incidents have been recorded at Carrickfergus water treatment works in the three years ended 31st March 2011? What is the nature of these incidents?

Answer

Although you mentioned Carrickfergus Water Treatment Works in your letter, the only Treatment Works (Water or Wastewater) NI Water has which is located off the dual carriageway to Carrickfergus is Greenisland Wastewater Treatment Works. Therefore for the purposes of answering this question NI Water has assumed this is the site you are referring to.

There have been no incidents over the past three years at Greenisland Wastewater Treatment Works.

For your clarification Carrickfergus Wastewater Treatment Works is actually on the far side of Carrickfergus on the outskirts of the village of Eden.

Subject – The specific qualifications required to undertake the testing of water samples

Disclosed – April 2011

Answer

NI Water undertakes clean water analysis at its laboratory at Westland House in Belfast, although there is also a bacteriology laboratory at Altnagelvin in Londonderry.

All wastewater analysis is carried out at NI Water's laboratory in Altnagelvin, Londonderry.

For recruitment to specialist scientific posts NI Water asks for third level qualifications in analytical chemistry or microbiology. Following successful recruitment staff can move to a variety of scientific posts including Scientific Officer, Higher Scientific Officer and Senior Scientific Officer etc

Occasionally NI Water also recruits trainees who would require 5 GCSE passes including English, Maths and a science subject. These trainees then participate in the Open University's distance learning "Analytical Science" foundation degree course while they work as a trainee analyst.

Subject – Fluoride
Disclosed – May 2011

Answer

NI Water, which was established as a Government Company (Goco) on 1 April 2007, has never fluoridated the water supply.

Prior to 1 April 2007 water and sewerage services were the responsibility of the Northern Ireland Water Service, an Executive Agency within the Department for Regional Development (1999 – 2007), the Northern Ireland Water Service an Executive Agency within the Department for the Environment (1996 – 1999) and the Water Executive within the Department for the Environment (1973 – 1996). Prior to 1973, water and sewerage services in Northern Ireland were the responsibility of local councils

The decision to fluoridate was taken by local councils in Northern Ireland while the water infrastructure was still under their remit. Following local government reorganisation in 1973 Water Service was formed and they inherited the fluoride dosing arrangements. These were for three areas only and were paid for by the local council. Dosing was only undertaken at three works.

1. Whinney Hill Water Treatment Works, Hollywood.
2. Church Hill Water Treatment Works, Hollywood &
3. Teemore Spring Water Treatment Works, Tandragee.

Unfortunately I have not been able to ascertain a definite start date for the fluoridation as it was before the formation of the Water Service (now NI Water). From the best estimates of senior colleagues fluoridation started in late 1960's or early 1970's and ceased when the sources mentioned were taken out of supply during the late 1990's. The Department of Health, Social Services and Public Safety (contact details below) may be able to assist with a more accurate date.

With regards to current arrangements the water supply in Northern Ireland is not fluoridated. Local supplies however, may contain naturally occurring fluoride that is found in underlying rock strata from where it finds its way into rivers lakes and reservoirs.

Responsibility for fluoridation of the public water supply is a dental health issue and ultimately a matter for the Department of Health, Social Services and Public Safety (DHSSPS). For your convenience the contact details for the Freedom of Information Department of DHSSPS are as follows:-

Departmental Information Manager,
Room A3.5b,
Castle Buildings,
Stormont,
Belfast.
BT4 3SQ
Telephone: 028 90 522353
Email: FOI@dhsspsni.gov.uk

You may also find the following guidance from the Drinking Water Inspectorate useful.
<http://dwi.defra.gov.uk/consumers/advice-leaflets/fluoride.pdf>

Subject – Site plans and locations

Disclosed – June 2011

Answer

Thank you for your recent request for asset drawings and locations from NI Water.

As your request falls under the definition of environmental Information, NI Water will be replying under the Environmental Information Regulations (EIR) 2004.

After careful consideration NI Water has decided not to disclose the requested information in accordance with Regulation 12(5) (a) of the Environmental Information Regulations 2004 – National Security/Public Safety.

All exceptions provided for in the Environmental Information Regulations 2004 are qualified and so in deciding whether or not to disclose the information requested NI Water must consider the public interest. The Information Commissioners Office considers that information requested should be released unless the public interest weighs in favour of withholding such information.

There is a public interest in the information requested being released because this would demonstrate that NI Water had met it's legislative requirements under the disclosure provisions of the Environmental Information Regulations 2004.

The public interest is however also to be served by the protection of the public at large. Under the legislation disclosure to an individual is considered disclosure to the public at large and there is a very real risk the information sought would, if released to the public domain/wider public at large, be of great value to potential terrorists in the potential malicious contamination or sabotage of a potable water source.

Drawings, Site Plans and Asset Locations could allow for the identification of various types of vulnerability and be of great use as an aid to a potential attacker in planning an operation. In fact the nature of the information is such that its release might in fact help to precipitate such an action, or at least help attackers to maximise their impact.

Protection of its citizens is the first duty of a Government and, therefore the release of any

information which might make that task more difficult to carry out would not be in the public interest.

Even if the risk of this happening were not considered to be very high the consequences of such an event if it did occur would be so grave that NI Water is in no doubt that the balance of the public interest in this case fell clearly in favour of maintaining the exemption rather than disclosing the information.

In its 'Introduction to EIR Exceptions' the Information Commissioner's Office states:-

"It is important to clarify that it is the public interest, not private interests, that are to be considered, and that public interest is not equivalent to simply what the public find interesting".

For the reasons detailed above and because current advice from Water Industry security advisors is against disclosure of any information on current assets on the critical national infrastructure, I have decided that the public interest favours the withholding of the information requested.

Subject – Water connections

Disclosed – 26 July 2011

Answer

Thank you for your recent request for information regarding the number of connections NI Water has to domestic users in Belfast, the average (mean) volume of water consumed at these connections per year and the average number of people served per connection.

As your queries fall under the definition of environmental requests NI Water will be replying under the Environmental Information Regulations 2004.

The average volume of water consumed is normally expressed as a volume in litres per person per day; typically this is taken as 150 litres / person / day by Northern Ireland Water. This could be extrapolated to an average volume per property per annum by factoring in average property occupancy rates and then multiplying by the number of days. This will give a large figure in litres so it is normal practice to convert the resultant figure to cubic metres (1 metre³ = 1000 litres).

The following table draws on population statistics from the Northern Ireland Statistics Research Agency (NISRA). It can be seen from this that the average population per property for 2011 is 2.47 when taken across the whole of Northern Ireland. Assuming 150 l /head/day and assuming an average occupancy of 2.47 head / prop would give an average water consumption of 135m³ per domestic property per annum.

The Environmental Information Regulations 2004 specifies that the right of access is restricted to information held by the organisation; NI Water is therefore not required to create information it does not hold. Regrettably NI Water do not hold occupancy figures specific to Geographic areas/towns or cities and as such we are unable to supply data pertinent to Belfast specifically.

Similarly whilst we cannot provide the number of domestic connections in Belfast, across the Province of a whole there are 693,005 domestic connections.

Table 1: Projected households by size, Northern Ireland, 2006-2031

Household Size	2006	2011	2021	2031
1 person	199000	225100	272000	319900
2 persons	195400	216500	248400	272200
3 persons	107000	110300	109800	107000
4 persons	94200	93800	92800	90100
5+ persons	77000	75400	75300	74000
All households	672600	721100	798300	863200
Average household size	2.55	2.47	2.37	2.27

http://www.nisra.gov.uk/archive/demography/population/household/NI06_House_Projs.pdf

Information regarding Household Projections (2008-based) by Local Government District, 2008-2023 is attached as Annex A for your perusal from the NISRA Internet Site.

I should add that In Northern Ireland, bills are not issued to domestic customers for the provision of water and sewerage services; the local government pays these charges on behalf of domestic customers. The charges for non-domestic customers have two elements – a variable charge and a standing charge. There are three methods of determining the variable charge:

- a) measured – the water supply is metered and charges are based on the volume of water consumed
- b) unmeasured – the variable charge is based on the Net Annual Valuation of the property
- c) assessed – the variable charge is based on the number and type of water using appliances within the property

The most common method is measured charging which accounts for 80%.

Subject – Water Supply and Billing

Disclosed – July 2011

Queries/Answers

1. *What is the common supply pressure of the incoming mains cold water supply pipe in a building? (by standards required minimum range)?*

1.5 bar is NI Water's minimum standard of pressure. The range could increase to around 5 bar.

2. *What is the average temperature of the mains cold water coming into a building in summer?*

Generally less than 10 degrees. A few degrees more in the summer 12 – 14 degrees.

3. *What are the typical pipes for the public water supply in your network? (Material, age of pipe system)*

Ductile Iron, PVC, MDPE, HDPE, asbestos. 1960's to date

4. In BS 6700, chapter 5.2.3.1 it states that "*Water suppliers cannot guarantee an uninterrupted supply of water*". How often does an interruption appear?

Interruptions are rare events and are due to essential planned maintenance or burst repairs

5. *How long does an average interruption of the water supply last?*

Less than 5 hours.

6. *What are the most common reasons for an interruption of the water supply? (Top 5 or top 10?)*

a) Bursts or repairs following damage by third parties (other contractors) to water mains

- b) Bursts or repairs following damage by third parties (other contractors) to supply pipes
- c) Essential maintenance to valves, meters and monitoring equipment
- d) Power failure at pumping stations although most have standby generation
- e) Unplanned demand / leakage / burst pipes / customers running water to prevent freezing

7. *What are the important laws, standards, COPs, Guides for the public water supply?*

The most relevant items of legislation, in order of hierarchy, are:

- a) The Water and Sewerage Services (Northern Ireland) Order 2006 – this is the primary legislation
- b) The Water Supply (Water Quality) Regulations (Northern Ireland) 2007
- c) The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009

The most relevant Standard is BS6700:2006 Design, installation, testing and maintenance of services supplying water for domestic use within buildings. In Northern Ireland it is the responsibility of the person building the property to ensure that the plumbing system complies with the relevant Standards and legislation.

8. *What is the command structure of the different papers? E.g. a law is the strongest – name of the law? Design guide is the second strongest – name of the design guide? Etc.*

The answer to question 7 above refers.

9. *On which basis is the consumed water paid by the customers? Is metering or a calculation that depends on persons per building etc more common? What is the future trend?*

In Northern Ireland, bills are not issued to domestic customers for the provision of water and sewerage services; the local government pays these charges on behalf of domestic customers. The charges for non-domestic customers have two elements – a

variable charge and a standing charge. There are three methods of determining the variable charge:

- d) measured – the water supply is metered and charges are based on the volume of water consumed
- e) unmeasured – the variable charge is based on the Net Annual Valuation of the property
- f) assessed – the variable charge is based on the number and type of water using appliances within the property

The most common method is measured charging which accounts for 80%.

10. How is the price of 1 m³ calculated? (e.g. production of the drinking water + lease of your water meter in the supplied building + draining the water through the drainage system back to your plants + something else? Or is this a complete different system?)

In Northern Ireland there are separate charges for water and sewerage, each charge will be composed of a variable element (see question 9) and a standing charge. The standing charge is levied to cover the cost of billing, meter reading, billing enquiries etc. The variable charge covers the cost of water production, operation and maintenance of the infrastructure etc. Measured sewerage charges are applied on the basis that 95% of the water supplied will return to the sewer (customers can apply for a higher non-return to sewer allowance).

11. What is the price of 1 m³ drinking water and what are the prices for the other positions on the bill – if there are some?

The charges for the provision of water and sewerage services are summarised in a leaflet which can be accessed by using the following link:

<http://www.niwater.com/siteFiles/resources/1849j%20ni%20water%20charges%20leaflet%20v3%2027%20april.pdf>

12. Is there a standard for insulation of potable water systems? If yes, what is the name of the document and who published it?

- The insulation should apply to all water systems not just potable water.
- The materials should conform to BS5422 and installed according to BS5970.
- Statutory rules of northern Ireland 2009 NO. 255
- Water and sewerage services
- The water supply (water fittings) regulations (northern Ireland) 2009
- This can be found in the WRAS Regulations Guide
- Guidance G4.4 to G4.13.

13. Is there any standard literature for public water supply?

Relevant literature is published by the Water Regulations Advisory Scheme (WRAS) and this can be viewed on their website www.wras.co.uk

*14. What do you use for the specification and layout of a potable water system?
(Name of Software, self-made Excel-sheet, other forms)*

Northern Ireland Water insists that the internal plumbing of a property (both cold and hot water systems) complies with The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009.

Subject – Water Quality

Disclosed – July 2011

Answer

For the period April 2010 to the end of March 2011 NI Water (including our Public Private Partnership sites of Castor Bay Water Treatment Works, Dunore Point Water Treatment Works, Moyola Water Treatment Works and Ballinrees Water Treatment Works) used 710 tonnes of Orthophosphoric Acid in water supplies.

It is important to note that all chemicals used at NI Water WTWs are Drinking Water Inspectorate (DWI) approved and are in common usage throughout the UK Water Industry. There are rigorous control measures in place and a routine sampling programme of the final water leaving the WTWs to ensure compliance with Regulatory Standards.

Subject – Sludge and Phosphorous

Disclosed – August 2011

Answer

The disposal of sewage sludge for NI Water is undertaken by Glen Water.

The Sludge Disposal volumes that have been undertaken between NI Water and Glen Water over the last few years are as follows:

2007/08 – 38.4 ttds (thousand tonnes dry solids)

2008/09 – 38.0 ttds

2009/10 – 37.9 ttds

2010/11 – 38.1 ttds (this period is the first full year of Glen Water responsibility for Sludge Disposal).

The concentration of Phosphorus as a nutrient in sewage sludge would have been of significant interest during the period when NI Water disposed of sludge to agricultural land. However, as this disposal route has ceased for many years now NI Water no longer monitors the Phosphorus content of sewage sludge and hence this information is not readily available.

Subject – Manholes
Disclosed – August 2011
Answer

In general new products are required to meet a British or European standard and have third party accreditation before they would be considered for use by NI Water.

Manhole covers and frames shall be in accordance with BS EN 124 and be a minimum of 150mm deep in class1, 2 and 3 roads.

A copy of BS EN 124, which details manhole shape, locking, materials and testing can be obtained from the British Standards Institute (BSI) Internet site.

<http://www.bsigroup.com/>

Subject – Infrastructure
Disclosed – August 2011

Answer

Thank you for your recent information request regarding the age of NI Water's water pipe infrastructure and the percentage that have been replaced.

Percentages can be extrapolated from the table below.

Age (years)	Length in 'km'
0 to 10	5273
11 to 20	3887
21 to 30	2960
31 to 40	4955
41 to 50	4963
51 to 60	1469
61 to 70	310
71 to 80	298
81 to 90	113
91 to 100	37
101 to 110	137
111 to 120	65
120 Plus	0.5
Unknown	2232

It should be noted that a number of these pipes have been refurbished by slip lining techniques but at present the system cannot isolate these therefore some pipes may appear older than they are. This data has been extracted from a live dataset which is continuously updated and validated. The data and the results of any analysis performed should be regarded as indicative only at this point in time.

NI Water intends to replace/rehabilitate approximately 1.27% of the water mains network on an annual basis. This is equivalent to 915 km over the three-year PC10 period of 2010/11, 2011/12 and 2012/13.

Subject – Post

Disclosed – September 2011

Answer

Northern Ireland Water currently facilitate the payment of bills by non-domestic customers at all Post Offices. Over the last twelve months, from July 2010 to July 2011, customers paid £1,470,247.85 using this facility.

NI Water will continue to look at opportunities to work with the Post Office as they arise to consider whether they would benefit our customers.

The introduction of domestic water and sewerage charges is a matter for the Northern Ireland Assembly. Should domestic billing be introduced by the Executive NI Water will further review the use of the Post Office Network by the Company to establish if there are benefits to extend our use.

Subject – Water sustainability

Disclosed – September 2011

Queries/Answer

Answering each of your questions in turn NI Water replies as follows:-

1. *What is the water service' view on water charges and why would they be required?*

The introduction of domestic water and sewerage charges is a matter for the Northern Ireland Assembly. As soon as it becomes available, the Executive decision on this matter will be published on NI Water's Internet Site.

2. *How should possible water charging be carried out?*

NI Water's response to Question 1 above refers.

3. *Does the water service have enough funds to maintain and improve all aspects of the system?*

Annex A attached and the Internet link below refer.

<http://www.niwater.com/pc10.asp>

4. *How will the water service deal with climate change and what measures would need to be taken?*

The following page on NI Water's Internet Site refers.

<http://www.niwater.com/climatechange.asp>

5. *How will the water service deal with possible population increase in Belfast?*

As part of our statutory duty, NI Water must produce and maintain a Water Resources Management Plan (WRMP). The WRMP sets out the following:

- NI Water's estimate of the quantities of drinking water required to meet the needs of the population of Northern Ireland over the period for which the plan is effective (the 25 years between 2008/09 and 2034/35)
- The measures which NI Water intends, or will continue to take, in order to supply the estimated required quantity of drinking water
- The schedule of activities that will be needed to be taken to implement the WRMP

Therefore the WRMP examines the current drinking water supply system within Northern Ireland, determines current consumption levels and projects future anticipated demand.

More information is available on the NI Water Internet site

<http://www.niwater.com/siteFiles/resources/pdf/niw%20nts%20sea%20-%20final.pdf>

See also <http://www.niwater.com/belfastsewersproject.asp>

6. *In the future how would such an event be managed?*

NI Water's response to Question 5 above refers.

7. *Does Northern Ireland have an unlimited supply of fresh water?*

Around 50% of water supplied comes from impounding reservoirs. The remainder comes from natural loughs (42%, mainly Lough Neagh), rivers (7%) and borewells (1%).

Although no limit is imposed on household water usage NI Water is committed to the promotion of water efficiency and water conservation and publishes relevant material on our Internet site.

- <http://www.niwater.com/waterefficiency.asp>
- <http://www.niwater.com/waterefficiencybusiness.asp>
- <http://www.niwater.com/siteFiles/resources/pdf/waterefficiencybookletv8.pdf>

One of the roles of the NI Water Key Account Managers is to offer water efficiency advice to key non domestic accounts and for our domestic customers we publish leaflets on Water Audits.

<http://www.niwater.com/homewateraudit.asp>

NI Water has a commitment to providing education on water efficiency through presentations to schools; community groups; tourism providers; environmental organisations and youth clubs. To this end NI Water has two full-time staff that deliver

presentations and attend Eco Fairs and Green Living shows etc. These talks give hints and tips on how to save water daily at home, school and in the workplace.

NI Water distribute water conservation promotional items to encourage the wise use of water including shower timers, hippo bags, 'use water wisely' pencils, magnets and bookmarks.

NI Water publish leaflets on using water wisely, guidance on dealing with leaks and a using water wisely audit for schools.

- http://www.niwater.com/siteFiles/resources/pdf/household/HowWaterWiseAreYou%20AUDIT%20DL_Feb09_V2.pdf
- http://www.niwater.com/siteFiles/resources/pdf/cop/cop3_leaks_v11.pdf
- http://www.niwater.com/siteFiles/resources/HTMLFiles/Information_Management/schools_water_audit.pdf
- http://www.niwater.com/siteFiles/resources/pdf/household/Home%20Water%20AUDIT%20DL_Jan09_V3.pdf
- <http://www.niwater.com/siteFiles/resources/pdf/waterefficiencybookletv8.pdf>

NI Water offers a large user tariff discount scheme which is dependent on the commitment of the customer to water efficiency. This is likely to include the installation of water saving devices, recycling plants and a review of water efficiency by an independent industry expert.

The NI Water Internet Site includes an educational element promoting a variety of water efficiency initiatives; quizzes and games for children as well as explanations of the water cycle and advice on using water wisely.

- <http://www.niwater.com/competition.asp>
- <http://www.niwater.com/educationatniw.asp>
- <http://www.niwater.com/education/>

NI Water promotes water efficiency on all Company vehicles through the 'Water is precious' logo.

NI Waters Resources Management Plan also refers.

8. *Is water usage sustainable in Belfast? And what measures would be needed to make it more sustainable?*

The attached links from NI Water's Internet Site refer.

<http://www.niwater.com/sustainabledev.asp>

<http://www.niwater.com/environmentalpol.asp>

Subject – Water usage statistics
Disclosed – October 2011

Answer

The Environmental Information Regulations specify that the right of access is restricted to information held by the organisation; NI Water is therefore not required to create information it does not hold.

In May 2007 the Northern Ireland Assembly deferred the introduction of domestic water charges in the Province and a further deferment was announced in April 2009 until at least 2012.

As such NI Water does not hold metering consumption data for domestic customers - this is usually assumed at 200m cubed as per the domestic / rateable allowance.

To assist in your research I have however captured the volume of all properties split between Commercial / Domestic in the BT22 postcode area in the table directly below. Please note this includes occupied and void properties.

Domestic_Commercial	Description11	Total
Commercial	Metered Water	974
	Site Meter	32
	Site Mtr, Primary TBC	18
	Trade Effluent	1
	Unm Water NAV	218
	Unm Water not charged	6
	Unm Water not supplied	33
	Commercial Total	
Domestic	Metered Water	530
	Site Meter	15
	Site Mtr, Primary TBC	1
	Unm Water CV	8283
	Unm Water not supplied	22

	Well Water	8
Domestic Total		8859
Grand Total		10141

Subject – Flood Map

Disclosed – October 2011

Answer

Regulation 6(1)(b) of the Environmental Information Regulations 2004 states that “where an applicant requests that the information be made available in a particular form or format, a public authority shall make it so available, unless the information is already publicly available and easily accessible to the applicant in another form or format.

The information you seek is already publicly available from the Department of Agriculture and Rural Development – Rivers Agency - Internet Site. For your convenience I include the link below.

<http://www.dardni.gov.uk/riversagency/index/stategic-flood-maps.htm>

Subject – Purchase cards
Disclosed – November 2011

Answer

Northern Ireland Water (NIW) used purchase cards between April and September 2011 solely for the purchase of fuel for its vehicles through one supplier.

12 purchase orders totalling £540,641.45 were issued by NIW to the supplier during the period of 1st April to 30th September 2011. Drivers of NIW vehicles use the purchase cards at petrol stations when refuelling. An invoice is received by NIW from the supplier which draws together all the purchases which is set against the purchase order. NIW then pay the supplier.

The timescale from issue of the order to payment date ranges from 9 to 38 days with an average of 22 days over the period. Invoices are usually received about 21 days from the issue of the order and paid within 10 days.

Subject – Environmental Engineering
Disclosed – December 2011

Answer

NI Water has in place a Climate Change mitigation strategy, which was launched in October 2010. This sets out how NI Water plans to reduce its carbon footprint by work under the following four headings:

- 1) Organisational Structure and Alignment of Corporate Strategies
- 2) Use Less Electricity
- 3) Use Renewable Electricity
- 4) Reduction of Other Greenhouse Gas Emissions

Under the heading of 'Use Renewable Electricity', NI Water already operates three water turbines ('Spelga Water Turbine at Fofanny WTW in the Mourne, between Ben Crom and the Silent Valley impounding reservoirs in the Mourne Mountains, and at Oaklands (near Ballymena). The revenue from these plants is circa £250k per annum.

Following recent changes to the Belfast water distribution network, NI Water is currently working towards bringing a disused turbine at Breda back into service. A disused unit at Purdysburn is no longer viable due to network changes however it is being evaluated for installation elsewhere.

NI Water is currently progressing appraisal studies into the future installation of water turbines to inform the Price Control 2015 Business Plan submission which NI Water will have to submit in draft to the Utility Regulator in the summer of 2013. These studies are under the following three broad categories:

- On raw water intakes.
- Within the potable water distribution system (typically at points where the pressure needs to be reduced)
- At out of service impounding reservoirs. For these NI Water will also include the appraisal of the viability of constructing pumped storage schemes. Such facilities allow hydro energy to be stored for release when needed, and for

conventional power stations to be operated more efficiently due to peaks in demand being accommodated quickly by the hydro facility. NI Water could either build the facilities, or lease the reservoirs and land to other investors and operators.

These appraisals require consultation with a significant number of stakeholders, including the economic and environmental regulators, and careful economic analysis before they are progressed.

NI Water's Energy Manager can be contacted by telephone on 02890 354813 extension: 20152 for further clarification or you can send any further information access requests to Waterline via our email address waterline@niwater.com or

Northern Ireland Water
PO Box 1026
Belfast
BT1 9DJ

Subject – Domestic consumption

Disclosed – December 2011

Answer

NI Water distributes 228.3 million m³ of water a year produced from the Company's Water Treatment Works.

This equates to 11.5m³ per month (per domestic connection), 154 l/head/day (per domestic customer).

NI Water's Annual Information Return (link below) provides the Company's most recent audited figures detailing information in relation to domestic households (volume and average consumption) and non-domestic households (measured and unmeasured) as well as water used outside these areas.

http://www.uregni.gov.uk/uploads/publications/AIR10_Public_Domain_version_-_FINAL.pdf

Subject – Water Quality
Disclosed – December 2011
Answer

The Belfast area is supplied by 15 different water distribution zones. NI Water has provided you with a list of these zones and the hardness of the water supplied from them. Annex A refers.

Annex A

Zone Code	Zone Name	Hardness Scale	Hardness mg/l Calcium (Permanent)	Hardness mg/l CaCO₃ (Temporary)
ZS0101	Belfast Ballygomartin North	Moderately Hard	64.4	161
ZS0102	Belfast Ballygomartin South	Moderately Hard	66.67	167
ZS0103	Belfast Ballyhanwood	Moderately Soft	28.75	72
ZS0104	Belfast Breda North	Moderately Hard	62.25	155
ZS0105	Belfast Breda South	Moderately Hard	62.2	155
ZS0106	Belfast North	Moderately Hard	61.6	154
ZS0107	Belfast Oldpark	Moderately Hard	63	157
ZS0108	Belfast Purdysburn	Slightly Hard	43.33	108
ZS0109	Dorisland Whiteabbey	Slightly Hard	54.75	137
ZS0110	Dunore Point Glengormley	Moderately Hard	62.83	157
ZN0401	Dunore Point Antrim	Moderately Hard	61.67	154
ZS0402	Drumaroad Comber	Soft	11.5	29
ZS0501	Drumaroad Lisburn	Soft	9.75	24
ZS0502	Forked Bridge Dunmurry	Moderately Hard	65.25	163
ZS0503	Forked Bridge Stoneyford	Moderately Hard	68.33	171

Subject – No. of Waste Water Treatment Works (WwTw)

Disclosed – January 2012

Answer

Please find below the information requested.

Number of WWTWs within Population Equivalent (PE) Bands above 500PE, based on Annual Information Return (AIR11) Information	
PE Band - based on AIR11 PEs	Number of WWTWs
500 -999	59
1000 - 1999	50
2000 - 10000	58
10001 - 50000	18
>50000	9

Subject – Energy Costs
Disclosed – February 2012

Subject – I require data to calculate a benchmark for energy cost used to supply 1 MI of clean water. I noticed in your Annual Information Return 2011 (page 571) that you give the Operational GHG per MI of treated water (t CO₂e/MI). However, you only provide a value for total electricity and total emissions and don't give a breakdown of electricity and emissions for treated water and sewage treated. Therefore is it possible for you to provide me with the following data:

- 1) Electricity usage for treated water only (MW.hr)
- 2) CO₂ emissions for treated water only (t CO₂e)"

Answer

In response to each of your queries and based upon figures for the financial year 2010/2011 NI Water replies as follows:-

Electricity usage in 2011 for treated water only (MW/hr)

142,741 MWhr per annum

CO₂ emissions for treated water only (tCO₂e)

77,824 tCO₂e electricity only and 83,134 tCO₂e with all fuel, e.g. sludge treatment, ozone treatment, etc.

Reference Number – NIW 415-11-12

Disclosure Date – February 2012

Subject – Is it possible you / legal department can provide some guidance as to the status of what materials can be placed in the Sewer system in Northern Ireland

In England and Wales it appears that control is via Section 111 of the Water Industry Act 1991. In Scotland it appears to be covered off by Section 46 of the Sewerage Scotland Act 1968. - both appear to be in force.

In Northern Ireland Is it present in a specific "Water and sewerage services (Northern Ireland) order if so can you please provide details of where it is located / or please provide a PDF copy."

Answer

NI Water performs its duties as laid out in the Water and Sewerage Services (Northern Ireland) Order 2006. Article 168 of the Order (Restrictions on use of public sewers) provides the legislation you have requested. Below NI Water has highlighted two sections you may find particularly useful.

168.—(1) Subject to the provisions of Chapter III of this Part, no person shall throw, empty or turn, or suffer or permit to be thrown or emptied or to pass, into any public sewer, or into any drain or sewer communicating with a public sewer or into any waste water treatment works—

(a) any matter likely to—

(i) injure the sewer, drain or works,

(ii) interfere with the free flow of its contents or

(iii) affect prejudicially the treatment and disposal of its contents,

either alone or in combination with the contents of the sewer, drain or works; or

(b) any such chemical refuse or waste steam, or any such liquid of a temperature higher than 43 degrees Celsius, as is by virtue of paragraph (2) a prohibited substance; or

(c) any petroleum spirit or carbide of calcium.

(3) A person who contravenes any of the provisions of this Article shall be guilty of an offence and liable—

(a) on summary conviction, to a fine not exceeding the statutory maximum and to a further fine not exceeding £50 for each day on which the offence continues after conviction;

(b) on conviction on indictment, to imprisonment for a term not exceeding two years or to a fine or to both.

The full legislation is publically available on NI Water's Internet Site.

<http://www.niwater.com/legislation.asp>

NI Water distributes the attached 'Bag It and Bin It' leaflet to its customers to provide advice on what materials are considered inappropriate to be disposed of into the public sewerage system. The Company also provides advice on the disposal of fats, oils and grease, which is attached for your reference.

Example Requests

01 April 2010 – 31 March 2011

Subject: Historic records on the Lagan

Query: I'm doing some research on the Lagan canal and I'm trying to find out the condition of the River Lagan in 18th and 19th centuries. I was wondering if you could help me since you (NI Water) are responsible for the sewerage systems and for sewage disposal.

Disclosed: 14 March 2011

Response:

For your information NI Water became a Government-owned Company on 1 April 2007. Prior to that date water and sewerage services were the responsibility of the Northern Ireland Water Service, an Executive Agency within the Department for Regional Development (1999 – 2007), the Northern Ireland Water Service an Executive Agency within the Department for the Environment (1996 – 1999) and the Water Executive within the Department for the Environment (1973 – 1996). Prior to 1973, water and sewerage services in Northern Ireland were the responsibility of local councils and within Belfast this role was undertaken by the Belfast Water Commissioners.

In this connection NI Water does not hold records prior to this date, as the majority of these documents were retained by the aforementioned bodies.

It is however possible that some information may have been retained by the following:-

- The Public Record Office of Northern Ireland (PRONI)
http://www.proni.gov.uk/index/contact_us.htm

- Belfast City Council
Records Management Unit
Chief Executive's Department
Belfast City Hall
Belfast

BT1 5GS

Tel : 028 9027 0639

Fax : 028 9027 0600

Email: records@belfastcity.gov.uk

- Given the nature of your query it may also be worth contacting the Northern Ireland Environment Agency (NIEA) and the Rivers Agency.

<http://www.doeni.gov.uk/niea/other-index/contacts.htm>

<http://www.dardni.gov.uk/riversagency/>

Subject: Energy efficiency and carbon reduction

Query: Does NI Water have any technological advances in water and wastewater treatment and distribution?

Disclosed: 14 March 2011

Response:

General Overview

NI Water has an active innovation and Research and Development programme, a strategic aim of which is to 'assist improved performance and the delivery of further efficiencies through the timely provision of focused applied research and development support to all areas of business need'. NI Water currently works on various technology driven energy efficiency and carbon reduction projects in conjunction with the mainland water companies.

Wastewater Treatment

NI Water is currently progressing a review of the Waste Water Treatment Works Progress Selection Manual which will inform ways that NI Water can reduce its carbon footprint in relation to wastewater treatment. This review will be completed in 2011/12. Other recent technically innovative projects have focused on improved aeration systems and plant controls to enable reduced energy, reduced carbon emissions and chemical consumption.

Wastewater and Water Pumping and Distribution

NI Water evaluates ways to reduce energy through the installation of increased efficiency pumps, timely replacement of key parts such as impellers, installation of intelligent pump and valve controls, the relining of pipework / pipelines, and changes to pump and distribution systems (such as increasing the diameter of pipework etc). NI Water is currently in the process of rolling out fluid coating to many of its water pumpsets to improve efficiency by energy reduction and to reduce associated carbon

emissions from inefficient systems. This is carried out through both base maintenance and specific improvement processes aimed at reducing energy consumption and associated carbon footprint.

Water Treatment

NI Water considers ways to reduce its carbon footprint in relation to water treatment through Asset Performance Analysis. Where this identifies that plants are not efficient, appraisals are progressed which determine which operational and capital interventions are necessary. Recent focus has been on improved pump systems and plant control so as to reduce energy and chemical consumption. A current project is looking at how we can manage the catchments better so as to produce improved quality of raw water so that this will in turn help reduce our carbon footprint.

Renewable Energy

NI Water currently purchases 15% of its total electricity use from guaranteed renewable sources and produces around a further 1% of its total electricity from its own renewable sources such as water and steam driven turbines. NI Water is currently investigating the potential for wind turbines within its estate as part of the drive to reduce cost, electricity use, carbon emissions and to ensure compliance with Government Renewable Targets.

Water Conservation

Although no limit is imposed on household water usage NI Water is committed to the promotion of water efficiency and water conservation and publishes relevant material on our Internet site.

- <http://www.niwater.com/waterefficiency.asp>
- <http://www.niwater.com/waterefficiencybusiness.asp>
- <http://www.niwater.com/siteFiles/resources/pdf/waterefficiencybookletv8.pdf>

One of the roles of the NI Water Key Account Managers is to offer water efficiency advice to key non domestic accounts and for our domestic customers we publish leaflets on Water Audits.

- <http://www.niwater.com/homewateraudit.asp>

NI Water has a commitment to providing education on water efficiency through presentations to schools; community groups; tourism providers; environmental organisations and youth clubs. To this end NI Water has two full-time staff that deliver presentations and attend Eco Fairs and Green Living shows etc. These talks give hints and tips on how to save water daily at home, school and in the workplace.

NI Water distribute water conservation promotional items to encourage the wise use of water including shower timers, hippo bags, 'use water wisely' pencils, magnets and bookmarks.

NI Water publish leaflets on using water wisely, guidance on dealing with leaks and a using water wisely audit for schools.

- http://www.niwater.com/siteFiles/resources/pdf/household/HowWaterWiseAreYou%20AUDIT%20DL_Feb09_V2.pdf
- http://www.niwater.com/siteFiles/resources/pdf/cop/cop3_leaks_v11.pdf
- http://www.niwater.com/siteFiles/resources/HTMLFiles/Information_Management/schools_water_audit.pdf
- http://www.niwater.com/siteFiles/resources/pdf/household/Home%20Water%20AUDIT%20DL_Jan09_V3.pdf
- <http://www.niwater.com/siteFiles/resources/pdf/waterefficiencybookletv8.pdf>

NI Water offers a large user tariff discount scheme which is dependent on the commitment of the customer to water efficiency. This is likely to include the installation of water saving devices, recycling plants and a review of water efficiency by an independent industry expert.

The NI Water Internet Site includes an educational element promoting a variety of water efficiency initiatives; quizzes and games for children as well as explanations of the water cycle and advice on using water wisely.

- <http://www.niwater.com/competition.asp>
- <http://www.niwater.com/educationatniw.asp>
- <http://www.niwater.com/education/>

NI Water promotes water efficiency on all Company vehicles through the 'Water is precious' logo.

Subject: Fluoride

Query: I live in Orby Close Belfast. Please can you advise the fluoride levels in our water? I understand that fluoride is not added to water in NI but I would like to know the natural level as I am considering giving my child fluoride tablets.

Disclosed: 08 March 2011

Response:

The water supply in Northern Ireland is not fluoridated. Local supplies however, may contain naturally occurring fluoride that is found in underlying rock strata from where it finds its way into rivers lakes and reservoirs.

Orby Close is in Belfast Purdysburn supply zone and last year the average naturally occurring fluoride level for this area was 0.068 mg/l. The regulatory limit is 1.5 mg/l.

You may also find the leaflet below useful.

<http://www.dwi.gov.uk/consumers/advice-leaflets/fluoride.pdf>

Responsibility for fluoridation of the public water supply is ultimately a matter for the Department of Health, Social Services and Public Safety (DHSSPS).

Subject: Largest non-domestic water users in Northern Ireland

Query: Which businesses/industries require the largest volumes in terms of water supply, which businesses/industries generate the largest quantities of wastewater and if possible, which businesses/industries generate the most polluting wastewater in terms of treatment requirements.

Disclosed: 22 February 2011

Response:

As your query falls under the definition of an environmental request NI Water will be replying under the environmental Information Regulations 2004.

After careful consideration I am unable to disclose the names of specific companies in the context of their water usage. As this information is not “already in the public domain”, I have decided to exempt it in accordance with the exception provided for under Regulation (12)(5)(f) of the Environmental Information Regulations 2004 – ‘the interests of the supplier of the information’.

This exception covers cases where the information was supplied on a voluntary basis in the expectation that it would not be disclosed to a third party and where the supplier has not consented to disclosure.

All exceptions under the Environmental Information Regulations (EIR) 2004 require the consideration of public interest. The Information Commissioner’s Office considers that information requested should be released unless the public interest weighs in favour of withholding such information. There is a public interest in the information requested being released because this may inform wider debate on the issue of commercial water usage in the Province.

The public interest is however also to be served by the need to preserve confidentiality and for this reason I have decided that the public interest favours the withholding of the information requested at this time. To assist you in your study I have however provided details of the largest water consumers and wastewater generators in Northern Ireland by their sector.

Commercial Water Users (by Sector) over 10,000m³

Textile Manufacturer	1,648,889
Power Company	604,842
Food or Drink Manufacturing Company	495,400
IT Manufacturing Company	423,041
Food or Drink Manufacturing Company	366,279
Health Trust	366,108
Food or Drink Manufacturing Company	321,432
Power Company	206,938
Health Trust	192,889
Defence	155,273
Food or Drink Manufacturing Company	151,092
Food or Drink Manufacturing Company	150,150
Food or Drink Manufacturing Company	130,176
Aerospace	116,761
Health Trust	114,300
Defence	113,133
Automobile and related Sector	98,746
Food or Drink Manufacturing Company	96,328
Food or Drink Manufacturing Company	92,669
Food or Drink Manufacturing Company	86,184
Food or Drink Manufacturing Company	78,218
IT Manufacturing Company	74,619

Defence	69,381
Food or Drink Manufacturing Company	45,692
Health Trust	38,163
Health Trust	34,381
Health Trust	32,032
Health Trust	27,541
Defence	23,148
Health Trust	10,854

Commercial Wastewater Generation (by Sector) over 10,000m³

Customer Details	Total Sewerage
Health Trust	347,049
Defence	217,423
Health Trust	179,705
Defence	134,085
Health Trust	108,383
Defence	65,432
Health Trust	35,754
Health Trust	32,660
Health Trust	30,430
Health Trust	23,404
Defence	21,855
Health Trust	10,309

Subject: NI Water Distribution Network Pumps

Queries:

1. The proportion of the distribution network which is gravity-fed / the proportion which is pump-fed
2. Total number of fixed-speed and variable-speed pumps in Northern Ireland Water's distribution network(s)
3. Are the variable speed pumps feeding a service reservoir / tank, or are they pumping straight into the distribution network?
4. How many booster pumps are there in the network?
5. Who are the main suppliers of pumps and variable speed pumps in UK, and in approximately what proportions? (ITT, Flowserve, Weir etc)
6. Are the pumps due to be replaced at all?

Disclosed: 21 February 2011

Response:

1. NI Water operates some 24,800 km of gravity distribution network and some 930 km of pumped water pipework.
2. NI Water operates some 199 Water Pumping stations and it is estimated that some 10-15% of these are variable speed units. NI Water operates some 139 Water Booster Stations and it is estimated that some 60-70% of these are variable speed. With the exception of some high-lift pumping stations the majority of installations (pumping & booster) will contain two pumps.
3. Booster station variable speed pumps feed directly into the distribution network. However the majority of water pumping stations feed directly to reservoirs.
4. There are some 139 water booster stations with typically 2 pumps at each site i.e. approx 278.
5. There are a significant number of suppliers who provide water distribution pumps to NI Water including Grundfos, KSB, Bombas, Weir, SPP, Lowara and Ebara. N.B. The list

provided above does not reflect any specific order of preference or predominance and other manufacturers' equipment is also in use.

6. NI Water reviews the performance of its assets on an ongoing basis to enable appropriate replacement and refurbishment. Clean water distribution pumps typically operate reliably for a significant time period i.e. up to 25 years depending on hours run without replacement. Their regular replacement is consequently not common.

Subject: Total length of water supply pipeline and sewers within NI Water's borders.

Query: I am currently studying for my BSc in Civil Engineering. In this, my final year, I am doing an Honours dissertation regarding sewerage and sanitation systems. I would be extremely grateful if you could please provide me information on:

- The approximate total length of water supply pipeline within your borders.
- The approximate total length of sewer within your borders.

Disclosed: 26 October 2010

Response:

- NI Water has a total mains length of 30,809.67 kms of which 26417.18 is classified as potable mains.
- NI Water has a total sewer length of 14,983.09 kms of which 14,786.81 kms are still in operation.

Subject: Expenditure

Query: Details of water and sewerage expenditure for each parliamentary constituency in the last three years

Disclosed: 14 June 2010

Response: The Freedom of Information Act 2000 specifies that the right of access is restricted to information held by the organisation; NI Water is therefore not required to create information it does not hold. NI Water do not hold this expenditure by parliamentary constituency however figures are available by Council Area.

Under Section 21 of the Freedom of Information Act (reasonably accessible by other means) NI Water are not obliged to supply the information you seek as this information is already available on the NI Water Internet Site and is therefore considered to be in the public domain. However to assist you we have identified the relevant information – AQW 6350/10 refers.

<http://www.niassembly.gov.uk/qanda/2007mandate/writtenans/2009/100507.htm>

<http://www.niwater.com/currentworks.asp>

Subject: Silent Valley

Query: Can you advise me on the counties/ areas whose water supplies come from the Silent Valley Reservoir and what other reservoirs supply the remaining counties/ areas in Northern Ireland?

Disclosed: 02 June 2010

Response: All water from this source is treated at Drumaroad Water Treatment Works (WTW) and then supplies the areas around Ballynahinch, Lisburn, Bangor, the Ards Peninsula and much of Belfast (in conjunction with Dunore Point WTW).

On the map overleaf, all areas marked as P are supplied with Drumaroad (Silent Valley) water as the sole source, and all areas marked as T are supplied with a mixture of Drumaroad and Dunore Point water.

Subject: Spelga Dam

Query: I was wondering if you could e-mail me some information on the geology of Spelga Dam and catchment in the Mourne Mountains.

Disclosed: 18 May 2010

Response:

Spelga Reservoir was formed by the construction of a concrete gravity dam at the confluence of the Rivers Bann and Spelga and was completed in 1957. The reservoir has a capacity of 3,327 Ml and a surface area of 62 ha at the top water level of 342.95 mOD.

The dam is located at the head of Spelga Pass a narrow and steep-sided valley that drops steeply from the dam to the north-west. The dam is aligned north-east to southwest and the reservoir extends 1.2 km to the south within a wide basin surrounded by a ring of steep and high hills.

Geology of dam

The dam is founded on Silurian grits and shales which dip steeply to the south that is away from the dam and these are extensively exposed in the vicinity of the dam. The rock contains many closely spaced joint planes and the upper strata, about 3m, are sheared and broken by glacial action. The grits and shales are underlain by Mourne granite at depths of 20 m or more. The bedrock is overlain by glacial gravel and peat, both of varying depth of up to 3 m in the valley sides. A major fault and a vein of china-clay like material were encountered during construction of the dam but it is not known what special action, if any, was taken.

Catchment

The catchment area of 7.0 km² is steep and rocky, rising to a maximum elevation of 673 mOD (Slieve Muck Mountain). The catchment area is predominantly open peat moorland

and there is no development within the catchment area although the B27 road runs along the foot of the mountains to the east of the reservoir.

Subject: Salt (Sodium) in the water Supply

Query: I had been advised to reduce salt (sodium) intake for health reasons by my GP. On a recent check-up he asked if I ever drank bottled water, as he said it was important to check the labeling because even some of the more "popular" brands had a high salt content per 100ml. Can you please confirm the sodium level in the water supply to the Scrabo Estate area of Newtownards.

Disclosed: 26 March 2010

Response:

Based on 2009 results, the average Sodium level in your supply zone is 8mg/l. This compares with the regulatory upper health limit for Sodium in drinking water which is 200mg/l.

Subject: Silent Valley

Query: I am doing family research and I believe my early relatives are from the Silent Valley area of County Down. Can you tell me what communities were in the Valley before the reservoir was formed?

Disclosed: 25 March 2010

Response: Between 1973 and 1996 the responsibility for the management and administration of water and sewerage services lay with the Water Executive within the Department of the Environment (Northern Ireland).

Prior to 1973, water and sewerage services in Northern Ireland outside Belfast were the responsibility of local councils. For Silent Valley (Happy alley) it is likely that such records would have been held by the former local authority that had responsibility for water and sewerage infrastructure in the Kilkeel/Annalong area of Northern Ireland.

For your convenience I include the contact details of Newry and Mourne District Council below.

http://www.newryandmourne.gov.uk/contact_us.asp

The Public Record Office of Northern Ireland (PRONI) may be of further assistance in your search for potential information.

http://www.proni.gov.uk/index/local_history.htm

http://www.proni.gov.uk/index/contact_us.htm

I am also advised that Marty Johnston at the BBC may be of assistance as he was involved in a Programme called "Your Place Or Mine" which featured Silent Valley.

Subject: Number of NI Water Assets (Water Treatment Works, Wastewater Treatment Works etc.)

Query: I am trying to find out the following figures with relation to NI Water

- The number of water sewage treatment works
- The number of wastewater pumping stations
- The number of wastewater treatment works

Disclosed: 17 February 2010

Response:

- NI Water has 27 Water Treatment Works (WTW), in service.
- NI Water has 1339 Sewage Pumping Stations (SPS) in service.
- NI Water has 685 Waste Water Treatment Works (WwTw) in service.

Subject: Additions to water in Bangor

Query: Details about the water supply in Bangor West following the recent demise of a customer's goldfish.

Disclosed: 08 September 2008

Response: During and after mains rehabilitation in a particular area there will be fluctuations in chlorine residuals within the distribution system. Whilst the chlorine levels may be slightly above normal for a short period, thereby ensuring bacteriological quality is maintained, there are no associated health risks.

A member of NI Water's scientific staff has indicated that the water used in the change should be dechlorinated (de-chlorination chemicals are available in aquatic shops) and conditioned (left standing in a container for 24 hours) and that this procedure would usually ensure the well-being of the fish.

Subject: Water Treatment

Query: Could you please tell me what other chemicals are added to drinking water?

Disclosed: 02 June 2008

Response: Various chemical coagulants are used at Water Treatment Works (WTW) to remove colour, naturally occurring metal ions and particulate matter. Depending on location these would be Aluminium Sulphate, Ferric Aluminium Sulphate or Poly Aluminium Chloride. They are removed as part of the flocculation (combining suspended solids) and filtration treatment processes at the Water Treatment Works (WTW).

The other chemicals added at WTWs are as follows: -

- Chlorine – used as disinfectant to ensure bacteriological quality of the drinking water.
- Lime and/or Soda Ash – used as a pH stabiliser within the treatment process and to maintain pH above 7 within the distribution system.
- Sulphuric Acid - used at some WTWs to stabilise pH of the coagulation process,
- Carbon Dioxide – used at some WTWs to stabilise alkalinity of the coagulation process.
- Orthophosphoric Acid – used as an inhibitor to Lead solubilisation within the distribution system as part of Lead Reduction Strategy agreed with (and monitored by) Drinking Water Inspectorate, Environment & Heritage Service.
- Carbon – used at some WTWs (where there have been identified problems) for the removal of Taste & Odour and/or pesticide.
- Polyelectrolytes – used at some WTWs as a coagulant aid and subsequently removed within the treatment processes.
- Ozone – used at several WTWs to aid the removal of dissolved organics.

It is important to note that all chemicals used at NI Water WTWs are Drinking Water Inspectorate (DWI) approved and are in common usage throughout the UK Water Industry. There are rigorous control measures in place and a routine sampling programme of the final water leaving the WTWs to ensure compliance with Regulatory Standards.

A Drinking Water Register is maintained recording detailed water quality results for each water supply zone. The Register is available for inspection, free of charge, during normal working office hours at our Customer Relations Centre (CRC). Customers can examine any record on the register and obtain a free copy of the information for the water supply zone they live in. A charge may be made for printed information on other zones. Customers, who wish to receive information about the quality of water in their water supply zone by post, can also write to the address listed below:

NI Water Customer Relations Centre,
4th Floor,
Capital House,
3 Upper Queen St,
Belfast.
BT1 6PU

Alternatively, CRC can also be contacted:-

By telephone: 0845 744 0088 (calls to this number are charged at the local rate).

By email: - waterline@niwater.com

Subject: Flushing of dog waste

Query: Could you please let me know Northern Ireland Waters official viewpoint as to whether or not dog waste is safe to flush?

Disclosed: 13 May 2008

Response: Dog waste is not intrinsically any different from human waste and therefore would not have an adverse effect on either the sewerage system or the receiving Waste Water Treatment Works. However this refers to dog waste only and under no circumstances should plastic bags etc be 'flushed'. This advice applies to a householder and is not applicable to a business such as Kennels, Rescue Centres, Vets etc as such practices could be construed to be Industrial Waste and would require a Consent / Trade Effluent Charge.

Subject: Pest Control at Wastewater Treatment Works

Query: Please advise with regard to NI Water's general pest control measures and issue of Personal Protective Equipment (PPE) at Wastewater Treatment Works (WwTws).

Disclosed: 25 October 07

Response: Under the terms and conditions of Annual Tender C191 (Pest Control and Baiting of Sewers) NIW employ a number of contractors to primarily provide rodent control. Buildings and WwTWs are baited approximately three times a year or if there is serious infestation it is specifically dealt with.

There are no specific controls for filters works. Insects, primarily flies, are not considered to be a pest and as such are not specifically treated. The filter fly is a natural consequence of the availability of suitable food and the presence of an environment resembling that of natural habitats. The fauna of biological filters resembles those of mud flats and decaying seaweed etc. which are natural habitats for flies.

Personal Protective Equipment (PPE) issue to Wastewater Services Operatives includes: overalls, gloves, safety shoes, goggles, disposable face masks (as required).