Clonegal WWTW

ATTACHMENT C1

APPLICATION FOR WASTE WATER Certificate of Authorisation.

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C1

The existing WWTP had been built in 1985 for an estimated capacity of 200 pe. The WWTP is currently receiving a load of 400pe. In spire of this the existing WWTP is performing in a reasonable manner particularly with regard to BOD and Suspended Solids.

There is no nutrient removal at the WWTP so the WWTP would not be reducing P levels down to 1mg/l.
There is also no storm water facilities at the WWTP and currently storm water discharges directly and untreated to the River Derry.

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The Existing Works

The flows enter the WWTP via a 225mm diameter sewer at the north eastern end of the site. The manhole within the site boundary contains a storm overflow which consists of a 225mm pipe to the river. The storm water currently receives no screening at this location.
It then enters a forward feed pump sump. There is a duty and standby pump in the forward feed chamber.
It then is pumped to the Aeration Tank, a concrete tank 6.8m by 6.8m in area and 3.5m deep. Here the effluent receives aeration via a 2.8 kw Venturi Aerator sitting on the floor of the tank. There was a new screen system fitted to the plant in 2012 which provides full screening of all incoming effluent, the control philosophy of how that screen and forward flow to the plant is attached.

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From the Aeration Basin the effluent flows into the clarifier. The clarifier is a concrete tank 4.6m by 4.6m in area and with a hopper at the centre. The hopper at the centre collects sludge. Sludge is then returned to the aeration tank or drawn off by a sludge tanker and transferred to Tullow WWTP.
There is a sludge drying bed on the site but this has not been used for a long period due to issues with smells and odours.

From the Clarifier the effluent discharges into an outlet chamber. There is a measuring device in the outlet chamber but this is not working.
From the outlet chamber effluent then discharges to the River Derry via a 225mm diameter outlet pipe.

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Clonegal WWTW Pump Station control Philosophy

The following is an outline proposal for the operation of the inlet pump station pump rates, activation and timing flowing to the EPS Orca Screen and onto either WWTP or river.

Control System:	Unitronics PLC c/w 5.7" HMI. Invertek VTC-2 VSD to each Pump Siemens Ultrasonic Level monitoring sytem in Wet well Siemens Dn150 Magflowmeter for Total pumped flow Siemens DN100 Magflowmeter for flow to WWTP.
Pump Spec:	Homa 4" Vortex pumps, 1450Rpm motor.
Max Design Duty:	20 ltr/sec @ 7m total head at 50hz.
Set min Duty:	3 ltr/sec @ 5m total head at ?Hz.

Control Philosophy:

General Principal – total flow to WWTP in 24 hrs is not to exceed $90m^3$. This equates to 3ltr/sec for max of 8hrs / day.
A flow limiting gate is in place after the screen to divert flows in excess of 3ltr/sec (or a pre set max flow) to river (overflow). All flows are pumped to the screen before with diversion chamber.

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Using realtime clock to allow for Peak loading of upto 3DWF during Peak times, and a general pump inhibit timer at all other times when higher flow are likely cause by rain event (thus very dilute influent).

During Peak times (eg: 7am-9am), pumps can operate to pump upto 3DWF as required

During "off-peak" periods, pumps should be time-limited to pump forward for upto 1/3 of the total time. The rate of pumping to cater for all possible inflow should be between min and Duty-Assist max flow (3-40ltr/sec) required to keep sump from overflowing to river, allowing max 3DWF (3ltr/sec) to WWTW – this will ensure total flow is limited to the plant as required and only dilute flows are sent to river via storm diversion system. The rate of flow will increase as required as follows in "off-peak" times:

Cut-in level at	0.5m
Cut-out level at	0.4m

Upon exceeding Cut-in level, pump 1 starts at min speed - PID control using Sump level reaction rate and pump speed should be utilised during storm events. As level rises past Cut in, Pump speed increases to max . with pump 1 at max speed, if level continues to rise, pump 1 ramps to min speed, pump 2 starts and ramps to min speed, they both then ramp up together to match and beat the inflow to reduce the level as required until cut-out is reached.

Upon reaching Cut-out, the total pump run time is logged and the system will be inhibited for twice this time period unless a pre determined Hi level is reached first.
In this case the pump(s) will start at the correct PID determined speed and pump to Cut –out again. This high level should be safely below sump inlet to allow for reaction and ramp up time of pumps.

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Upon reaching Cut-out level, inhibiting for required time, the cycle timer resets and pumps will start to pump at min rate of 3ltr/sec when called on.

For Peak times: (which can be user set if required)

- 7-9am
- 12-2pm
- 5-7pm

The pumps must pump at 3ltr/sec as required without (or with minimal) inhibit.
Hi and Hi-Hi levels should be set at slightly higher levels during this period as base flow will be higher, wider use of the tank retention ability should be utilised as dilution will be less in general. minimum pumping flowrate should be used to clear storm effect additional flow during these periods while maximising Hi loaded biological flow to the plant – PID control using Sump level reaction rate and pump speed should be utilised to maximise this during storm events. As level rises past Cut in, Pump speed increases to max. If level continues to rise, pump 1 ramps to min speed, pump 2 starts and ramps to min speed, they both then ramp up together to match and beat the inflow to reduce the level as required until cut-out is reached. Pump 2 ramps down and drops out as required after running at min speed for set time.

The PLC should log total flow for each day at end of evening peak time. This info can be used to evaluate allowed pump on-off bias time periods during evening off peak time. The overall timer and flow counters should reset at start of morning peak period – 7am.

Eg: if 60m^3 of allowed 90m^3 have been pumped to WWTP during the day, 30m^3 can be pumped over the remaining 12 hours. This allows 2.5m^3/hr to plant. Which allows for 14mins pumping per hour (at 10.8m^3 to plant) or - roughly inhibited for 3 times the duration of each pumping period – ie 1min on, 3 mins off.
This will mean higher pump rates required when pump is on.

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If cut in level is exceeded when inhibit is de-activated – PID control sets initial speed accordingly in relation to level of excedence over cut-in. it maintains this speed to cut-out. This should ensure high levels are avoided where possible and low concentration loaded night flows are managed. High night flows will be very dilute.

Pump flow and Current usage graphs should be stored for constant comparison within the PLC to determined inefficient pump operation, blockages etc. pump to stop, reverse and pump forward, re-evaluate in this case.
Pumps to pump to ultra-low level (0.25m) once per 2 hour period to maintain clean sump.

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D0395-01 - Estimation of Dry Weather Flow

Location: E 291717 N160752

Waterbody: Derry River

Date of evaluation: 12/09/2013

Evaluation carried out by: Rebecca Quinn

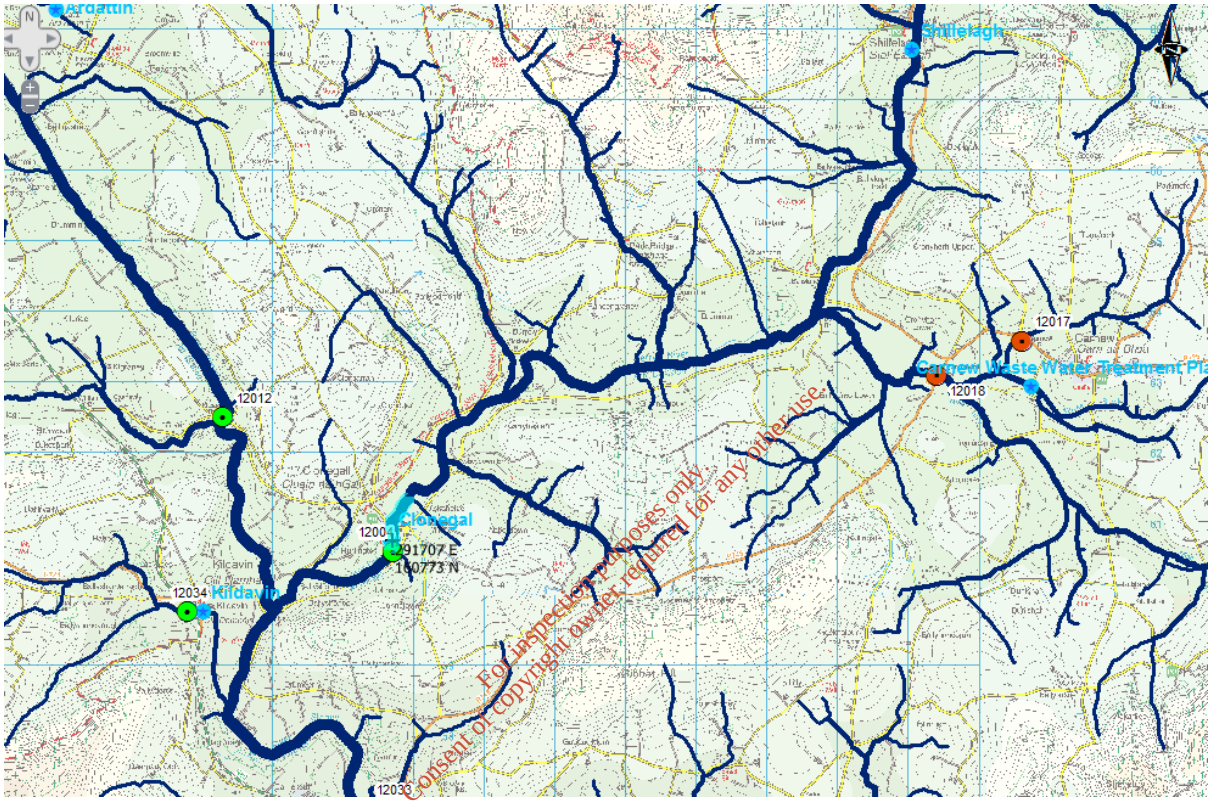

Figure 1: Location of Clonegal on the Derry River highlighted.

Available hydrometric data: The closest hydrometric station is downstream of the location at 12004 Clonegal (Carlow County Council). This is a staff gauge only station with limited flow measurements.

The nearest hydrometric station with continuous flow data is on the Slaney, Station 12001 Scarawalsh (OPW). There are a number of synchronous flow measurements between station 12004 and station 12001.

Result: The estimated Dry Weather Flow for hydrometric station 12004 Clonegal is 0.25m^3/s

Note: The above estimate of Dry Weather Flow is based on available data to date. This value may be revised in the future when more hydrometric data becomes available.

The dry weather flow is the annual daily mean flow with a return period of 50 years. It is recommended that a minimum of 25 years, continuous flow data, be used in the analysis. In the absence of long-term continuous flow data, as is the case on the Derry River, recourse is made to best estimate based on spot flow measurements.

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Method of estimation:

The station 12001 Scarawalsh was taken as an analogue station for the purposes of comparing flow data to the spot flow measurements taken at 12004 Clonegal on the Derry River. This station was chosen as it is the only station in the vicinity with long-term continuous flow data and has similar catchment characteristics to the Derry River.

All available continuous flow data (01/01/1971 to 31/12/2010) for the station 12001 Scarawalsh were evaluated. A low flow extreme value statistical analysis was conducted on data from 01/10/1971 to 30/09/2010. An EV2 distribution function using a simple method of moments was used to analyse the data and gave a value of 1.3m^3/s for a return period of 50 years. The catchment area to the station is 1030km^2.

Synchronous flow measurements taken at stations 12001 and 12004 were analysed and are summarised in table 1. A relationship between flows at both stations was established as shown in figure 2.

Table 1: Synchronous flow measurements at stations 12004 and 12001

Date	12004 CLONEGAL. Flow Measurements [m^3/s]	12001 SCARAWALSH. Daily Mean Flow [m^3/s]
27/09/1995	0.3586	2.0667
28/09/1990	0.424	1.0618
10/08/1990	0.517	4.5403
10/10/1990	0.6	1.9872
04/09/1981	0.792	3.6353
28/08/1981	0.8325	4.7181
28/09/1979	0.9395	7.3034
18/10/1978	0.9787	4.2202
21/08/1981	1.0421	2.9652
14/08/1981	1.1933	5.46
22/06/1989	1.2302	6.2427
08/10/1991	1.3231	9.9343
20/11/1978	1.3762	2.1635
08/09/1992	1.5843	6.9725
07/05/1980	1.8977	10.2479
28/10/1981	3.9653	15.3511
09/01/1984	5.9435	26.5874
22/01/1979	6.5418	27.7083
20/02/1979	8.0391	32.6365

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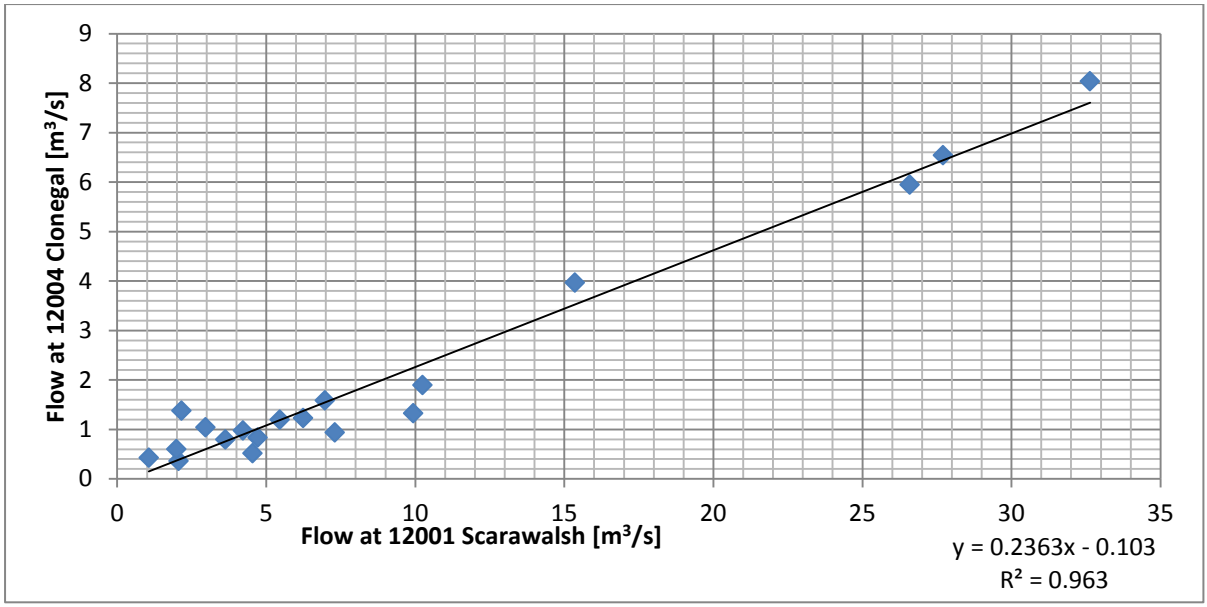

Figure 2: Relationship between flow at Clonegal and Scarawalsh

Taking the DWF at 12001 Scarawalsh as 1.3m^3/s, then based on this relationship between the flows at the two stations the estimated DWF for 12004 Clonegal is 0.25m^3/s.

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Clonegal Waste Water Treatment Plant - Monitoring Results 2009 - 2011 (Average Results mg/l)									
	Upstream	Downstream	Outlet		EPA ELV's	*Surface Water Regulations 2009*			
Ammonia	0.0268	0.13	16.91			High status ≤0.040 (mean) or ≤0.090 (95%ile)			
						Good status ≤0.065 (mean) or ≤0.140 (95%ile)			
BOD	1.14	<2	31		25	High status ≤1.3 (mean) or ≤2.2 (95%ile)			
						Good status ≤1.5 (mean) or ≤2.6 (95%ile)			
Ortho-P	0.033	0.059	2.84			High status ≤0.025 (mean) or ≤0.045 (95%ile)			
						Good status ≤0.035 (mean) or ≤0.075 (95%ile)			
Total N	4.47	4.6	32.9						
Total P	0.103	0.118	5.5						
TSS	5.18	10	38.7		35				
Nitrates	10.5	9.95							
95% flow = 1.0895m3/sec									
Flow From Plant		72	m3/day						
Discharge	Current 4year Average	With New Plant Complying with EPA Licencse	Assimilative Capacity	Concentration in river using EPA ELV's	Concentration in river using current discharge level's				
	kg/day	kg/day	kg/day	mg/l	mg/l				
Ammonia	1.22	0.00	2.01	0.03	0.33				
BOD	2.24	1.80	26.5	0.48	1.32				
Ortho-P	0.30	0.00	1.03	0.011	0.04				
Total N	2.36								
Total P	0.40	0.00		0.017	0.058				
TSS	4.71	2.52	508	1.08	1.46				
Note 1:Good status figures from Surface water Regs used to calculated AC for BOD, Ammonia, ortho-p. Salmonid Rivers limit used for SS.									
Assimilative Capacity=(Cmax-Cback)xF95X86.4 kg/day where Cmax is EQS 95%ile, C back is mean background concentration, F95 is 95%ile flow in river.									
Note 2:Concentration Figures calculated using formula T=FC+fc/F+f									
where F=95%ile flow in river, C=mean background concentration, f = maximum discharge flow, c = maximum concentration in the discharge									

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Clonegal WwTP Calculations						
Kg Discharge to River from WwTP						
Flow from plant (m3, litres)	72	72000	1000000			
	BOD	Ammonia	TP	Ortho-P	TN	TSS
Current discharge average level	31.1	16.9	5.5	2.84	32.9	65.35
EPA Limit	25	2	0.5	0.4	No ELV	25
Kgs Discharge to river /day at current level	2.2392	1.2168	0.396	0.2988	2.3688	4.7052
Concentrations in River as result of discharge						
	BOD	Ammonia	TP	Ortho-P	TN	TSS
T=Fc+fc/F+f (Formula used)						
River flow 95%ile m3/s F	1.0895	1.0895	1.0895	1.0895	1.0895	1.0895
C mean background	1.14	0.0268	0.103	0.033	4.47	5.18
f = max discharge flow	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
c=max concentration in discharge (current Level)	31.1	16.9	5.5	2.84	32.9	65.35
c=max concentration in discharge (ELV Level)	25	2	0.5	0.4	No ELV	25
Concentration in river at current level	1.264849	0.041599	0.1162541	0.038037	4.894205	5.69156
Assimilative capacity in river						
AC=(Cmax-Cback)*F95*86.4 kgs/day						
Cmax mg/l	2.2	0.14		0.075		25
Cbackground (u/s monitoring) mg/l	1.14	0.0268	0.103	0.033	4.47	5.18
F 95	1.0895	1.0895	1.0895	1.0895	1.0895	1.0895
	86.4	86.4	86.4	86.4	86.4	86.4
Assimilative capacity in river Kgs	99.78077	10.65583		3.953578		1865.712

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1.0 Effluent Dilution.

The Clonegal WWTW discharges directly into the Derry River. The Derry River had a Q4 rating in 2003,.

There is a staff gauge on the Derry River at Clonegal and the 95%ile flow is for the staff gauge at Clonegal as measured by the EPA, the median flow is an estimated flow.

- Calculated long-term 95%ile flow - 0.58m3/s
- Estimated 50%ile flow > 2.0m3/s

WWTW Flows

The flow modelled for the discharge from the WWTW is 230 l/h/d for the average flow, with the dry weather flow (DWF) being 180l/h/d. These correspond to a daily flow average flow of 230m3/d and a DWF of 180 m3/d for a population equivalent of 1000pe. These flows are then modelled discharging into the Derry River at 50%ile and 95%ile flows.

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The parameters considered for assimilative capacity are BOD, Phosphorous and ammonia and the final effluent concentrations for the future design loading are set out in the Table 1 below and the resulting increases in the parameter concentrations in the receiving waters as a result of these discharges are set out in Table 2 below. The model data for these tables is contained in Appendix A.

Table 1 - Concentrations of parameters discharged to river by Clonegal WWTW

River	BOD mg/l	Amm N mg/l	Phosphorous mg/l	ORP mg/l
Derry River	10	5	2	1

Table 3 – Increases in Parameter Concentrations in Receiving waters

River Flow	BOD mg/l	Amm N mg/l	ORP mg/l
95%ile Flow	0.1	0.016	0.002
50%ile Flow	0.03	0.004	0.001

BOD

A final effluent standard of 10mg/l was selected for Clonegal WWTW, this is a strict standard given the dilutions provided by the Derry River, this was selected because the Derry river flows into the Slaney River about 2 miles south of the wwtw discharge and the Slaney River is a Salmonid river.

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The BOD concentration of 10 mg/l was used in the water dilution modelling as this is a worst case as the WWTW is designed to achieve this for 95% of the time so on average it should be producing a BOD concentration of less than 5mg/l. The BOD concentrations in the Derry River as a result of the WWTW discharge are 0.1 mg/l at 95%ile low flow and 0.03 mg/l at median flow which are negligible concentrations and would be consistent with a high water quality status or Q5 rating and is an improvement compared with the loads discharged from the old works.

Ammonia

An Ammonia concentration of 5mg/l was used for the water quality modelling, this would be a worst case as on average the ammonia in the effluent would be around 2 mg/l. The ammonia concentrations in the Derry River as a result of the WWTW discharge are 0.016 mg/l at 95%ile low flow and 0.004 mg/l at median flow. These are very low concentrations and would have minimum impact on the water quality in the receiving water and would be consistent with a Q5 water quality. They are also be a reduction of some 3-4 times that discharged by the old works.

Phosphorous, ORP

A phosphorous concentration of 1 mg/l was used for the dilution modelling this was modelled as an ORP concentration of 0.5mg/l. The ORP concentrations in the Derry River as a result of the WWTW discharge are 0.002 mg/l at 95%ile low flow and less than 0.001 mg/l at median flow. Given the dilutions available the impact of the wwtw ORP discharge is minimal and would have little additional impact on receiving water quality. The old works had P discharges of between 4 – 8 mg/l as there was no P reduction so with the new WWTW at the future design loading of 1000pe discharging at less than 1mg/l, there would be 3-4 times less phosphorous being discharged into the river, thus improving the water quality.

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Appendix A – Modelling Data

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River Derry and Slaney Low Flow Data - EPA

Station Number	Waterbody	Location	Body Responsible	Hydro-Office Responsible	Station Status	EASTING	NORTHING	irish grid by GPS	Longitude	Latitude	TYPE
12004	DERRY	CLONEGAL	Carlow County Council	KIK	Active Secondary	291710	160619		-6.6444534	52.6893360	RIVER
12019	DERRY	TINAHELY	Wicklow County Council	DUB	Obsolete	303696	173264		-6.4632679	52.8007625	RIVER
12001	SLANEY	SCARAWALSH	Office of Public Works	KIK	Act. Permanent	298380	145014		-6.5504855	52.5479840	RIVER
12002	SLANEY	ENNISCORTHY	Office of Public Works	KIK	Act. Permanent	297431	139891		-6.5659704	52.5479840	TIDAL
12012	SLANEY	KILCARRY	Carlow County Council	KIK	Active Secondary	289304	162519		-6.6795096	52.7068064	RIVER
12013	SLANEY	RATHVILLY	Carlow County Council	KIK	Active Primary	288470	184349		-6.6859433	52.7068064	RIVER
12021	SLANEY	TULLOW	Carlow County Council	KIK	Obsolete	285120	173149		-6.7386371	52.8029766	RIVER
12027	SLANEY	CLOHAMON	Kilkenny County Council	KIK	Obsolete	293293	154809		-6.6226926	52.6368723	RIVER
12033	SLANEY	BUNCLODY	Wexford County Council	KIK	Active Secondary	291284	156984		-6.6517576	52.6567528	RIVER
12035	SLANEY	RATHVILLY D/S	Wicklow County Council	KIK	Active Secondary	288399	184227		-6.6870313	52.9019678	RIVER
12037	SLANEY	CASTLERUDDERY	Wicklow County Council	DUB	Obsolete	290907	193888	N 90902 / 93894	-6.6470650	52.9883357	RIVER
12060	SLANEY	WEXFORD	Wexford County Council	KIK	Obsolete	303900	122900		-6.4760192	52.3483060	TIDAL
12061	SLANEY	EDERMINE	Wexford County Council	KIK	Obsolete	297854	134200		-6.5614126	52.3483060	TIDAL

Station Number	Waterbody	Station Type	RIVER BASIN DISTRICT	CATCHNAME	Station Catchment Area [	Long Average Rainfall 41-60 (mm/annum)	Additional Comments
12004	DERRY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	242.894		
12019	DERRY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	32.791		
12001	SLANEY	Logger/Autographic Recorder	SOUTH EASTERN RBD	Slaney	1030.754	1108.0	Velocity-area station with natural control. Unstable con
12002	SLANEY	Autographic Recorder	SOUTH EASTERN RBD	Slaney	1319.920	1070.0	Velocity-area station with natural control. Partly affecte
12012	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	558.940	1104.0	
12013	SLANEY	Data Logger	SOUTH EASTERN RBD	Slaney	204.390	1231.0	Velocity-area station with natural control. Unstable (gra
12021	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	249.051		
12027	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	902.963		
12033	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	848.679		Water Supply abstraction D/S of site
12035	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD	Slaney	204.555		
12037	SLANEY	Autographic Recorder	SOUTH EASTERN RBD	Slaney	76.838		Velocity-area station with rock outcrop as control (Reco
12060	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD		0.000		
12061	SLANEY	Staff Gauge Only	SOUTH EASTERN RBD		1641.376		

Station Number	Waterbody	Long Average Rainfall 71-00 (mm/annum)	DWF (m³/s	95 percentile (m³/s)	Comment - DWF 95%	IRISH_GRID
12004	DERRY	1140.6	0.2800	0.5800		S917606
12019	DERRY	1170.5	0.0250	0.0450		T036732
12001	SLANEY	1143.3	1.6000	3.4000		S983450
12002	SLANEY	1140.1	1.9 *	4.4 *	* Freshwater inflow	S973399
12012	SLANEY	1138.5	1.0000	--		S896625
12013	SLANEY	1249.7	0.6400	1.1500	ɔstraction at Rathvilly (Carlo	S882844
12021	SLANEY	1196.0	0.7800	1.8000		S852732
12027	SLANEY	1143.7				S933548
12033	SLANEY	1135.7	1.3000	3.0000		S913570
12035	SLANEY	1249.5				S882844
12037	SLANEY	1509.9	0.3200	0.5600		S909939
12060	SLANEY	#N/A				T039229
12061	SLANEY	1153.6				S978342

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River Derry and Slaney Low Flow Data - EPA

LOC_VERIF	*LA Y/N*	*HYDRO_Area*	*Purpose of Station*
Y	Y	12	
Y	Y	12	
Y	N	12	
Y	N	12	
Y	Y	12	
y	Y	12	
Y	Y	12	
Y	Y	12	
Y	Y	12	
Y	Y	12	
Y	Y	12	
Y	Y	12	
Y	Y	12	

ıtrol. Poor rating.
by tides. Stable control. Very good rating at low and middle flow Uncertain upper rating due to effect of tides.

ıvel) control. Poor rating.

ɔrds end 1998)

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WWTW DWF Effluent Discharges
BOD, Ortho P and Amm N concentrations in Receiving River Waters

Clonegal WWTW - PE = 1000

Derry River - 95%ile Flow

River Flow		WTTW PE = 800				WTTW PE = 1000				WTTW PE = 1500				WTTW PE = 2500			
l/s		Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N
Derry River			mg/l	mg/l	mg/l		mg/l	mg/l	mg/l		mg/l	mg/l	mg/l		mg/l	mg/l	mg/l
50		27.00	0.93	0.019	0.144	21.60	1.16	0.023	0.180	14.40	1.74	0.035	0.270	8.64	2.89	0.058	0.450
60		32.40	0.77	0.015	0.120	25.92	0.96	0.019	0.150	17.28	1.45	0.029	0.225	10.37	2.41	0.048	0.375
70		37.80	0.66	0.013	0.103	30.24	0.83	0.017	0.128	20.16	1.24	0.025	0.193	12.10	2.07	0.041	0.321
80		43.20	0.58	0.012	0.090	34.56	0.72	0.014	0.112	23.04	1.09	0.022	0.169	13.82	1.81	0.036	0.281
90		48.60	0.51	0.010	0.080	38.88	0.64	0.013	0.100	25.92	0.96	0.019	0.150	15.55	1.61	0.032	0.250
100		54.00	0.46	0.009	0.072	43.20	0.58	0.012	0.090	28.80	0.87	0.017	0.135	17.28	1.45	0.029	0.225
150		81.00	0.31	0.006	0.048	64.80	0.39	0.008	0.060	43.20	0.58	0.012	0.090	25.92	0.96	0.019	0.150
200		108.00	0.23	0.005	0.036	86.40	0.29	0.006	0.045	57.60	0.43	0.009	0.067	34.56	0.72	0.014	0.112
250		135.00	0.19	0.004	0.029	108.00	0.23	0.005	0.036	72.00	0.35	0.007	0.054	43.20	0.58	0.012	0.090
300		162.00	0.15	0.003	0.024	129.60	0.19	0.004	0.030	86.40	0.29	0.006	0.045	51.84	0.48	0.010	0.075
350		189.00	0.13	0.003	0.021	151.20	0.17	0.003	0.026	100.80	0.25	0.005	0.039	60.48	0.41	0.008	0.064
400		216.00	0.12	0.002	0.018	172.80	0.14	0.003	0.022	115.20	0.22	0.004	0.034	69.12	0.36	0.007	0.056
500		270.00	0.09	0.002	0.014	216.00	0.12	0.002	0.018	144.00	0.17	0.003	0.027	86.40	0.29	0.006	0.045
580		313.20	0.08	0.002	0.012	250.56	0.10	0.002	0.016	167.04	0.15	0.003	0.023	100.22	0.25	0.005	0.039
700		378.00	0.07	0.001	0.010	302.40	0.08	0.002	0.013	201.60	0.12	0.002	0.019	120.96	0.21	0.004	0.032
900		486.00	0.05	0.001	0.008	388.80	0.06	0.001	0.010	259.20	0.10	0.002	0.015	155.52	0.16	0.003	0.025
1000		540.00	0.05	0.001	0.007	432.00	0.06	0.001	0.009	288.00	0.09	0.002	0.013	172.80	0.14	0.003	0.022
1500	Estimated	810.00	0.03	0.001	0.005	648.00	0.04	0.001	0.006	432.00	0.06	0.001	0.009	259.20	0.10	0.002	0.015
2000	50%ile Flows	1080.00	0.02	0.000	0.004	864.00	0.03	0.001	0.004	576.00	0.04	0.001	0.007	345.60	0.07	0.001	0.011
2500		1350.00	0.02	0.000	0.003	1080.00	0.02	0.000	0.004	720.00	0.03	0.001	0.005	432.00	0.06	0.001	0.009
3000		1620.00	0.02	0.000	0.002	1296.00	0.02	0.000	0.003	864.00	0.03	0.001	0.004	518.40	0.05	0.001	0.007
3500		1890.00	0.01	0.000	0.002	1512.00	0.02	0.000	0.003	1008.00	0.02	0.000	0.004	604.80	0.04	0.001	0.006
4000		2160.00	0.01	0.000	0.002	1728.00	0.01	0.000	0.002	1152.00	0.02	0.000	0.003	691.20	0.04	0.001	0.006

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Effluent Discharge Levels

Per capita discharge	200	l/c/d
BOD	25	mg/l
P	1	mg/l
Ortho P	0.5	mg/l
Amm N	5	mg/l
Amm N as N	3.9	mg/l

Flows

95%ile flows are measured from EPA staff gauge data for theDerry River at Clonegal(staff gauge), The median flow is estimated.

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WWTW DWF Effluent Discharges
BOD, Ortho P and Amm N concentrations in Receiving River Waters

Clonegal WWTW - PE = 1000

Derry River - 95%ile Flow

River Flow		WTTW PE = 800				WTTW PE = 1000				WTTW PE = 1500				WTTW PE = 2500			
l/s		Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N	Dilution	BOD	Ortho P	Amm N
Derry River			mg/l	mg/l	mg/l		mg/l	mg/l	mg/l		mg/l	mg/l	mg/l		mg/l	mg/l	mg/l
50		27.00	0.93	0.019	0.144	21.60	1.16	0.023	0.180	14.40	1.74	0.035	0.270	8.64	2.89	0.058	0.450
60		32.40	0.77	0.015	0.120	25.92	0.96	0.019	0.150	17.28	1.45	0.029	0.225	10.37	2.41	0.048	0.375
70		37.80	0.66	0.013	0.103	30.24	0.83	0.017	0.128	20.16	1.24	0.025	0.193	12.10	2.07	0.041	0.321
80		43.20	0.58	0.012	0.090	34.56	0.72	0.014	0.112	23.04	1.09	0.022	0.169	13.82	1.81	0.036	0.281
90		48.60	0.51	0.010	0.080	38.88	0.64	0.013	0.100	25.92	0.96	0.019	0.150	15.55	1.61	0.032	0.250
100		54.00	0.46	0.009	0.072	43.20	0.58	0.012	0.090	28.80	0.87	0.017	0.135	17.28	1.45	0.029	0.225
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580	Measured	313.20	0.08	0.002	0.012	250.56	0.10	0.002	0.016	167.04	0.15	0.003	0.023	100.22	0.25	0.005	0.039
700	95%ile flows	378.00	0.07	0.001	0.010	302.40	0.08	0.002	0.013	201.60	0.12	0.002	0.019	120.96	0.21	0.004	0.032
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1500	Estimated	810.00	0.03	0.001	0.005	648.00	0.04	0.001	0.006	432.00	0.06	0.001	0.009	259.20	0.10	0.002	0.015
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2500		1350.00	0.02	0.000	0.003	1080.00	0.02	0.000	0.004	720.00	0.03	0.001	0.005	432.00	0.06	0.001	0.009
3000		1620.00	0.02	0.000	0.002	1296.00	0.02	0.000	0.003	864.00	0.03	0.001	0.004	518.40	0.05	0.001	0.007
3500		1890.00	0.01	0.000	0.002	1512.00	0.02	0.000	0.003	1008.00	0.02	0.000	0.004	604.80	0.04	0.001	0.006
4000		2160.00	0.01	0.000	0.002	1728.00	0.01	0.000	0.002	1152.00	0.02	0.000	0.003	691.20	0.04	0.001	0.006

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Amm N as N	3.9	mg/l

Flows

95%ile flows are measured from EPA staff gauge data for theDerry River at Clonegal(staff gauge), The median flow is estimated.

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SITE SYNOPSIS

SITE NAME: SLANEY RIVER VALLEY

SITE CODE: 000781

This site comprises the freshwater stretches of the Slaney as far as the Wicklow Mountains; a number of tributaries the larger of which include the Bann, Boro, Glasha, Clody, Derry, Derreen, Douglas and Carrigower Rivers; the estuary at Ferrycarrig and Wexford Harbour. The site flows through the counties of Wicklow, Wexford and Carlow. Towns along the site but not in it are Baltinglass, Hacketstown, Tinahely, Tullow, Bunclody, Camolin, Enniscorthy and Wexford. The river is up to 100 m wide in places and is tidal at the southern end from Edermine Bridge below Enniscorthy. In the upper and central regions almost as far as the confluence with the Derry River the geology consists of granite. Above Kilcarry Bridge, the Slaney has cut a gorge into the granite plain. The Derry and Bann Rivers are bounded by a narrow line of uplands which corresponds to schist outcrops. Where these tributaries cut through this belt of hard rocks they have carved deep gorges, more than two miles long at Tinahely and Shillelagh. South of Kildavin the Slaney flows through an area of Ordovician slates and grits.

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The site is a candidate SAC selected for alluvial wet woodlands, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, estuaries, tidal mudflats and old oak woodlands, all habitats listed on Annex I of the E.U. Habitats Directive. The site is further selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Twaite Shad, Atlantic Salmon and Otter.

Floating river vegetation is found along much of the freshwater stretches within the site. Species present here include Pond Water-crowfoot (*Ranunculus peltatus*), Water-crowfoot (*Ranunculus* spp.), Canadian Pondweed (*Elodea canadensis*), Broad-leaved Pondweed (*Potamogeton natans*), Water Milfoil (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), Water-starwort (*Callitriche* spp.), Hemlock Water-dropwort, Fine-leaved Water-dropwort (*Oenanthe aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica*. Two rare aquatic plant species have been recorded in this site: Short-leaved Water-starwort (*Callitriche truncata*), a very rare, small aquatic herb found nowhere else in Ireland; and Opposite-leaved Pondweed (*Groenlandia densa*), a species that is legally protected under the Flora Protection Order, 1999.

Good examples of wet woodland are found associated with Macmine marshes, along banks of the Slaney and its tributaries and within reed swamps. Grey Willow (*Salix cinerea*) scrub and pockets of wet woodland dominated by Alder (*Alnus glutinosa*) have become established in places. Ash (*Fraxinus excelsior*) and Birch (*Betula pubescens*) are common in the latter and the ground flora is typical of wet woodland with Meadowsweet (*Filipendula ulmaria*), Angelica (*Angelica sylvestris*), Yellow Iris, Horsetail (*Equisetum* spp.) and occasional tussocks of Greater Tussock-sedge (*Carex paniculata*). These woodlands have been described as two types: one is quite eutrophic, is dominated by Willow and is subject to a tidal influence. The

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other is flushed or spring-fed subject to waterlogging but not to flooding and is dominated by Alder and Ash.

Old oak woodlands are best represented at Tomnafinnoge though patches are present throughout the site. At Tomnafinnoge the wood is dominated by mature, widely spaced Sessile Oak (*Quercus petraea*), which were planted around 1700, with some further planting in 1810. There is now a varied age structure with overmature, mature and young trees; the open canopy permits light to reach the forest floor and encourages natural regeneration of Oak. As well as Oak, the wood includes the occasional Beech (*Fagus sylvatica*), Birch (*Betula* sp.), Rowan (*Sorbus aucuparia*) and Scots Pine (*Pinus sylvestris*).

The shrub layer is well-developed with Hazel (*Corylus avellana*) and Holly (*Ilex aquifolium*) occurring. The ground layer consists of Great Wood-rush (*Luzula sylvatica*) and Bilberry (*Vaccinium myrtillus*), with some Bracken (*Pteridium aquilinum*) and Brambles (*Rubus fruticosus* agg.). Herbaceous species in the ground layer include Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Common Cow-wheat (*Melampyrum pratense*) and Bluebell (*Hyacinthoides non-scripta*). Many of the trees carry an epiphytic flora of mosses, Polypody Fern (*Polypodium vulgare*), and lichens such as *Usnea comosa, Evernia prunastri*, *Ramalina* spp. and *Parmelia* spp.

Tomnafinnoge Wood is a remnant of the ancient Shillelagh Oak woods, and it appears that woodland has always been present on the site. In the past, the wood was managed as a Hazel coppice with Oak standards, a common form of woodland management in England but not widely practised in Ireland. The importance of the woodland lies in the size of the trees, their capacity to regenerate, their genetic continuity with ancient woodland and their historic interest. The nearest comparable stands are at Abbeyleix, Co. Laois and Portlaw, Co. Waterford.

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Below Enniscorthy there are several areas of woodland with a mixed canopy of Oak, Beech, Sycamore (*Acer pseudoplatanus*), Ash and generally a good diverse ground flora. Near the mouth of the river at Ferrycarrig is a steep south facing slope covered with Oak woodland. Holly and Hazel are the main species in the shrub layer and a species-rich ground flora typical of this type of Oak woodland has abundant ferns - *Dryopteris filix-mas, Polystichum setiferum, Phyllitis scolopendrium* - and mosses - *Thuidium tamariscinum, Mnium hornum, Eurynchium praelongum.*

North of Bunclody, the river valley still has a number of dry woodlands though these have mostly been managed by the estates with the introduction of Beech and occasional conifers. The steeper sides are covered in a thick scrub from which taller trees protrude. At the southern end of the site, the Red Data Book species Yellow Archangel (*Lamiastrum galeobdolon*) occurs. Three more Red Data Book species have also been recorded from the site: Basil Thyme (*Acinos arvensis*), Blue Fleabane (*Erigeron acer*) and Small Cudweed (*Filago minima*). A nationally rare species Summer Snowflake (*Leucojum aestivum*) is also found within the site.

Mixed woodlands occur at Carrickduff and Coolaphuca in Bunclody. Oak trees, which make up the greater part of the canopy, were originally planted and at the present time are not

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regenerating actively. In time, if permitted, the woodland will probably go to Beech. A fair number of Yew (*Taxus baccata*) trees have also reached a large size and these, together with Holly give to the site the aspect of a south-western Oak wood.

The site is considered to contain a very good example of the extreme upper reaches of an estuary. Tidal reedbeds with wet woodland are present in places. The fringing reed communities support Sea Club-rush (*Scirpus maritimus*), Grey Club-rush (*S. tabernaemontani*) and abundant Common Reed (*Phragmites australis*). Other species occurring are Bulrush (*Typha latifolia*), Reed Canary-grass (*Phalaris arundinacea*) and Branched Bur-reed (*Sparganium erectum*). The reed-swamp is extensive around Macmine, where the river widens and there are islands with swamp and marsh vegetation.

Further south of Macmine are expanses of intertidal mudflats and sandflats and shingly shore often fringed with a narrow band of salt marsh and brackish vegetation. Narrow shingle beaches up to 10 m wide occur in places along the river banks and are exposed at low tide. Upslope the shingle is sometimes colonised by Saltmarsh Rush (*Juncus gerardi*), Townsend's Cord-grass (*Spartina townsendii*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Hemlock Water-dropwort (*Oenanthe crocata*) and Himalayan Balsam (*Impatiens glandulifera*).

Wexford Harbour is an extensive, shallow estuary which dries out considerably at low tide exposing large expanses of mudflats and sandflats. The harbour is largely sheltered by the Raven Point to the north and Rosslare Point in the south.

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Other habitats present within the site include species-rich marsh in which sedges such as *Carex disticha, Carex riparia* and *Carex vesicaria* are common. Among the other species found in this habitat are Yellow Iris (*Iris pseudacorus*), Water Mint (*Mentha aquatica*), Purple Loosestrife (*Lythrum salicaria*) and Soft Rush (*Juncus effusus*). Extensive marshes occur to the west of Casltebridge associated with the tidal areas of the River Sow.

The site supports populations of several species listed on Annex II of the EU Habitats Directive including the three Lampreys - Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) and Brook Lamprey (*Lampetra planeri*), Otter (*Lutra lutra*), Salmon (*Salmo salar*), small numbers of Freshwater Pearl Mussel (*Margaritifera margaritifera*) and in the tidal stretches, Twaite Shad (*Alosa fallax fallax*). A survey of the Derreen River in 1995 estimated the population of Freshwater Pearl Mussel at about 3,000 individuals. This is a significant population, especially in the context of eastern Ireland. The Slaney is primarily a spring salmon fishery and is regarded as one of the top rivers in Ireland for early spring fishing. The upper Slaney and tributary headwaters are very important for spawning.

The site supports important numbers of birds in winter. Little Egret are found annually along the river. This bird is only now beginning to gain a foothold in Ireland and the south-east appears to be its stronghold. Nationally important numbers of Black-tailed Godwit, Teal, Tufted Duck, Mute Swan, Little Grebe and Black-headed Gull are found along the estuarine stretch of the river. The mean of the maximum counts over four winters (1994/98) along the stretch between Enniscorthy and Ferrycarrig is: Little Egret (6), Golden Plover (6), Wigeon (139), Teal (429), Mallard (265), Tufted Duck (171), Lapwing (603), Shelduck (16), Black-tailed Godwit (93), Curlew (81), Red-breasted Merganser (11), Black-headed Gull (3030), Goldeneye (45), Oystercatcher (19), Redshank (65), Lesser Black-backed Gull (727), Herring

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Gull (179), Common Gull (67), Grey Heron (39), Mute Swan (259) and Little Grebe (17). Wexford Harbour provides extensive feeding grounds for wading birds and Little Terns, which are listed on Annex I of the E.U. Birds Directive have bred here in the past.

The Reed Warbler, which is a scarce breeding species in Ireland, is regularly found in Macmine Marshes but it is not known whether or not it breeds in the site. The Dipper also occurs on the river. This is a declining species nationally.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger, Irish Hare and Daubenton's Bat. Common Frog (*Rana temporaria*), another Red Data Book species, also occurs within the site.

Agriculture is the main landuse. Arable crops are important. Improved grassland and silage account for much of the remainder. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of Annex II animal species within it. Run-off is undoubtedly occurring, as some of the fields slope steeply directly to the river bank. In addition, cattle have access to the site in places. Fishing is a main tourist attraction along stretches of the Slaney and its tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place. There are some gravel pits along the river below Bunclody and many of these are active. There is a large landfill site adjacent to the river close to Hacketstown and at Killurin. Boating, bait-digging and fishing occur in parts of Wexford Harbour.

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Waste water outflows, runoff from intensive agricultural enterprises, a meat factory at Clohamon and a landfill site adjacent to the river and further industrial development upstream in Enniscorthy and in other towns could all have potential adverse impacts on the water quality unless they are carefully managed. The spread of exotic species is reducing the quality of the woodlands.

The site supports populations of several species listed on Annex II of the EU Habitats Directive, and habitats listed on Annex I of this directive, as well as important numbers of wintering wildfowl including some species listed on Annex I of the EU Birds Directive. The presence of wet and broad-leaved woodlands increases the overall habitat diversity and the occurrence of a number of Red Data Book plant and animal species adds further importance to the Slaney River site.

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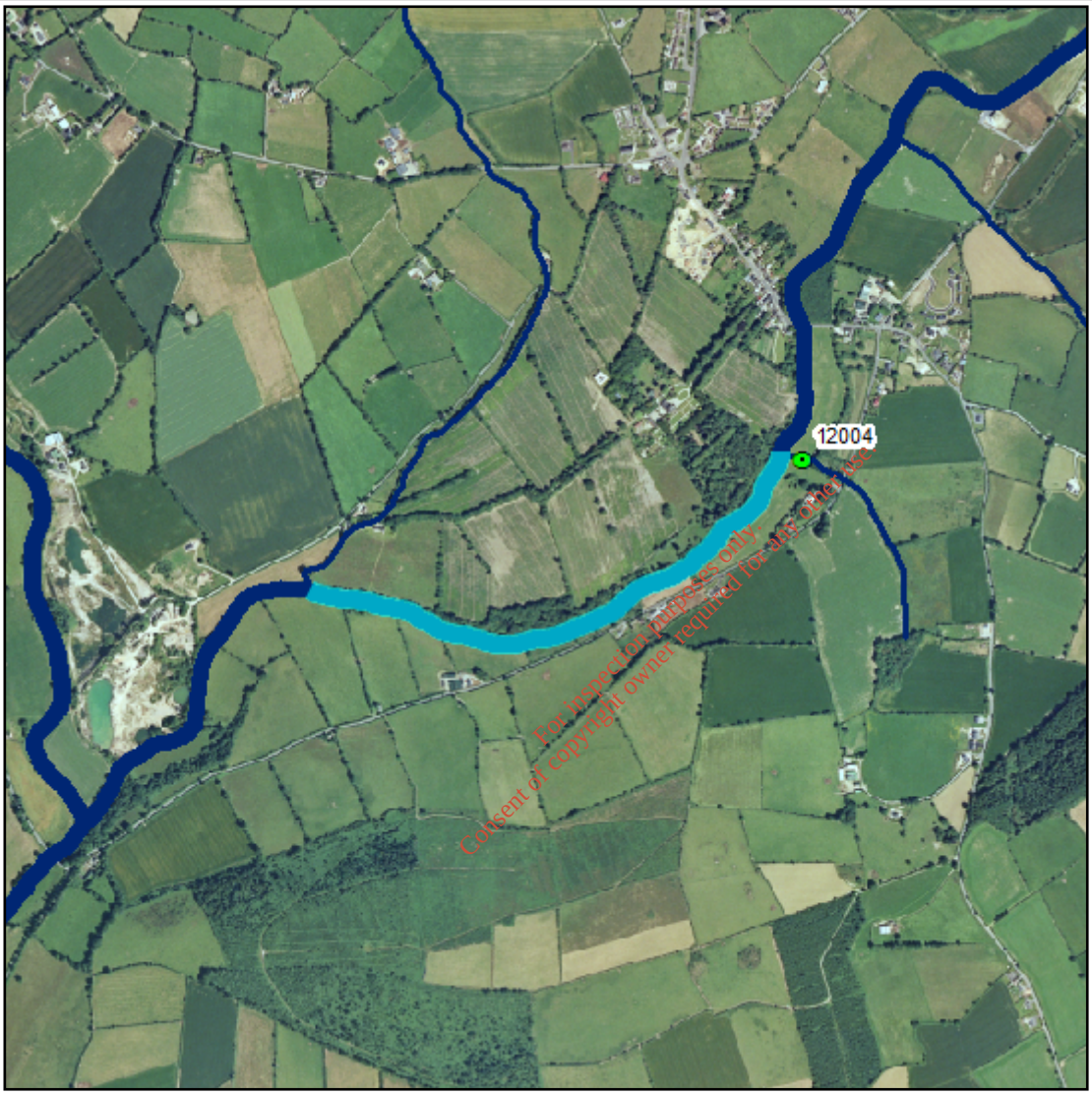
Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

River Name	Derry [Slaney](12_2096)
XY Location	291236,160240 (ING)

River Segment Map



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Disclaimer
The source hydrometric data used to estimate the flow duration curve ordinates for ungauged catchments was obtained from (1) water level data and (2) the rating curve(s) generated for each hydrometric station. The Environmental Protection Agency and the Office of Public Works used these data, respectively, to calculate daily mean flows. The daily mean flows were then used by the Environmental Protection Agency to prepare flow duration curves for each station. Neither body accepts any liability for the subsequent handling of the data.

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The user should familiarise himself/herself with the catchment being studied and confirm that the ungauged site is in a natural catchment where flows conditions are suitable for the use of the model.

It is strongly recommended that the user examine the catchment descriptors contained in the report produced and confirm that the percentages of the various constituent elements are comparable to a natural catchment.

If the flow in a catchment is not entirely natural, the estimation of flows using the model in these catchments could be affected due to:

- existence of local conduit karst within the catchment;
- the selected location itself is on local conduit karst;
- regulation of the river flow on the river channel (e.g. power station, sluice gates etc)
- impacts of abstractions upstream of the selected location or the impact of the discharge associated with the abstraction into the same/different catchment;
- estimates of flow being sought at locations effected by storage effects at, or near, lake outfalls;
- lack of similar catchments with observed flows, ie where catchment descriptors lie outside the range of available gauging station catchments (e.g. the catchment area is under 5 km²);
- any other special circumstances that may affect river flows.

Expert judgement will be required to ensure that the estimate of flow is not unduly affected by any of these influences.

Please note that the model does not provide estimates of flood peaks and, specifically, should not be used for that purpose.

The EPA has also prepared estimates of DWF and long term 95 percentile flows which are also presented on the EPA web site. These data are presented at http://www.epa.ie/whatwedo/monitoring/water/hydrometrics/data/

The data produced by the model for specific stations should be compared to the data contained in this file of DWF and long term 95percentile flows.

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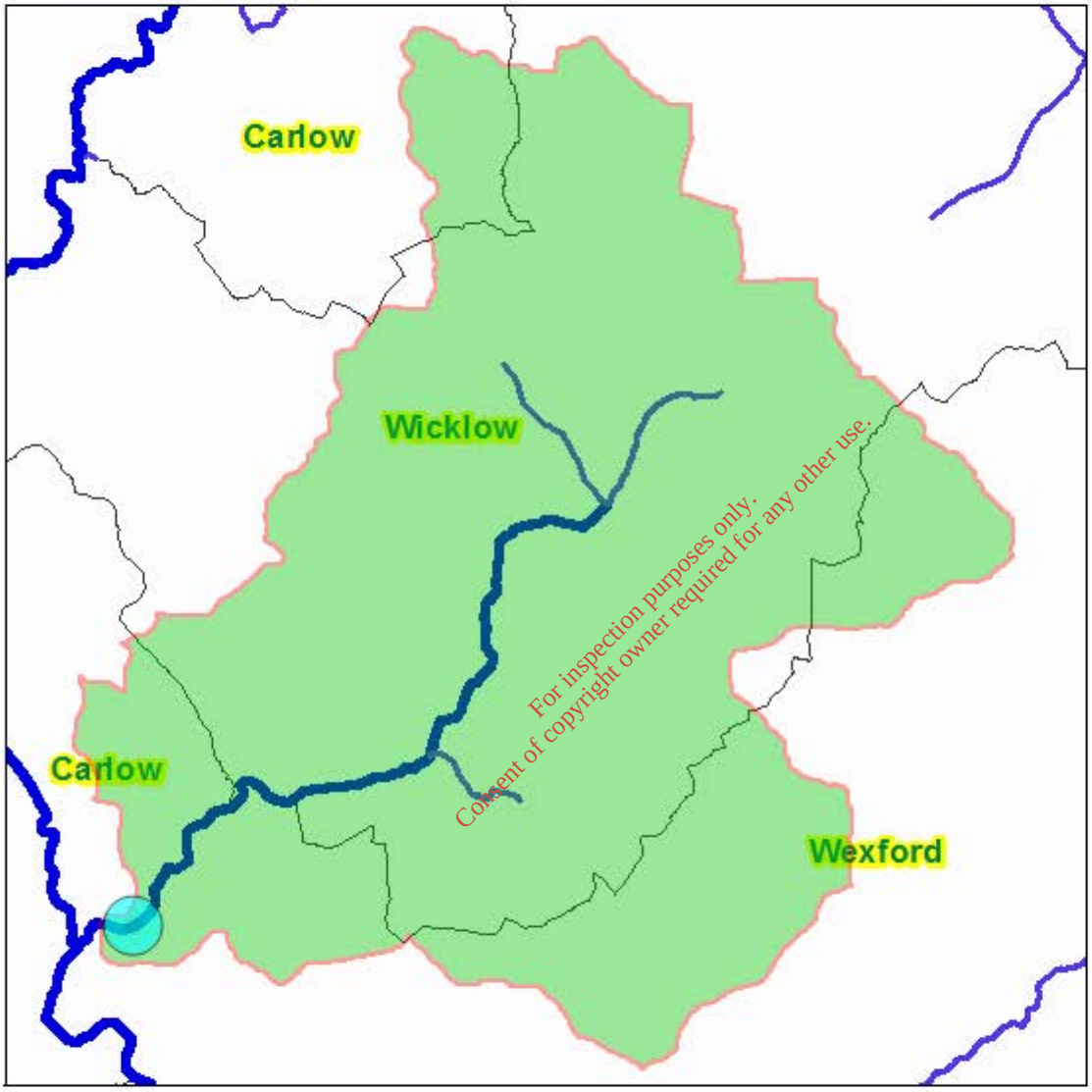
Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

River Name	Derry [Slaney](12_2096)
XY Location	291236,160240 (ING)

Nested Catchment Map



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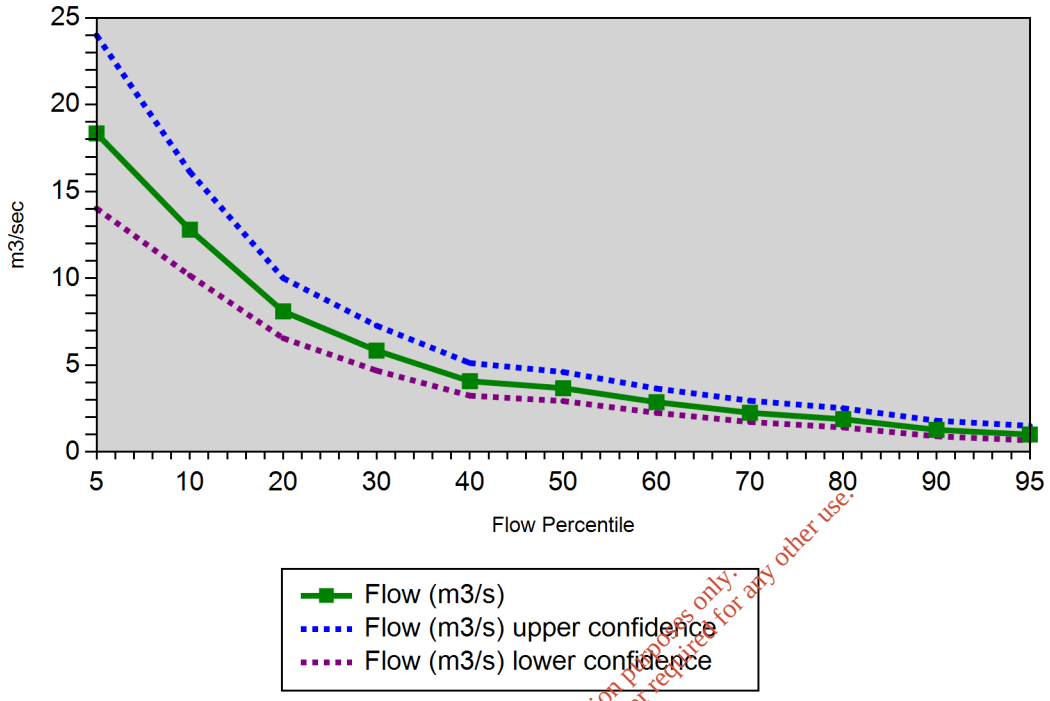
The source hydrometric data used to estimate the flow duration curve ordinates for ungauged catchments was obtained from (1) water level data and (2) the rating curve(s) generated for each hydrometric station. The Environmental Protection Agency and the Office of Public Works used these data, respectively, to calculate daily mean flows. The daily mean flows were then used by the Environmental Protection Agency to prepare flow duration curves for each station. Neither body accepts any liability for the subsequent handling of the data.

Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

Flow Duration Curve (Flow in m3/sec)



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%ile	flow(m3/sec)	upper 95% confidence limit m3/sec	lower 95% confidence limit m3/sec
5	18.343	23.993	14.024
10	12.804	16.133	10.162
20	8.1	10.012	6.553
30	5.841	7.278	4.688
40	4.077	5.125	3.244
50	3.675	4.605	2.933
60	2.87	3.654	2.255
70	2.259	2.953	1.728
80	1.888	2.52	1.414
90	1.277	1.802	0.904
95	1.006	1.509	0.67

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Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

Catchment Descriptors		
General		
Descriptor	**Unit**	**Value**
Area	sq km	244.1
Average Annual Rainfall (61-90)	mm/yr	1124
Stream Length	km	286.2
Drainage Density	Channel length (km)/catchment area (sqkm)	1.2
Slope	Percent Slope	9.9
FARL	Index (range 0:1)	1

Soil	
Code	**% of Catchment**
Poorly Drained	14.6
Well Drained	79
Alluvmin	4.2
Peat	1.8
Water	0
Made	0.5

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Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

Subsoil Permeability		
Code	**Explanation**	**% of Catchment**
H	High	2.6
M	Moderate	49.5
L	Low	0.8
ML	Moderate/Low	0
NA	No Subsoil/Bare Rock	47

Aquifer		
Code	**Explanation**	**% of Catchment**
LG_RG	LG:Locally important sand-gravel aquifer RG: Regionally important sand-gravel aquifer	0
LL	Locally important aquifer which is moderately productive only in local zones	67.1
LM_RF	LM: Locally important aquifer which is generally moderately productive RF: Regionally important fissured bedrock aquifer	0
PU_PL	PU: Poor aquifer which is generally unproductive PL: Poor aquifer which is generally unproductive except for local zones	32.5
RKC_RK	Regionally important karstified aquifer dominated by conduit flow	0
RKD_LK	Regionally important karstified aquifer dominated by diffuse flow	0

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Stations in Pooling group			
%ile Flow	**Station 1**	**Station 2**	**Station 3**
5	16003	23001	24030
10	16003	23001	24030
20	16003	23001	24030
30	16003	23001	24030
40	24030	16003	23001
50	12001	18005	25044
60	12001	18005	25044
70	12001	18005	25044
80	12001	25038	18005
90	12001	25038	18005
95	12001	25038	18005

Disclaimer
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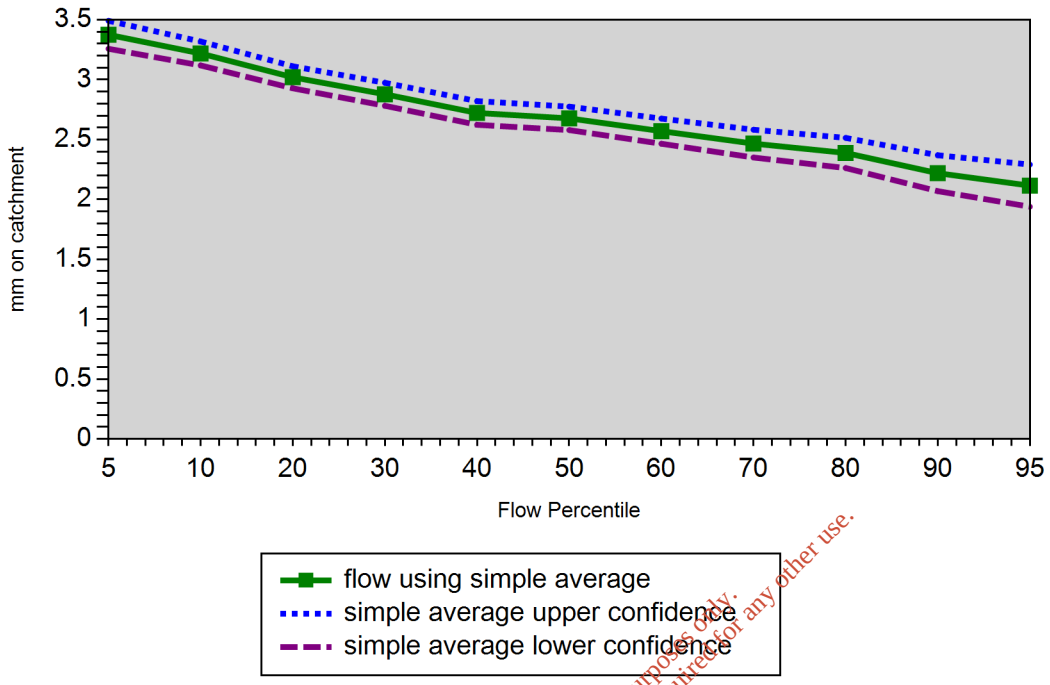
Environmental Protection Agency

Estimation of Flow Duration Curve for Ungauged Catchment

Flow Duration Curve (mm on catchment)



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Log Flow (mm on catchment)			
%ile	mm	upper 95% confidence limit	lower 95% confidence limit
5	3.375	3.492	3.258
10	3.219	3.319	3.119
20	3.02	3.112	2.928
30	2.878	2.974	2.782
40	2.722	2.821	2.623
50	2.677	2.775	2.579
60	2.57	2.675	2.465
70	2.466	2.582	2.35
80	2.388	2.514	2.262
90	2.219	2.369	2.069
95	2.115	2.291	1.939

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CARLOW
COUNTY COUNCIL
COMHAIRLE CHONTAE CHEATHARLOCHA

Water Quality (Dangerous Substances) Regulations, 2001 S.I. No. 12 of 2001

Dangerous Substances Implementation Report 2006

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1.0 Introduction

Dangerous Substances have the potential to cause the most harm to aquatic life due to their persistence, toxicity or bioaccumulation. Many human activities, and some natural processes, release chemicals into rivers and the sea. Industrial plants and sewage treatment works are the biggest source of the most harmful or dangerous substances, which include certain metals and pesticides. The aim of the EU Dangerous Substances Directive (76/464/EEC and Daughter Directives) is to improve water quality through the elimination and/or reduction of dangerous substances discharged to the aquatic environment.

The Water Quality (Dangerous Substances) Regulations, 2001, prescribe water quality standards in relation to certain substances in surface waters, e.g., rivers, lakes and tidal waters. The substances include certain pesticides (atrazine, simazine, tributylin), solvents (dichlormethane, toluene, xylene), metals (arsenic, chromium, copper,lead, nickel,zinc) and certain other compounds (cyanide and fluoride). The Regulations give further effect to the EU Dangerous Substances Directive (76/464/EC) and give effect to certain provisions of the EU Water Framework Directive (200/60/EC).

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The Regulations specify quality standards for the country's rivers and lakes that must be achieved by 31st of December 2010. Carlow County Council is the local authority assigned statutory responsibility to implement the Regulations in County Carlow and is required to submit a Measures Report to the EPA in line with Article 10(1) of the Regulations.

This measures report is based on the 'Guidance Manual to Local Authorities on Preparation and submission of Measures and Implementation Reports' issued by the EPA. It will also be based on the experience gained from the implementation of the actions specified in the Phosphorous Measures Report and the fundamental principles of an environmental management systems approach.

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2.0 Current Water Quality and Targets

2.1 Main rivers in County Carlow

There are two main river Catchment systems in County Carlow, the River Barrow and the River Slaney. The western portion of the county is drained by the Barrow and its tributaries while the Slaney and its tributaries drain the eastern portion. The main rivers and their tributaries are shown in Tables 2.1 and 2.2 with the relevant EPA Hydrometric Codes provided (EPA, 2001).

Table 2.1 Barrow Catchment – Hydrometric Area 14

River	River Code
Aghalona	14AO2
Barrow	14BO1
Burren	14B05
Lerr	14LO1
Mountain	14MO1
Pollmounty	14PO3

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Table 2.2 Slaney Catchment - Hydrometric Area 12

River	River Code
Clody	12CO3
Clonmore Stream	12CO5
Derreen	12DO1
Derry	12DO2
Douglas	12DO3
Slaney	12SO2

The Slaney has been designated a salmonid river under the European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988). Designated waters are required to meet the quality standards set out in the Regulations. In Carlow sampling is carried out by the EPA on a monthly basis which complies with the sampling requirements set out in the salmonid regulations.

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2.2 Water Quality Standards

The target substances and applicable standards to be achieved by 2010 as specified in the Regulations are presented in the tables below.

Table 2.3

	Substance	**Standard ug/l**
Pesticides	Atrazine	1.0
	Simazine	1.0
	Tributyltin	0.001 **
Solvents	Dichloromethane	10.0
	Tolulene	10.0
	Xylenes	10.0

Note**
The standard for Tributyltin shall apply in relation to tidal waters only and shall be deemed to be met if the results of biological monitoring for biological effects indicate no reproductive impairment in gastropods.

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Table 2.4

	Substance	**Standard (ug/l) for Freshwaters** Hardness of water measured in mg/lCaCO3	
		<100	>100
Metals	Arsenic	25	25
	Chromium	5	30
	Copper	5	30
	Lead	5	10
	Nickel	8	50
	Zinc	See notes **	100
Inorganic ions	Fluoride	500	500
	Cyanide	10	10

Note**
The value for metals are for total concentration (dissolved and colloidal/ss). In the case of zinc the standard is 8ug/l for water hardness 10mg/lCaCO3 and 50ug/l for water hardness between 10mg/l and 100mg/l CaCO3.

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2.3 Current Water Quality Status

All the main river channels in the county are subject to routine quality monitoring, which is carried out by the EPA, on behalf of Carlow County Council. The current monitoring programme was established to monitor general water quality and was not designed to target the substances listed in the Dangerous Substances Regulations. It must be emphasized that poor water quality, as measured by biological and/or chemical assessment, cannot be taken to indicate the presence of Dangerous substances.

In the past the Council has conducted monitoring in the rivers, which included analyses for some of the target substances including copper, nickel, chromium and lead. The purpose of the monitoring was to assess the overall water quality in terms of suitability for abstraction for use as a potable water supply. The monitoring has not identified any problem with metal levels however, the detection limits were based on the limits set in the EC (Quality of Water intended for the Abstraction of Drinking Water) Regulations and Directive 78/659/EC, which were higher than the standards set in the Dangerous Substances Regulations. The data is therefore unsuitable for use in evaluating water quality status in the context of the Regulation requirements.

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The EPA were commissioned by Carlow County Council, together with other local authorities in the South East Region, to carry out sampling of river waters and analysis for the presence of Dangerous Substances in these samples in 2004. The results of this survey are contained within a Report to the Local Authorities for the South East Region on Dangerous Substances in Surface Waters dated 19th Nov. 04. The survey focused on sites where pollution from the selected substances was most likely i.e. on watercourses downstream of major towns and in areas where arable farming was predominant. The survey included three sampling sites in County Carlow:

- River Barrow – d/s Carlow.
- River Slaney – Rathvilly.
- River Burren – Carlow Abstraction point.

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The results of this sampling, which were carried out on 22nd September 2004, found that all samples complied with the specified parameters of the Dangerous Substances Regulations where tested. No substances were present in any environmentally significant concentration. Details of Dangerous substances monitoring are shown in Table 2.5. Full details of monitoring carried out are also given in Appendix A.

The surface water potable water supply sources in the County are subject to routine quality monitoring as required by EC (Drinking Water) Regulations 2000. The monitoring carried out on these sources in Carlow have not identified any significant problems with Dangerous substances in surface water supply sources.

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3.0 Identification of potential pressures

The main pressures due to dangerous substances on the general water quality in the county are located at or near the major population centres within the county. This is due to the concentration of households, industries, waste disposal facilities, construction sites etc located in these areas.

Dangerous substances pose a major threat to general water quality however there is limited knowledge of the occurrence of these substances in the county. Dangerous substances can enter the aquatic environment from both point and non-point (diffuse) sources. Point sources are potentially of most concern in relation to acute accidents while diffuse sources e.g. leaching and run-off can have a significant accumulative effect.

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Carlow County Council has conducted a review of all activities in the County, which had the potential to use any of the Dangerous substances identified in the regulations. The review included the following activities:

3.1 Wastewater Treatment Plants

The Council's Wastewater Treatment Plants can be identified as a pressure source in terms of general water quality. The influent to these treatment works and the associated effluent from the plants may potentially contain some of the target substances and therefore enter and contaminate the receiving aquatic environment. The current monitoring programme at the WWTP does not include the specified Dangerous Substances. (the effluent from these treatment works are tested in accordance with the requirements of the Urban Wastewater Treatment Directive.) Samples of the effluent from the main wastewater treatment plants in the county were due to be analysed for the presence of dangerous substances in 2005 however this has not taken place as yet. A programme to conduct the required analysis is being prepared with implementation planned by the end of 2006.

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3.2 Industrial discharges

Discharges by industry either directly to waters or indirectly through the sewer network have the potential to cause pollution of watercourses and in particular to affect the levels of dangerous substances in the watercourses. In order to control pollution from such discharges, any industry whose effluent has the potential to cause pollution is licensed and monitored in accordance with the provisions of the Water Pollution Act.

Unregulated drainage from industries to sewer collection systems can effect treatment processes in downstream plants resulting in reduced operational efficiency or in the worst case scenario, failure of the plant treatment processes resulting in discharge of untreated industrial and domestic sewage.

IPC Licensed facilities in the county are controlled and regulated by the EPA. The Licences specify the monitoring and reporting requirements for the licensed facility, some of which include the specified Dangerous Substances. The EPA is responsible for licensing, auditing and compliance monitoring of IPC licensed industries. The IPC licensed industries are required to provide monitoring data to the EPA.

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The Council also investigates incidents of water pollution. The investigation records are a potential source of information on incidents where spills or incidents may have resulted in the discharge of Dangerous Substances to surface waters.

3.3 Agricultural Activity

Agriculture is the main land use and industry within both catchments especially the Barrow. Agricultural point and diffuse loads are therefore another major threat to general water quality in the region. Agricultural practices are very intensive in the northern region of the county leading to increased pollution levels especially in the Barrow catchment. Whilst phosphorous and nitrate levels are of particular concern in the county, agricultural run-off may also result in other pollutants entering water bodies including pesticides and BOD and bacterial loadings. The main threat in relation to dangerous

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substances is the usage of herbicides and pesticides in the region. Accidental releases of oils and other chemicals can also occur and need to be investigated. The application of pig slurries to land poses another threat to both catchments as copper is a very important feed additive in the pig industry. A requirement for Nutrient Management Planning is included in all intensive agriculture planning permissions.

3.4 Urban stormwater overflows and runoff

Untreated urban runoff from the major population centres such as Carlow town can have a significant affect on the water quality in the catchments. This runoff enters the water courses through gullies etc following periods of heavy rain and can potentially contain high levels of metals, hydrocarbons, organic pollutants etc. There is currently no register of outfalls or overflows from urban areas in the county and no monitoring data for the quality of effluent from such systems.

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3.5 Powerstown Landfill Facility

The Waste License for Powerstown Landfill facility requires that monitoring be carried out throughout the lifecycle of the landfill, from operational phase through to the aftercare phase. Carlow County Council undertake monitoring with the EPA carrying out annual audits. The Waste License issued by the EPA permits the Council to discharge treated landfill leachate to the Barrow subject to quality and flow restrictions. However this route is not utilized. Leachate is collected in a lagoon on-site and transported for treatment in the Mortarstown Treatment Plant. There is therefore no impact from landfill discharges on the Barrow.

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4.0 Programme of measures of implementation

Refer to table 4.1 for implementation programme summaries.

In the programme, the timescale column is defined by the EPA in their report "Guidance Manual to Local Authorities on Preparation and Submission of Measures and Implementation report".

Immediate term by July 2004
Short term by July 2006
Medium term by July 2008
Long term by July 2010

4.1 Monitoring programme & Catchment Management

Water samples for measuring the concentrations of Dangerous Substances within rivers in Carlow were taken at three sites during 2004 with all sites being sampled on one day only. All results for these parameters were within the limits specified within the regulations. The limited data available indicates that the presence of the specified substances is not a cause for concern. It should be noted that whilst the samples taken were tested for the parameters specified in the Dangerous Substances Regulations, the samples were analysed for the presence of a total of 84 parameters – no substance was found to be present in any environmentally significant concentration for any of the samples. The samples were not tested for Atrazine, simazine, tributyltin and cyanide.

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The river catchments of Co. Carlow are part of the South Eastern River Basin District (SERBD) area. The SERBD project has been set up to satisfy the requirements of the Water Framework Directive and the need to have a catchment based national strategy to the implementation to the Water Framework Directive. The objective is to prepare a programme of measures designed to maintain and /or achieve at least good water quality for all waters, which includes assistance in complying with the Water Quality (Dangerous Substances) Regulations 2001.

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The **Characterization Report** for the SERBD project has been completed. The purpose of this report was to collect and analyse all existing datasets to provide a baseline report of the Water quality within the SERBD project area. This will facilitate the development of recommendations for monitoring programmes and the design of measures which will be required to ensure compliance with the requirements of the Water Framework Directive. Such monitoring must cover both surface and groundwater and must be operational by 22nd December 2006. The lack of data in relation to dangerous substances will be addressed by additional data collection and monitoring for the first river basin management plan.

In addition to the work of the SERBD project, in 2003 a **National Dangerous Substances Expert Group** was established, by the DoEHLG, to assist with developing lists of dangerous substances relevant to water quality in an Irish context. Having reviewed available datasets the Expert Group has put forward a list of pollutants that are potentially relevant in Ireland. These substances will have particular relevance to the implementation of the Dangerous Substances and Water framework Directives.

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A National Substances Screening Monitoring Programme was started in 2005. The programme will run until October 2006 and includes monitoring over 200 dangerous substances identified. The programme will serve to feed into the setting of national E.Q.S. for waters.

Carlow County Council, on behalf of the combined river basin districts, utilized 2 main facilities to carry out the analysis for priority action substances (41 no.), candidate relevant pollutants (161 no.) and candidate general components (24 no.) The first phase of this programme investigated evidence of substances at specific locations in the vicinity of likely potential sources of pollutants. This provided a general overview of the presence or absence of substances. In the second phase, further target sites were be selected to isolate the causes of individual substances identified by the initial investigations.

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As much of the potential usage of chemicals in concentrated in major urban centres, sampling in the vicinity of the major population centres was undertaken during the first phase. This included the sampling of the River Barrow at two locations - upstream of Carlow Town and upstream of St Mullins. Results from the sampling will not be available until November 2006.

4.2 Wastewater Treatment Works

Whilst the effluent from Wastewater treatment works has been identified as a potential source of dangerous substances to river water systems, there is no data available to confirm if these substances are present. In order to investigate this, it is proposed that samples of the effluent from the major wastewater treatment works in the County be analysed, on a once off basis, for the presence of these substances.

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A number of the plants in Carlow County require upgrading to cater for new development in urban and village centres in the county and also to comply with the requirements of the relevant EU directives .

- Mortarstown – upgraded to provide nutrient removal
- Tinnahinch – now connected to the new WWTP at Graiguenamanagh.
- Raheendoran – WWTP installed in 3005

Improvement works to be carried out in 2006 include the following plants :

- Leighlinbridge
- Muinebheag
- Ballon
- Myshall

Improvements are also planned for Palatine, Rathvilly, Hacketsown and documents for the appointment of Consultants have been prepared for the WWTP at Tullow, Fenagh and Rathoe.

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4.3 Industrial Discharges

Carlow County Council will continue on an ongoing basis to license industrial discharges to waters and sewers in accordance with the provisions of the Water Pollution Act. Where any of the Dangerous Substances identified in the Regulations are present in the effluent, the requirements of the Regulations will be considered in setting the discharge limits. A review of the application process for licenses will be carried out with specific reference to the Dangerous substances regulations.

Since January 2004, Carlow County Council has issued 65 new/revised Section 4 licenses (discharge to waters) and 14 new/revised Section 16 licenses (discharge to sewers) under the Water Pollution Act.

4.4 Consultative and Cooperative Measures

There are many different stakeholders who have an impact on the quality of waters. Setting up consultative and co-operative structures that involve all stakeholders is essential to the successful management of the implementation programme for the Water Framework Directive and other EU regulations including the Dangerous Substances Regulations. The SERBD project has provided a suitable forum for bringing these stakeholders together – these stakeholders include Teagasc, Irish farmers Association, Coillte, IBEC, Teagasc, Duchas, neighbouring local authorities , Barrow Catchment Group.

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4.5 Public Education and Advisory Measures

An important element of the programme is raising public awareness of the importance of prevention of emissions to the aquatic environment. This involves the development of an education programme targeted at the sectors both directly and indirectly involved in the usage and emission of target substances. Carlow Co Council has appointed an environmental awareness officer whose role includes the development and delivery of this programme.

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The SERBD project has created a project website which is aimed at providing information to the general public on water quality issues in the region.

Carlow Co Co participates in the Rural Environmental Protection Scheme (REPS) lectures organized by Teagasc and deliver lectures/talks on an ongoing basis to the farming community on topics in relation to Water Quality issues and measures which they can take to protect water quality. The REPS scheme makes particular reference to the use by farmers of pesticides and fertilizers near rivers/streams etc – such substances are included in the lists of substances specified in the Dangerous Substances Regulations.

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Appendix A

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CARLOW COUNTY COUNCIL

COMHAIRLE CHONTAE CHEATHARLOCHA

County Buildings, Athy Road, Carlow.
Tel: 059 9170300
Fax: 059 9141503
Email: secretar@carlowcoco.ie
Web: www.carlow.ie

Our Ref : JC/MC

4th August 2009

Administration , Environmental Licensing Programme
Office of Climate, Licensing & Resource Use
Environmental Protection Agency
Headquarters, PO Box 3000
Johnstown Castle Estate
Co Wexford

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RE : Waste Water Discharge Licence for the Clonegal Waste Water Works

Dear Sir

In relation to the Waste Water Discharge Licence for the Clonegal Waste Water Works and as requested please find attached Appropriate Assessment of Biological Impacts of Clonegal Waste Water Works on Special Area of Conservation 000781.

The Appropriate Assessment is provided in the form of one original copy plus one further copy also one copy in electronic PDF format on CD Rom.

Should you have any queries in relation to the attached please do not hesitate to contact the undersigned Jerry Crowley, Water Services Department, Carlow County Council telephone number 059 9136263 or 9136225.

Yours sincerely

Jerry Crowley
Senior Executive Engineer
Water Services

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CARLOW
COUNTY COUNCIL
COMHAIRLE CHONTAE CHEATHARLOCHA

CARLOW COUNTY COUNCIL

Appropriate Assessment of Biological Impacts of Clonegal Waste Water Works on Special Area of Conservation 000781

July 2009

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Prepared by:
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1. INTRODUCTION

The present report by Pascal Sweeney, Consultant Ecologist, was commissioned by Carlow County Council. The discharge from Clonegal Waste Water Works enters the River Derry within Special Area of Conservation 000781 (Slaney River Valley SAC). Under Article 6(3) of the EU Habitats Directive, there is a requirement for an Appropriate Assessment of the implications for the designated site of a discharge such as this, in view of the site's conservation objectives.

The objective of this report is to establish the implications of the existing discharge on the protected habitats and species within SAC 000781.

Because the discharge from Clonegal Waste Water Works is to a river with unpolluted conditions (Q4) recorded in the latest EPA results both upstream and downstream of the discharge, further field investigations were deemed unnecessary. This Appropriate Assessment report is a desktop study.

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The scope of this assessment is :

- Review of EPA Q-values.
- Review of available chemical data.
- Likely occurrence of protected aquatic species at and downstream of the proposed discharge point, based on habitat suitability and available records.
- Likely impacts of the discharge on protected aquatic species and habitats.
- Cumulative effects on the qualifying interests of the Natura 2000 site.
- Measures to mitigate negative impacts on the protected species and habitats.

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2. METHODOLOGY

Because the Clonegal Waste Water Works is already in existence, the current impact on the biota of the receiving environment can be directly assessed. Biological water quality assessment is based on EPA Q-values and available chemical data. Available records of species listed in Annex II of the EU Habitats Directive were checked.

3. RESULTS

3.1 EPA Q-values

The Clonegal Waste Water Works outfall is on the River Derry, between EPA Sites 900 and 1000. Site 1000 was not assessed in the most recent (2007) EPA Q-scheme monitoring. The River Derry enters the River Slaney between EPA Sites 1600 and 1800.

EPA Q-values for the River Derry and for the River Slaney downstream of Site 1600 are presented in Appendix 1. The 2007 results show unpolluted conditions (Q4) at all site on the River Derry and at Site 1800 on the River Slaney downstream of the confluence.

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The most recent EPA Q-value results therefore do not show the discharge from Clonegal Waste Water Works to be having any impact on biological water quality.

3.1 Chemical Data

The EPA 2006 chemical results are the most recent for which there are corresponding data for both Sites 900 (upstream) and 1000 (downstream). These are presented in Appendix 2.

Available chemical data from Carlow County Council are for the inlet and outfall only and, without relevant detailed flow data, are less useful in assessing the impact within the river.

At the downstream site, one high orthophosphate result was recorded in January 2006 and one elevated BOD_5 was recorded in July 2006. No difference in the mean nitrate level was seen. The mean ammonia level was lower t the downstream site. Any slight differences in the chemical results between the upstream and downstream sites are not reflected in the EPA Q-value results.

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3.3 Protected Habitats and Species.

In this section, the impact of Clonegal Waste Water Works discharge on each of the habitats and species for which the SAC is designated, is estimated. While the zone of potentially highest impact was taken as being from the discharge point to 1km downstream and this section of river was the main focus of the detailed investigation, the entire downstream freshwater section of the river was considered when assessing the presence of protected habitats and species and the potential effects of the discharge on these.

The Site Synopsis for the Slaney River Valley SAC states:

"The site is a candidate SAC selected for alluvial wet woodlands, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, estuaries, tidal mudflats and old oak woodlands, all habitats listed on Annex I of the E.U. Habitats Directive. The site is further selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Twaite Shad, Atlantic Salmon and Otter."

Some of the species and habitats listed above are terrestrial and could not be affected by the Clonegal Waste Water Works discharge. Some are estuarine, in which cases the distance from the outfall to the saline waters must be taken into account when assessing the likelihood of any impacts.

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3.3a Protected Habitats

Floating River Vegetation

Of the Annex I habitats listed above, only floating river vegetation would occur within 1 km downstream of the discharge and is therefore considered to be the only Annex I habitat that could potentially be affected to any significant degree. A slight increase in plant nutrients would result in increased growth of floating river vegetation. A more substantial increase in plant nutrients could cause an increase in the competitive interactions between plant species, resulting in a loss of species. However, the available chemical data do not show an increase in plant nutrients downstream of the outfall that would have a negative impact on floating river vegetation.

Old Oak Woodlands

Terrestrial habitat, unaffected by discharges to rivers.

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Alluvial Wet Woodlands

Alluvial wet woodland occurs along banks of the Slaney, particularly in the lower reaches and the tidal section, e.g. at Macmine marshes. Plant growth in this habitat could potentially be positively affected to some extent if there were increased nutrient concentrations in the water. However, no change in biological water quality was detected close to the outfall and the available chemical data do not show an increase in plant nutrients downstream of the outfall that would significantly impact on this habitat.

Estuary, Tidal Mudflats

Saline habitats which potentially could be affected by substantially increased nutrient concentrations in the freshwater sections of rivers. However, no change in biological water quality was detected close to the outfall and the available chemical data do not show an increase in plant nutrients downstream of the outfall that would significantly impact on this habitat, particularly considering the distance from Clonegal to saline waters and the dilution involved.

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3.3b Protected Species

Freshwater Pearl Mussel (*Margaritifera margaritifera*)

Within SAC 000781, the freshwater pearl mussel population is concentrated in the Dereen River. Low numbers of found adult freshwater pearl mussels have also been found in the River Derry downstream of Clonegal and in the River Slaney main channel downstream of the River Derry confluence (Moorkens, 2000). Although the current biological water quality of the River Clonegal, both upstream and downstream of the Clonegal Waste Water Works is rated as unpolluted, Q4 is considered to be an unsatisfactory quality for a sustainable population of freshwater pearl mussels, which need pristine conditions for successful reproduction. However, as no decline in biological water quality associated with the discharge from Clonegal Waste Water Works in the most recent EPA Q-scheme survey, it is considered that the discharge is currently having no significant impacts on the remaining mussels downstream of the discharge.

Atlantic Salmon (*Salmo salar*)

The Site Synopsis for The Slaney River Valley SAC states:

"The Slaney is primarily a spring salmon fishery and is regarded as one of the top rivers in Ireland for early spring fishing. The upper Slaney and tributary headwaters are very important for spawning."

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The main channel of the River Slaney, but not the River Derry, is a Salmonid Water, designated under the European Communities (Quality of Salmonid Waters) Regulations of 1988 (S.I. No. 293 of 1988). The chemical data presented in Appendix 2 are within the standards specified for compliance with these regulations in Salmonid Waters, both upstream and downstream of the outfall for the following parameters for which data are available: Temperature, Dissolved Oxygen, pH, Non-ionised Ammonia, Total Ammonium, Nitrite. The BOD_5 standard specified in these regulations is less than 5mg/l. The EPA 2006 data shows this BOD_5 level exceeded once and the downstream site. The egg and juvenile stages of the salmon life cycle are very vulnerable to deteriorations in water quality (Hendry and Cragg-Hine, 2003). A significant drop in water quality would also negatively affect adult salmon. As EPA Q-value results show unpolluted conditions both upstream and downstream of the outfall, no significant impacts on salmon are considered likely.

Brook Lamprey (*Lampreta planeri*) and **River Lamprey** (*Lampreta fluviatilis*)

King and Linnane (2004) report a widespread distribution of brook and river lampreys in the main channel of the main channel of the Slaney and in tributaries examined, including the Derry. A significant drop in water quality could negatively affect any lamprey population present. However, as EPA Q-value results show unpolluted conditions both upstream and downstream of the outfall, no significant impacts on these species are considered likely.

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Sea Lamprey (*Petromyzon marinus*)

King and Linnane (2004) recorded low numbers of juvenile sea lamprey in tributaries of the river Slaney (including the Derry), but none in any of the 35 sites examined in the main channel. Kurz and Costello (1999) report that sea lamprey has occasionally been observed downstream of Enniscorthy. As EPA Q-value results show unpolluted conditions both upstream and downstream of the outfall, no significant impacts on this species are considered likely.

Twaite Shad (*Alosa fallax*)

Twaite shad is an anadromous fish which enters large estuaries in late April or May to spawn in gravels near the end of the freshwater reaches, with the only known spawning population of Twaite shad in Ireland occurring in the River Barrow (Doherty *et al.* 2004). Adult Twaite shad are also known to occur in the lower parts of the River Slaney (King and Linnane, 2004), although spawning has not been recorded here in recent years. Threats to Irish shad populations include deterioration of water quality and habitat degradation.

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As EPA Q-value results show unpolluted conditions both upstream and downstream of the outfall, and given the distance from Clonegal Waste Water Works to the upstream end of the tidal range, no impacts are considered likely.

Otter (*Lutra lutra*)

Within the South Eastern River Basin District, which includes the River Slaney catchment, Baily and Rochford (2006) recorded positive results at nearly 73% of the sites surveyed (with no significant difference in the occurrence of otters between polluted and unpolluted sites), indicating a widespread distribution of the species. If water quality dropped to the extent that the abundance of prey species were significantly affected, otters could be negatively impacted. However, as prey species are plentiful in the River Slaney catchment, it is considered that the discharge is currently having no impacts on otters.

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4. CONCLUSIONS

4.1 Conservation Objectives

Summarising the main threats to the designated site, the Site Synopsis for The Slaney River Valley SAC states:

"Waste water outflows, runoff from intensive agricultural enterprises, a meat factory at Clohamon and a landfill site adjacent to the river and further industrial development upstream in Enniscorthy and in other towns could all have potential adverse impacts on the water quality unless they are carefully managed."

The relevant conservation objective pertaining to the discharge to Clonegal Waste Water Works must therefore be to avoid impacts from high BOD, suspended solids and nutrients by proper treatment of the effluent before discharge to the river. The fact that the EPA Q-value results show no biological impact of the discharge indicates that this conservation objective is currently being achieved.

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4.2 Cumulative Impacts

The 2007 EPA Q-ratings (Appendix 1) show unpolluted conditions (Q4 or better) at all site on the Derry River and at two of the five sites assessed on the River Slaney downstream of the Derry confluence. Slightly polluted conditions (Q3-4) were recorded at the other three Slaney sites, all of which are downstream of Bunclody.

The following facilities in the catchment of the River Derry have IPPC licences:

Duffy Meats Limited Trading As Kerry Foods, Code P0804-01. The licence specifies emission limits to the River Derry and the monitoring requirements.

Irish Flexible Packaging, Code P0108-01. The licence specifies that there will be no emissions to sewer or to waters and also specifies measures for the protection of groundwater and surface water and actions to be taken if contamination is detected.

The following facility in the catchment of the River Slaney, downstream of the River Derry confluence, have a waste licences:

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Greenstar Limited (Enniscorthy), Licence Code W0241-01. The licence specifies that there are to be no direct emissions to groundwater. The licence also specifies conditions and limits for emission to sewer.

Killurin Landfill Site, Licence Code W0016-02. The licence specifies that there are to be no direct emissions to groundwater and that no leachate or contaminated surface water is to be discharged directly to the River Slaney catchment. All leachate is treated off-site at Enniscorthy WASTE WATER WORKS.

The following facilities in the catchment of the River Slaney, downstream of the River Derry confluence, have IPPC licences:

Slaney Foods International Limited and Slaney Proteins, Code P0074-03. The licence specifies emission limits to the River Slaney.

Hogg Enterprises Limited, Code P0622-01. The licence specifies measures for the protection of surface waters and groundwater at the facility. The licence also specifies conditions on the landspreading of the slurry produced.

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Wexal International, Code P0394-01. The licence specifies measures for the protection of groundwater and surface water and emission limits to sewer and to the river Urrin. The licence also specifies the monitoring requirements for ground and surface water and actions to be taken if contamination is detected.

Rennard Pig Farms Limited, Code P0453-02. The licence specifies measures for the protection of surface waters and groundwater at the facility. The licence also specifies conditions on the landspreading of the slurry produced.

Provided that the facilities listed above comply with the terms of their licences, they will have no cumulative impact on the biological water quality of the River Nore, and on the conservation objectives of Special Area of Conservation 002162.

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4.3 Mitigation Measures

The lack of detected biological impacts on the river indicates that the measures in place within Clonegal Waste Water Works are adequate to maintain the discharge at a quality that does not significantly impact on the conservation objectives of the Natura 2000 site. Details of mitigation measures within Clonegal Waste Water Works, provided by Carlow County Council, are presented in Appendix 4. In any future changes made to Clonegal Waste Water Works in terms of capacity or design that could impact on the effluent quality, it must be ensured that mitigation measures are adequate to avoid inputs to the river that would negatively impact on the conservation objectives of the SAC.

5. NON TECHNICAL SUMMARY

- A desktop assessment was carried out in order to assess the current effect, if any, of the discharge from Clonegal Waste Water Works on the Rivers Derry and Slaney and the implications of any such effects for protected habitats and species within the Special Area of Conservation (SAC).

- Recent EPA biological water quality assessment results indicates unpolluted conditions at all sites on the River Derry and at the site on the River Slaney downstream of the Derry confluence, indicating that that the effluent from Clonegal Waste Water Works is currently having no significant impact on the biological water quality.

- Five species and one habitat which are listed for protection under the EU Habitats Directive were identified as being present, or likely to be present at or downstream of the Clonegal Waste Water Works outfall.

- As the discharge is not resulting in any significant difference between the biota upstream and downstream of the discharge point, it appears unlikely that there could be any negative effects, either direct or cumulative, of the effluent on the protected habitats and species within the SAC.

- Mitigation measures currently in place in Clonegal Waste Water Works are adequate to prevent impacts on the qualifying interests of the SAC site, under present conditions.

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APPENDIX 1

Derry River (12D02) EPA Q-values 2001 - 2007

Station No.	Station Location	2001	2004	2007
0100	Cross Br	4	3-4	4
0200	Tinahely Br	4	4-5	4
0350	Greenahill Br	4-5	4-5	4
0500	Shillelagh Br	3-4	3-4	4
0700	Balisland Br	4	4	4
0800	Ford N of Garryhasten	3-4*	4	
0900	Clonegall Br			4
1000	Just u/s Slaney R confl	4	4	

River Slaney (15N01) EPA Q-values 2001 - 2007

Station No.	Station Location	2001	2004	2007
1600	Kilcarry Br	3-4	3-4	4
1800	Slaney Br Bunclody	4	4	4
2000	1.3km d/s Clohamon Br	4	4-5	3-4
2100	Ballycarney Br	3-4	4	3-4
2200	Scarawalsh Br	-	-	4
2220	Just W of Salsborough Br	4	4	-
2400	1 km d/s Enniscorthy Br	-	-	3-4*

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APPENDIX 2
CHEMICAL DATA – EPA MONITORING

	SampleDate	BOD mg/l O2	Ortho-phosphate mg/l P	Chloride mg/l	Nitrate mg/l N	Ammonium mg/l N	Non-ionised Ammonia mg/l NH3	Nitrite mg/l N	Dissolved Oxygen % O2	Conductivity @ 25°C uS/cm	Temperature °C	pH	Alkalinity mg/l CaCo3
Upstream	10/01/2006	2.0	0.041	22	4.7	0.13	0.0008	0.022	90	207	8.2	7.5	35
	21/03/2006	1.2	0.007	19	5.7	0.025	0.0001	0.005	96	199	6.4	7.5	
	25/04/2006	0.8	0.011	22	5	0.02	0.0004	0.02	112	203	11.3	7.9	32
	10/07/2006	1.7	0.019	22	4.1	0.009	0.0001	0.024	99	218	15.5	7.6	78
	30/08/2006	0.3	0.024	28	4.2	0.033	0.0006	0.013	99	251	13.3	7.8	
	02/11/2006	1.0	0.015	18	5.6	0.028	0.0001	0.007	94	204	7.9	7.3	39
Downstream	10/01/2006	1.1	0.2	22	4.8	0.055	0.0004	0.018	91	204	8.7	7.5	35
	21/03/2006	1.0	0.008	19	5.6	0.026	0.0001	0.006	97	198	6.8	7.5	
	25/04/2006	0.9	0.013	23	4.9	0.026	0.0005	0.019	113	201	11.3	7.9	31
	10/07/2006	8.4	0.015	22	4	0.005	0.0000	0.023	97	218	17.0	7.4	84
	30/08/2006	0.5	0.022	29	4.1	0.013	0.0002	0.01	101	252	13.6	7.8	

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APPENDIX 3

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APPENDIX 4

Clonegal WASTE WATER WORKS – Mitigation Measures

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CARLOW
COUNTY COUNCIL
COMHAIRLE CHONTAE CHEATHARLOCHA

CARLOW COUNTY COUNCIL

CLONEGAL WASTEWATER WORKS

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WASTEWATER DISCHARGE LICENCE APPLICATION

Mitigation Measures for Biological Assessment

August 2009

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Introduction

The purpose of a Waste Water Discharge licence is to make provision for the protection of the environment and the protection of human, animal and plant life from harm or nuisance caused by the discharge of Dangerous Substances to the aquatic environment as well as to ensure compliance with National Law. Waste Water Discharge Licensing encourages the use of advanced waste water treatment technologies, the regularisation of waste water discharges from primary and secondary discharge points and storm water overflows, improved efficiency and effectiveness of pollution control, and allows for a more streamlined regulatory system that is open and transparent.

Clonegal and the Catchment Area

Clonegal is located 30 kms south-east of Carlow Town. At present sewage is treated at a site to the south-west of the village in the Huntington Estate and effluent from the existing treatment works discharges to the Derry River, 150m downstream of Clonegal and about a mile upstream of where the River Derry joins the Slaney River. The catchment area consists of the village of Clonegal. No areas outside of the village of Clonegal are pumped or transferred to this WWTP.

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Clonegal Waste Water Works

The existing WWTP had been built in mid 1970s for a designed capacity of 200pe. The WWTP currently is receiving a load of approximately over 400pe. The treatment works is over 30 years old and no longer providing adequate levels of treatment for the catchment it serves.

There was considerable development in the village during the recent building boom and there are currently planning permission for three further developments which incorporate an additional 46 housing units.

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Carlow County Council have therefore decided to replace the existing wastewater treatment plant with a new larger WWTP with a proposed capacity of 1,000p.e.

The project has gone through the tendering process as a bundle with the Rathoe WWTP.

The successful tenderer was EPS Ltd from Mallow, Co Cork. Work is currently underway on the Rathoe WWTP Upgrade and work will commence on the Clonegal WWTP in late 2009 or early 2010.

The existing works at Clonegal consists of a secondary treatment works using an extended aeration process. There is a storm water overflow in the inlet manhole and there is a Forward Feed Pumping Station which lifts the flow into the aeration tank. The aeration tank is aerated by a vertical shaft surface aerator which is far too small. Aeration has been supplemented by a venturi aerator, which provides adequate aeration for the current load. Venturi aerators are not very energy efficient and are generally used as a temporary solution.

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The secondary settlement tank is hydraulically over loaded particularly as the inflow can be high, particularly in storm conditions and the inlet pumps are oversized. This creates pumping high flows through the works when running, which hydraulically shock loads the settling tank every time. There is also sludge drying beds, with sludge wasted to them on a regular basis.

Carlow County Council is now progressing the procurement of the new Clonegal Waste Water Treatment Plant and the works will be funded through the monies given each year by the DEHLG for Small Schemes.

Tenders were received during May 2008 and the Tender has been awarded to Electrical & Pump Services Limited (EPS).

The contract included the design and construction of a waste water treatment plant with a capacity of 1,000pe.

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The proposed works consist of the following:

- Automatic inlet screenings and grit removal.
- Automatic sampler on inlet and outlet.
- Two Sequential batch Reactor(SBR), D.O. probe and ferric sulphate dosing point.
- Forward feed pumping station.
- Was pumps.
- Tertiary sand filter.
- Ferric dosing system with drench shower and bund.
- Sludge holding tank with roof.
- Control building with electric form 4 panel.
- Strom water holding tank with capacity for 3DWF for 2 hours.
- Storm water return to treatment.

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Sources of Emissions from the Waste Water Works

The Waste Water Treatment Works discharges final effluent and treated storm water into the Derry River, about a mile upstream from where the River Derry joins the Slaney River. There are no other emissions to the environment except for a minimal level of odour associated with a secondary treatment waste water works, there is no primary treatment and therefore no odours associated with primary sludges.

The effluent being transferred to the WWTP is a typical municipal sewage with no industrial or agricultural type discharges such as food processing.

The treated effluent entering the River Derry is consistent with the type of effluent associated with an activated sludge type process. There are no loadings coming to the WWTP that would be radically different from typical municipal sewage.

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The potential loadings to the receiving waters are BOD, COD, Suspended Solids, Phosphorus, Nitrates and Ammonia.

Phosphorus loadings will be greatly reduced by the injection of Ferric Sulphate at the WWTP. There is no ferric dosing at the existing WWTP.

The specification for the proposed WWTP is very tight with the following parameters:

BOD, 10mg/l
SS, 10mg/l
Ammonia, 5mg/l
Total P, 1mg/l

The effects on the receiving waters of the treated effluent are greatly reduced by the treatment process at the WWTP. This includes the dosing of Ferric Acid and the provision of tertiary treatment at the WWTP. There is currently no tertiary treatment at the WWTP.

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A stormwater overflow storage tank will also be provided and the effluent is returned to the main plant for full treatment. This will minimise the amount of untreated stormwater entering the River Derry.

Currently the WWTP does not have a storm water tank.

Water Framework Directive (WFD;

The objectives of the Water Framework Directive (WFD) are to protect all high status waters, prevent further deterioration of all waters and to restore degraded surface and ground waters to good status by 2015. A major programme is under way to achieve this target.

The provision by Carlow County Council of a new WWTW at Clonegal with secondary and tertiary treatment meets these objectives. The SERBD Draft Management Plan developed under the WFD is on display at present and the construction of the new WWTW at Clonegal meets the requirements of this plan.

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The proposed WWTP will secure good water quality in the River Derry and subsequently into the River Slaney.

Urban Waste Water Treatment Directive (UWWTD);

The proposed new Clonegal Treatment Plant will be designed and constructed in line with all requirements under the UWWTD. Additional tertiary treatment is provided to protect the Slaney River and reduce phosphorous levels. The Slaney River is a designated Nutrient Sensitive Water Catchment.

Storm overflows from the WWTP will be recorded by an electromagnetic meter (magmeter) that displays the volume on the Panel in the Control Building. This reading will be recorded in a daily log book.

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Habitat Directive;

The Slaney river valley is designated a candidate Special Area of Conservation (SAC), due to the presence of habitats and species listed in Annexes 1 and 11 of the EU Habitats Directive92/43/EEC.

It is a priority habitat under Annex I of the EU Habitats Directive92/43/EEC). It is also designated as such due to the presence of floating river vegetation, estuaries, tidal mudflats and old oak woodlands which are all habitats listed in Annex I of the EU Habitats Directive. Also Annex II species from the directive such as Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Twaite Shad, Atlantic Salmon and Otter are present in the Slaney River Valley.

The Fresh Water Pearl Mussel, Margaritefera Margaritefera, is of particular significance. This species is in serious decline and is in real danger of extinction. It is found mainly in the Munster Blackwater and also in the Barrow, Slaney, Dereen and Mountain Rivers. A separate species is found in the Nore. It is an excellent indicator of pristine waters as these mussels will only breed in high quality water.

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If the programme of measures in the South East River Basin Management Plan can achieve the objective of creating the environment to allow these mussels to reproduce it will be a very good indicator of success as well as preventing its extinction.

The Slaney is also a designated salmonid river in accordance with EU Freshwater Fish Directive (78/659/EEC).

The River Slaney and its tributaries support a small non recruiting population of the freshwater pearl mussel particularly in the River Dereen which joins the River Slaney approximately 2.5km downstream of Tullow. A small adult population of freshwater mussel has been recorded in the main channel of the Slaney at the confluence with the River Dereen.

The effluent from the Clonegal WWTP enters the River Derry which enters the River Slaney well downstream of the River Dereen confluence with the River Slaney.

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Receiving Waters

The primary discharge point from Clonegal Waste Water Treatment Plant is into the River Derry, 150 metres downstream from Clonegal Bridge.

The River Derry rises in County Wicklow, flows along the Wicklow-Carlow and the Carlow–Wexford borders and flows south west from Clonegal Village to join the River Slaney near Kildavin Village just upstream of Kildavin Bridge.

The EPA has a monitoring station (0900) at Clonegal Bridge which is upstream of the discharge from the Clonegal WWTP. In the EPA River Water Quality Report 2008 a Q-rating of 4 (unpolluted) at this station was recorded.

This River Derry has been evaluated for its assimilative capacity so that final effluents standards can be set.

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Flow data was obtained from the EPA for the River Derry and based on this flow data and the design population, final effluent discharges to the water courses were modelled. Resulting from this modelling final effluent standards have been set, these are detailed in the table below.

Results of Dilution Modelling

River	BOD/TSS mg/l	Amm N mg/l	Phosphorous mg/l	Orthophosphate mg/l
Derry River	25/35	40	1	0.5

However as the Derry River joins the Slaney River about a mile downstream of the effluent discharge point and as the Slaney is a designated Salmonid water, a stricter standard for the final effluent is required and this is set out in the table below.

Final Effluent Standards for Clonegal WWTW

River	BOD/TSS mg/l	Amm N mg/l	Phosphorous mg/l	Orthophosphate mg/l
Derry River	10/10	5	1	0.5

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Setting the ammonia level to 5mg/l requires that the works nitrify the organic nitrogen to nitrates, resulting in nitrate effluent discharges of between 40 - 50mgNO3/l. At low flows in the river these will result in approximately 0.3mg/l increase in nitrate levels, which is negligible. The nitrates levels in the River Derry at Clonegal are in the range of 3 – 5.5 mgNO3/l.

Furthermore most nitrifying treatment plants will have an element of de-nitrification which can reduce the discharge levels of nitrates from the wastewater works by up to 50% further minimising the impact on the river.

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Given the small size of the Clonegal WWTW (future design load – 1,000pe), the discharge from this new works with secondary and tertiary treatment will improve this environment, as the new works will discharge, at future design load (2020), about 30% less than the load discharged by the old works due to the performance of the old works and the final effluent is now being discharged to the Derry River directly where there is significant dilution.

To comply with Phorsphorus Regulations (S.I. No 258 of 1998) the WWTP at Clonegal WWTP, phosphorus removal takes place in the WWTP with the injection of Ferric Sulphate.

The EPA Biological Quality Ratings (Q-Values) are the parameters used to monitor river water quality.

Q5, Q4-5, Q4	Unpolluted
Q3- 4	Slightly Polluted
Q3, Q2-3	Moderately Polluted
Q2, Q1-2, Q1	Seriously Polluted

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In the EPA 2004 Report a 4 rating was applied upstream at station Ford N of Garryhasten and a 4 rating downstream at station Kildavin. We would now expect there will be improvement in the Q value rating with the removal of the effluent loading from the older WWTP.

Conclusion

Carlow County Council will be constructing a new and high specification WWTP in Clonegal. This replaces the older inefficient WWTP that was the point source of substantial loadings into the River Derry. The new WWTP is expected to reduce the loading by up to 40% into the River Derry. Ferric dosing is provided at the plant to achieve phosphorus reduction.

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Storm Tanks will also be installed as part of the upgrade works to manage storm flows.

At a capacity of 1000 pe the plant is adequately sized to cater for the wastewater loadings from Clonegal village for many years. The current loading is 400pe, only 40% of the proposed capacity.

This proposed WWTP will allow Carlow County Council to do its part in removing pollution from the Derry River and contributing to improvements in the water quality in the Derry and Slaney Rivers.

The new proposed WWTP will eliminate a substantial source of phosphate and nitrate loading into the Derry River at Clonegal Bridge.

The new proposed WWTP will allow Carlow County Council to achieve the objectives and programmes set out under the SERBD Management Plan and under the Dangerous Substances Directive.

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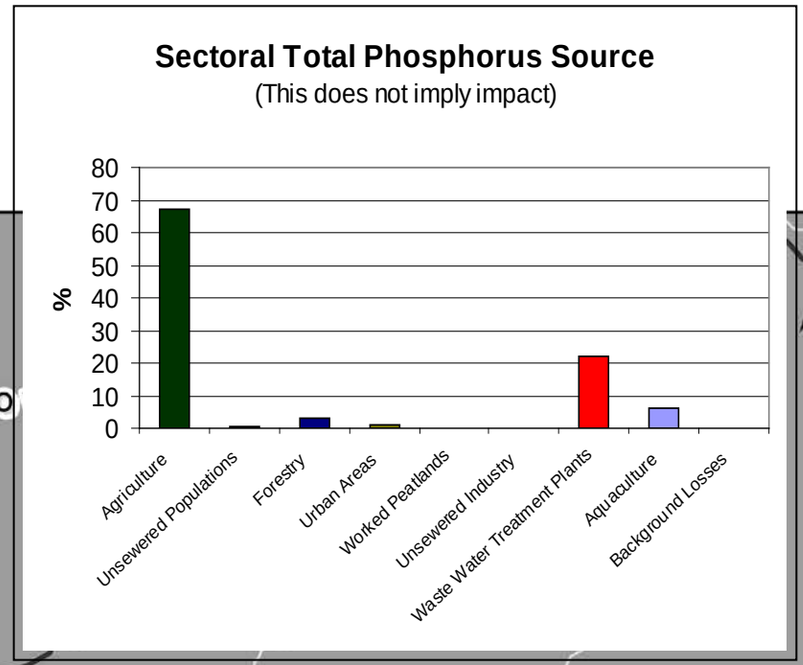
Slaney Lower Water Management Unit Action Plan



SlaneyLower
Water Management Unit

Legend

- WMU Boundary
- County Boundary
- Quarries
- Waste Water Treatment Plants
- Local Authority Licensed Discharge
- EPA Licensed Facility (IPPC)

River Status

- High
- Good
- Moderate
- Poor
- Bad

Lake Status

- High
- Good
- Moderate
- Poor
- Bad

Name	Slaney Lower Water Management Unit
Area	417 km^2
River Basin District	South Eastern RBD
Main Counties	Wexford, Carlow
Protected Areas	Blackstairs Mountains SAC Slaney River Valley SAC Slaney River SAC 3 drinking water abstractions from Bann, Clody, Ballingale.

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Slaney Lower Water Management Unit Action Plan

STATUS/IMPACTS	
Overall status	19 River Water Bodies - 9 Good, 7 Moderate, 3 Poor. There are no lakes.
Status elements	Q score dictates status in all WBs with the exception of 1 WB where Physico Chemical is the driver for good status. Status was extrapolated for 6 WBs. Chemical status passes in all 5 WBs monitored.
Possible Impacts - EPA Water Quality 2004	Ballingale Stream - (SE_12_955 - Status 09 - Poor); Overall quality just 'Fair' but heavy siltation at stated monitoring point. Ballycarney Stream - (SE_12_934 - Status 09- Good; SE_12_924 - Moderate); Slight improvement in Q in the lower reaches but further improvement required. Borris Stream - (SE_12_932 - Status 09 -Good based on Q Score); 2007 –Improvement in Q-score but further improvement required. Agriculture suspected. Corbally Stream - (SE_12_924 - Status 09 -Moderate); Only the lowermost reaches remain heavily silted and in need of improvement. Douglas - (SE_12_913 - Status 09 -Poor); Generally unsatisfactory. Smell of human faeces, deep banks of silt, over-grown, devoid of sensitive species, excessive weed and algal growth marked eutrophication. Glasha - (SE_12_946 - Status 09 -Good); Major improvement but presence of Cladophora was noted so further pollution abatement required. Slaney - (SE_12_924 - Status 09 -Moderate); Continuing improvement but still some signs of over-enrichment d/s/ of Rathvilly and again below the eutrophic Douglas. Tinnacross Stream - (SE_12_2075 - Moderate); Slightly enriched but just about satisfactory following a slight improvement.

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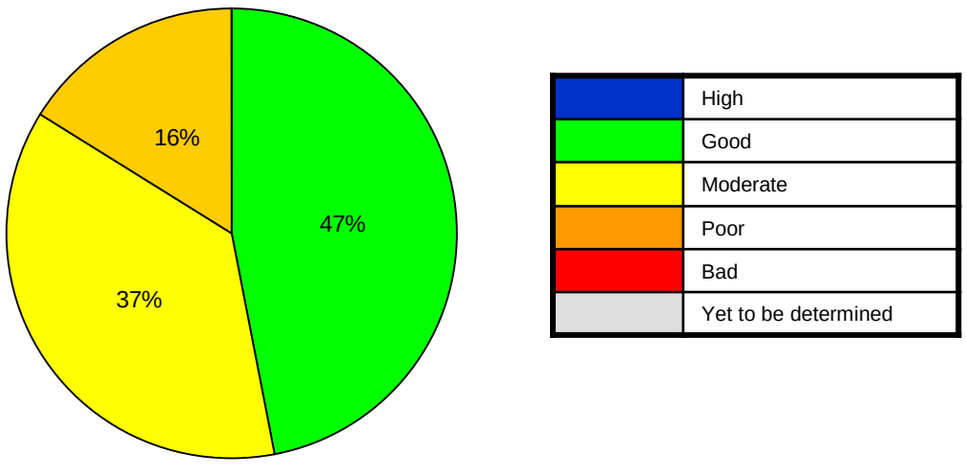
PRESSURES/RISKS	
Nutrient sources	72% of TP is diffuse (67% from Agriculture). 22% from WWTP.
Point pressures	13 WWTP - Ardattin, Ballon, Boolevogue, Bunclody, Castledockrell, Enniscorthy Kilogoley, Enniscorthy WWTP, Kildavin, Kilmyshall, Marshallstown, Monageer, Myshal); 3 WTP (Bunclody, Fern's Water, Vinegar Hill, and Clonhamon. 21 Section 4s – 15 x private firms, 1 quarry, Health Board, Hospital, Food Suppliers, Residential Home, Hotel, 7 IPPCs 1 EPA Licensed Waste Facility
Wastewater Treatment Plants (WWTP) and Industrial Discharges	WWTP's at risk: Bunclody WWTP Enniscorthy WWTP Kildavin Enniscorthy (Kilogoley) Ballon Myshal 1 IPPC has seen historical deterioration in water quality and Q<4 within 3km d/s of outfall.
Quarries, Mines & Landfills	There are 13 Quarries within WMU but no waterbodies at risk.
Agriculture	The majority of the area of the WMU is at risk from Agriculture
On-site systems	There are 4644 septic tanks in this WMU, none of them are posing a risk to water quality due to their density, location and unsuitable hydrogeological conditions.
Forestry	No waterbodies at risk from forestry
Dangerous substances	No waterbodies at risk from Dangerous Substances.
Morphology	4 waterbodies 'At Risk' due to channelisation (SE_12_789, SE_12_1859, SE_12_1727, SE_12_913). Douglas Drainage District (Pre 1945 Drainage Scheme) in and around Ballon
Abstractions	8 Abstractions within WMU but none at risk
Other	None

River Status



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Slaney Lower Water Management Unit Action Plan

SELECTED ACTION PROGRAMME *NB All relevant basic measures, general supplementary measures and SEA mitigation measures apply*	
Point Sources	WWTP – Refer to Action table below INDUSTRY: Examine the terms of discharge authorisations to determine whether they require review for the purpose of compliance with water body objectives including protected area objectives and environmental quality standards. Investigate IPPC at risk.
Diffuse Sources	AGRICULTURE - Good Agricultural Practice Regulations and Enforcement.
Other	MORPHOLOGY: SE_12_913, SE_12_1859 and SE_12_789 will all require Channelisation Investigation to determine impact. Enniscorthy Sewerage Scheme and Enniscorthy & Sow Regional Water Supply Scheme in place.

Point Source Discharge	County	Priority	Measure (Capital Works)
Bunclody WWTP	Wexford	1	Increase capacity of treatment plant.
Enniscorthy WWTP	Wexford	1	Provide nutrient removal.
Enniscorthy (Kilogoley)	Wexford	1	Increase capacity of treatment plant.
Point Source Discharge	**County**	**Priority**	**Measure (Investigation before Capital Works)**
Kildavin	Carlow	3	Investigate the need for increase in capacity of treatment plant.
Point Source Discharge	**County**	**Priority**	**Measure**
Enniscorthy WWTP	Wexford	1	Plant requiring the implement an appropriate performance management system
Point Source Discharge	**County**	**Priority**	**Measure**
Ballon	Carlow	3	Plant requiring the investigation of CSO's
Myshal	Carlow	3	Plant requiring the investigation of CSO's
Point Source Discharge	**County**	**Priority**	**Measure**
Ballon	Carlow	3	Plant requiring to ensure capacity of treatment plant is not exceeded
Enniscorthy WWTP	Wexford	2	Plant requiring to ensure capacity of treatment plant is not exceeded
Enniscorthy WWTP	Wexford	2	Plant requiring to ensure capacity of treatment plant is not exceeded

OBJECTIVES	
Good status 2015 Protect	3 water bodies 9 water bodies
Alternative Objectives	Extended Deadlines – 7 water bodies with 2021 deadline New Modifications or Development – Enniscorthy flood alleviation scheme HMWB/AWB - none

FUTURE DEVELOPMENT	
Future Pressures and Developments	Throughout the river basin management cycle future pressures and developments will need to be managed to ensure compliance with the objectives of the Water Framework Directive and the Programme of Measures will need to be developed to ensure issues associated with these new pressures are addressed.

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Slaney Lower Water Management Unit Action Plan

This table outlines water body information including status and a breakdown of its elements, protected areas, objectives and timescales.

River Data

IE_SE_SlaneyLower																	
			Biological Elements				Supporting Elements					Protected Areas					
Member State Code	Monitored Y (Extrapolated N)	Donor Waterbody	Macroinvertebrates (Q)	FreshWater Pearl Mussel	Fish	Phytobenthos (Diatoms)	Morphology	Specific Polutants	Physio-chemical	Ecological Status	Chemical Status	Special Area of Conservation	Special Protection Area	Nutrient Sensitive Waters	Drinking Water	Objective	Date objective to be achieved
SE_12_1727	Y		M						M	M						GES	2021
SE_12_1859	N	SE_12_913								P						GES	2021
SE_12_2065	N	SE_12_934								G						GES	2009
SE_12_2075	Y		M						G	M		Y				GES	2021
SE_12_2084	N	SE_12_934								G						GES	2009
SE_12_2085	Y		M							M						GES	2015
SE_12_2098	Y		G			H	G	H	G	G	G	Y				GES	2009
SE_12_2375	N	SE_12_2098								G						GES	2009
SE_12_789	Y		M			M	G	H	M	M	G					GES	2021
SE_12_910	N	SE_12_789								M		Y				GES	2015
SE_12_913	Y		P							P						GES	2021
SE_12_924_1	Y		G					H	H	G		Y				GES	2009
SE_12_924_2	Y		M			H	G	H	H	M	G	Y				GES	2015
SE_12_924_3	Y							H	G	G		Y	Y		Y	GES	2009
SE_12_932	Y		G							G						GES	2009
SE_12_934	Y		G							G						GES	2009
SE_12_946	Y		G						H	G		Y				GES	2009
SE_12_955	Y		P							P					Y	GES	2021
SE_12_968	N	SE_12_789								M						GES	2021

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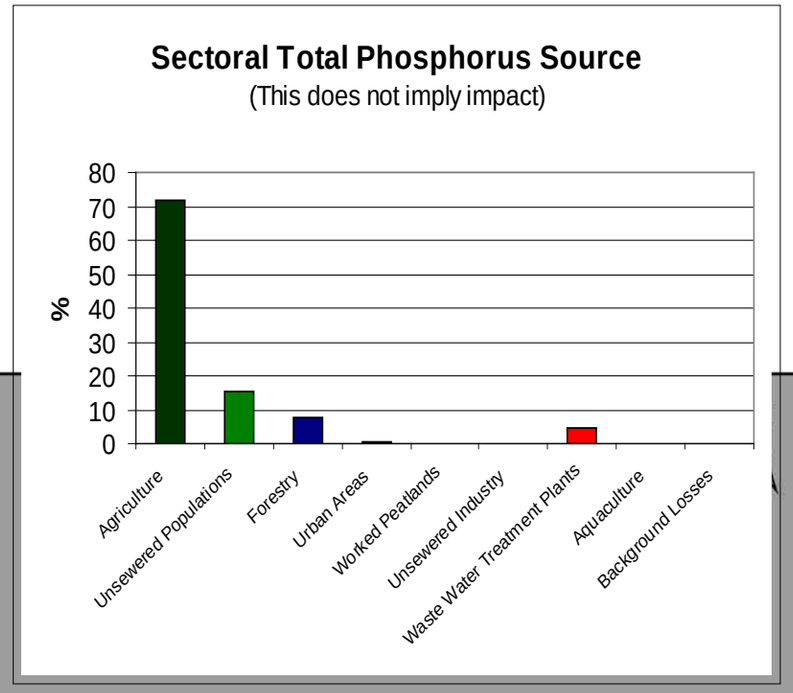
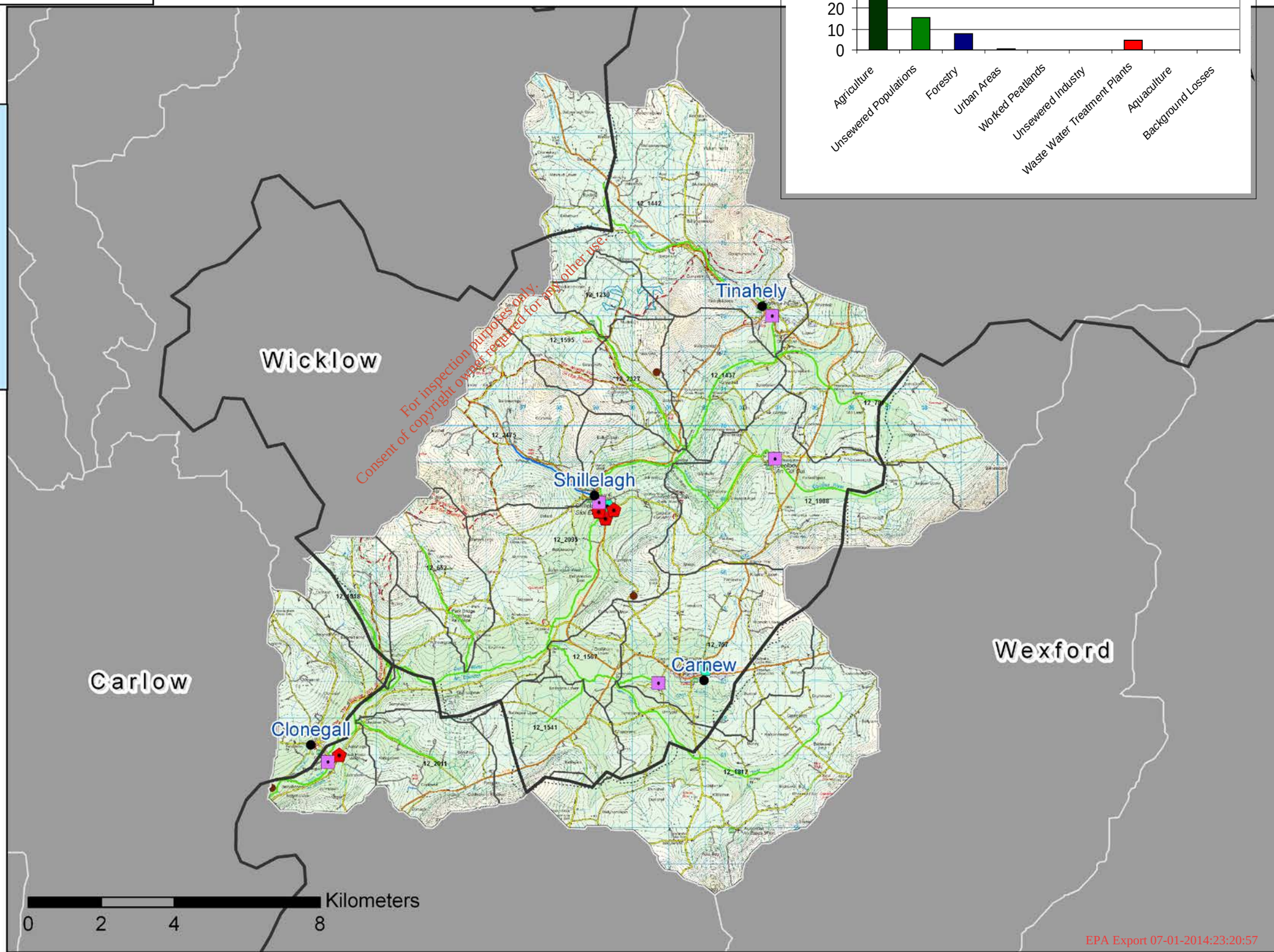
Derry Water Management Unit Action Plan

Name	Derry Water Management Unit
Area	246 km^2
River Basin District	South Eastern RBD
Main Counties	Wicklow
Protected Areas	Slaney River Valley SAC 2 drinking water abstractions from Derry River



Derry
Water Management Unit



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Legend

- WMU Boundary
- County Boundary
- Quarries
- Waste Water Treatment Plants
- Local Authority Licensed Discharge
- EPA Licensed Facility (IPPC)

River Status

- High
- Good
- Moderate
- Poor
- Bad

Lake Status

- High
- Good
- Moderate
- Poor
- Bad

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Derry Water Management Unit Action Plan

STATUS/IMPACTS	
Overall status	16 RWB - 1 High, 15 Good
Status elements	Q score dictates status. Phys Chem is high or good in all 8 WBs monitored. Chemical status passes in the 1 WB monitored (Derry River main channel). Status for 8 good WBs was extrapolated.
Possible Impacts - EPA Water Quality 2004	**Coolboy Stream** - (SE_12_2095 - Good); Remains in satisfactory ecological condition. **Derry** - (SE_12_1442 - Good) and 299106, 167968 (SE_12_2095 - Good); Continued its improvement but signs of over-enrichment show more improvement is possible. Cross Bridge had elevated Phosphorus at Cross Bridge in 2008. Invest. Samples inconclusive. **Mine** - (SE_12_1567 - Good); At overall satisfactory ecological condition in 2007 but signs of enrichment were evident at both locations. Agriculture and sewage suspected. **Rosnastraw Stream** - (SE_12_781 - Good); The Rosnastraw Stream was in a satisfactory ecological condition at Rosnastraw bridge in 2007. Agricultural pressures on this river upstream Kilcommon Bridge. High BOD in 2008 and channel overgrown.

PRESSURES/RISKS	
Nutrient sources	95% of TP is Diffuse, 72% of which is from Agriculture, and 15% from Unsewered properties
Point pressures	5 WWTPs: Clonegal, Carnew Wicklow, Coolboy, Shillelagh, Tinahely. 2 WTPs: Logan, Tinahely. 4 Section 4s: Offices, Housing Development, 2 discharges from Meat Processing Plant, Private Company. 2 IPPCs: Meat Processing Plant, Packaging Company.
Wastewater Treatment Plants (WWTP) and Industrial Discharges	The following WWTPs are at risk: Clonegal WWTP Carnew WWTP Tinahely WWTP Shillelagh
Quarries, Mines & Landfills	There are 4 Quarries.
Agriculture	The majority of the area of the WMU is at risk from Agriculture
On-site systems	There are 2307 septic tanks in this WMU, none of them are posing a risk to water quality due to their density, location and unsuitable hydrogeological conditions.
Forestry	No waterbodies at risk from forestry. WCC SSRS and investigative monitoring suggest Shilelagh River at risk from Forestry
Dangerous substances	No waterbodies at risk from Dangerous Substances.
Morphology	No waterbodies at risk
Abstractions	6 abstractions but no waterbodies at risk
Other	None

River status

SELECTED ACTION PROGRAMME *NB All relevant basic measures, general supplementary measures and SEA mitigation measures apply*	
Point Sources	See Action Table for WWTP at risk below. INDUSTRY - Examine the terms of discharge authorisations to determine whether they require review for the purpose of compliance with water body objectives including protected area objectives and environmental quality standards.
Diffuse Sources	AGRICULTURE - Good Agricultural Practice Regulations and Enforcement.
Other	None

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Point Source Discharge	County	Priority	Measure (Capital Works)
Carnew, Wicklow	Wicklow	2	Provide tertiary treatment or relocate outfall.
Carnew, Wicklow	Wicklow	2	Provide nutrient removal or relocate outfall.
Point Source Discharge	**County**	**Priority**	**Measure (Investigation before Capital Works)**
Clonegal	Carlow	2	Investigate the need for increase in capacity of treatment plant.
Tinahely WWTP	Wicklow	2	Investigate the need for tertiary treatment or for the relocation of the outfall.
Point Source Discharge	**County**	**Priority**	**Measure**
Carnew, Wicklow	Wicklow	1	Implement an appropriate performance management system
Shillelagh	Wicklow	1	Implement an appropriate performance management system
Tinahely WWTP	Wicklow	1	Implement an appropriate performance management system
Point Source Discharge	**County**	**Priority**	**Measure**
Carnew, Wicklow	Wicklow	3	Ensure capacity of treatment plant is not exceeded
Tinahely WWTP	Wicklow	2	Ensure capacity of treatment plant is not exceeded

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Derry Water Management Unit Action Plan

OBJECTIVES	
Restore/Protect 2015	16 water bodies
Alternative Objectives	Extended Deadlines – none New Modifications or Development – none requiring alternative objectives at present. HMWB/AWB - none

FUTURE DEVELOPMENT	
Future Pressures and Developments	Throughout the river basin management cycle future pressures and developments will need to be managed to ensure compliance with the objectives of the Water Framework Directive and the Programme of Measures will need to be developed to ensure issues associated with these new pressures are addressed.

River Data This table outlines water body information including status and a breakdown of its elements, protected areas, objectives and timescales.

IE_SE_Derry																		
			Biological Elements				Supporting Elements					Protected Areas						
Member State Code	Monitored Y (Extrapolated N)	Donor Waterbody	Macroinvertebrates (Q)	FreshWater Pearl Mussel	Fish	Phytobenthos (Diatoms)	Morphology	Specific Polutants	Physio-chemical	Ecological Status	Chemical Status	Special Area of Conservation	Special Protection Area	Nutrient Sensitive Waters	Drinking Water	Objective	Date objective to be achieved
SE_12_1230	N	SE_12_2475								G						GES	2009
SE_12_1437	Y		G						H	G		Y				GES	2009
SE_12_1442	Y		g						H	G		Y			Y	GES	2009
SE_12_1541	N	SE_12_1567								G						GES	2009
SE_12_1567	Y		G						H	G						GES	2009
SE_12_1595	N	SE_12_1437								G						GES	2009
SE_12_1817	Y		G						H	G						GES	2009
SE_12_1918	N	SE_12_2095								G						GES	2009
SE_12_1988	Y		G						H	G						GES	2009
SE_12_2011	N	SE_12_2095								G						GES	2009
SE_12_2095	Y		G			G	G	H	G	G	G	Y				GES	2009
SE_12_2327	N	SE_12_2475								G						GES	2009
SE_12_2475	Y		H						H	H						HES	2009
SE_12_652	N	SE_12_2095								G						GES	2009
SE_12_757	N	SE_12_1567								G						GES	2009
SE_12_781	Y		G						H	G						GES	2009

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WWTW DWF Effluent Discharges
Ortho P concentrations in Receiving River Waters

Table 1 Total P =10mg/l

River Flow		WTTW PE =	500		WTTW PE =	800		WTTW PE =	1000		WTTW PE =	1500		WTTW PE =	2000	
l/s		Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP
			mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l
5	Sample	4.32	5.79	1.157	2.70	9.26	1.852	2.16	11.57	2.315	1.44	17.36	3.472	1.08	23.15	4.630
10	95%ile	8.64	2.89	0.579	5.40	4.63	0.926	4.32	5.79	1.157	2.88	8.68	1.736	2.16	11.57	2.315
15	Flow	12.96	1.93	0.386	8.10	3.09	0.617	6.48	3.86	0.772	4.32	5.79	1.157	3.24	7.72	1.543
20		17.28	1.45	0.289	10.80	2.31	0.463	8.64	2.89	0.579	5.76	4.34	0.868	4.32	5.79	1.157
30		25.92	0.96	0.193	16.20	1.54	0.309	12.96	1.93	0.386	8.64	2.89	0.579	6.48	3.86	0.772
40		34.56	0.72	0.145	21.60	1.16	0.231	17.28	1.45	0.289	11.52	2.17	0.434	8.64	2.89	0.579
50		43.20	0.58	0.116	27.00	0.93	0.185	21.60	1.16	0.231	14.40	1.74	0.347	10.80	2.31	0.463
60		51.84	0.48	0.096	32.40	0.77	0.154	25.92	0.96	0.193	17.28	1.45	0.289	12.96	1.93	0.386
75		64.80	0.39	0.077	40.50	0.62	0.123	32.40	0.77	0.154	21.60	1.16	0.231	16.20	1.54	0.309
95	Expected	82.08	0.30	0.061	51.30	0.49	0.097	41.04	0.61	0.122	27.36	0.91	0.183	20.52	1.22	0.244
105	50%ile	90.72	0.28	0.055	56.70	0.44	0.088	45.36	0.55	0.110	30.24	0.83	0.165	22.68	1.10	0.220
115	Flow	99.36	0.25	0.050	62.10	0.40	0.081	49.68	0.50	0.101	33.12	0.75	0.151	24.84	1.01	0.201
150		129.60	0.19	0.039	81.00	0.31	0.062	64.80	0.39	0.077	43.20	0.58	0.116	32.40	0.77	0.154
200		172.80	0.14	0.029	108.00	0.23	0.046	86.40	0.29	0.058	57.60	0.43	0.087	43.20	0.58	0.116
250		216.00	0.12	0.023	135.00	0.19	0.037	108.00	0.23	0.046	72.00	0.35	0.069	54.00	0.46	0.093
300		259.20	0.10	0.019	162.00	0.15	0.031	129.60	0.19	0.039	86.40	0.29	0.058	64.80	0.39	0.077
350		302.40	0.08	0.017	189.00	0.13	0.026	151.20	0.17	0.033	100.80	0.25	0.050	75.60	0.33	0.066
400		345.60	0.07	0.014	216.00	0.12	0.023	172.80	0.14	0.029	115.20	0.22	0.043	86.40	0.29	0.058
450		388.80	0.06	0.013	243.00	0.10	0.021	194.40	0.13	0.026	129.60	0.19	0.039	97.20	0.26	0.051
500		432.00	0.06	0.012	270.00	0.09	0.019	216.00	0.12	0.023	144.00	0.17	0.035	108.00	0.23	0.046
600		518.40	0.05	0.010	324.00	0.08	0.015	259.20	0.10	0.019	172.80	0.14	0.029	129.60	0.19	0.039
700		604.80	0.04	0.008	378.00	0.07	0.013	302.40	0.08	0.017	201.60	0.12	0.025	151.20	0.17	0.033
800		691.20	0.04	0.007	432.00	0.06	0.012	345.60	0.07	0.014	230.40	0.11	0.022	172.80	0.14	0.029

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Per capita discharge	200	l/c/d
BOD	25	mg/l
P	10	mg/l
MRP	5	mg/l

Carlow Co Co

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WWTW DWF Effluent Discharges
Ortho P concentrations in Receiving River Waters

Table 2 Total P =2mg/l

River Flow		WTTW PE =	500		WTTW PE =	800		WTTW PE =	1000		WTTW PE =	1500		WTTW PE =	2000	
l/s		Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP
			mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l
5	Sample	4.32	5.79	0.231	2.70	9.26	0.370	2.16	11.57	0.463	1.44	17.36	0.694	1.08	23.15	0.926
10	95%ile	8.64	2.89	0.116	5.40	4.63	0.185	4.32	5.79	0.231	2.88	8.68	0.347	2.16	11.57	0.463
15	Flow	12.96	1.93	0.077	8.10	3.09	0.123	6.48	3.86	0.154	4.32	5.79	0.231	3.24	7.72	0.309
20		17.28	1.45	0.058	10.80	2.31	0.093	8.64	2.89	0.116	5.76	4.34	0.174	4.32	5.79	0.231
30		25.92	0.96	0.039	16.20	1.54	0.062	12.96	1.93	0.077	8.64	2.89	0.116	6.48	3.86	0.154
40		34.56	0.72	0.029	21.60	1.16	0.046	17.28	1.45	0.058	11.52	2.17	0.087	8.64	2.89	0.116
50		43.20	0.58	0.023	27.00	0.93	0.037	21.60	1.16	0.046	14.40	1.74	0.069	10.80	2.31	0.093
60		51.84	0.48	0.019	32.40	0.77	0.031	25.92	0.96	0.039	17.28	1.45	0.058	12.96	1.93	0.077
75		64.80	0.39	0.015	40.50	0.62	0.025	32.40	0.77	0.031	21.60	1.16	0.046	16.20	1.54	0.062
95	Expectd	82.08	0.30	0.012	51.30	0.49	0.019	41.04	0.61	0.024	27.36	0.91	0.037	20.52	1.22	0.049
105	50%ile	90.72	0.28	0.011	56.70	0.44	0.018	45.36	0.55	0.022	30.24	0.83	0.033	22.68	1.10	0.044
115	Flow	99.36	0.25	0.010	62.10	0.40	0.016	49.68	0.50	0.020	33.12	0.75	0.030	24.84	1.01	0.040
150		129.60	0.19	0.008	81.00	0.31	0.012	64.80	0.39	0.015	43.20	0.58	0.023	32.40	0.77	0.031
200		172.80	0.14	0.006	108.00	0.23	0.009	86.40	0.29	0.012	57.60	0.43	0.017	43.20	0.58	0.023
250		216.00	0.12	0.005	135.00	0.19	0.007	108.00	0.23	0.009	72.00	0.35	0.014	54.00	0.46	0.019
300		259.20	0.10	0.004	162.00	0.15	0.006	129.60	0.19	0.008	86.40	0.29	0.012	64.80	0.39	0.015
350		302.40	0.08	0.003	189.00	0.13	0.005	151.20	0.17	0.007	100.80	0.25	0.010	75.60	0.33	0.013
400		345.60	0.07	0.003	216.00	0.12	0.005	172.80	0.14	0.006	115.20	0.22	0.009	86.40	0.29	0.012
450		388.80	0.06	0.003	243.00	0.10	0.004	194.40	0.13	0.005	129.60	0.19	0.008	97.20	0.26	0.010
500		432.00	0.06	0.002	270.00	0.09	0.004	216.00	0.12	0.005	144.00	0.17	0.007	108.00	0.23	0.009
600		518.40	0.05	0.002	324.00	0.08	0.003	259.20	0.10	0.004	172.80	0.14	0.006	129.60	0.19	0.008
700		604.80	0.04	0.002	378.00	0.07	0.003	302.40	0.08	0.003	201.60	0.12	0.005	151.20	0.17	0.007
800		691.20	0.04	0.001	432.00	0.06	0.002	345.60	0.07	0.003	230.40	0.11	0.004	172.80	0.14	0.006

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Per capita discharge	200	l/c/d
BOD	25	mg/l
P	2	mg/l
MRP	1	mg/l

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WWTW DWF Effluent Discharges
Ortho P concentrations in Receiving River Waters

Table 3 Total P =1mg/l

River Flow		WTTW PE =	500		WTTW PE =	800		WTTW PE =	1000		WTTW PE =	1500		WTTW PE =	2000	
l/s		Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP
			mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l
5	Sample	4.32	5.79	0.116	2.70	9.26	0.185	2.16	11.57	0.231	1.44	17.36	0.347	1.08	23.15	0.463
10	95%ile	8.64	2.89	0.058	5.40	4.63	0.093	4.32	5.79	0.116	2.88	8.68	0.174	2.16	11.57	0.231
15	Flow	12.96	1.93	0.039	8.10	3.09	0.062	6.48	3.86	0.077	4.32	5.79	0.116	3.24	7.72	0.154
20		17.28	1.45	0.029	10.80	2.31	0.046	8.64	2.89	0.058	5.76	4.34	0.087	4.32	5.79	0.116
30		25.92	0.96	0.019	16.20	1.54	0.031	12.96	1.93	0.039	8.64	2.89	0.058	6.48	3.86	0.077
40		34.56	0.72	0.014	21.60	1.16	0.023	17.28	1.45	0.029	11.52	2.17	0.043	8.64	2.89	0.058
50		43.20	0.58	0.012	27.00	0.93	0.019	21.60	1.16	0.023	14.40	1.74	0.035	10.80	2.31	0.046
60		51.84	0.48	0.010	32.40	0.77	0.015	25.92	0.96	0.019	17.28	1.45	0.029	12.96	1.93	0.039
75		64.80	0.39	0.008	40.50	0.62	0.012	32.40	0.77	0.015	21.60	1.16	0.023	16.20	1.54	0.031
95	Expectd	82.08	0.30	0.006	51.30	0.49	0.010	41.04	0.61	0.012	27.36	0.91	0.018	20.52	1.22	0.024
105	50%ile	90.72	0.28	0.006	56.70	0.44	0.009	45.36	0.55	0.011	30.24	0.83	0.017	22.68	1.10	0.022
115	Flow	99.36	0.25	0.005	62.10	0.40	0.008	49.68	0.50	0.010	33.12	0.75	0.015	24.84	1.01	0.020
150		129.60	0.19	0.004	81.00	0.31	0.006	64.80	0.39	0.008	43.20	0.58	0.012	32.40	0.77	0.015
200		172.80	0.14	0.003	108.00	0.23	0.005	86.40	0.29	0.006	57.60	0.43	0.009	43.20	0.58	0.012
250		216.00	0.12	0.002	135.00	0.19	0.004	108.00	0.23	0.005	72.00	0.35	0.007	54.00	0.46	0.009
300		259.20	0.10	0.002	162.00	0.15	0.003	129.60	0.19	0.004	86.40	0.29	0.006	64.80	0.39	0.008
350		302.40	0.08	0.002	189.00	0.13	0.003	151.20	0.17	0.003	100.80	0.25	0.005	75.60	0.33	0.007
400		345.60	0.07	0.001	216.00	0.12	0.002	172.80	0.14	0.003	115.20	0.22	0.004	86.40	0.29	0.006
450		388.80	0.06	0.001	243.00	0.10	0.002	194.40	0.13	0.003	129.60	0.19	0.004	97.20	0.26	0.005
500		432.00	0.06	0.001	270.00	0.09	0.002	216.00	0.12	0.002	144.00	0.17	0.003	108.00	0.23	0.005
600		518.40	0.05	0.001	324.00	0.08	0.002	259.20	0.10	0.002	172.80	0.14	0.003	129.60	0.19	0.004
700		604.80	0.04	0.001	378.00	0.07	0.001	302.40	0.08	0.002	201.60	0.12	0.002	151.20	0.17	0.003
800		691.20	0.04	0.001	432.00	0.06	0.001	345.60	0.07	0.001	230.40	0.11	0.002	172.80	0.14	0.003

Per capita discharge	200	l/c/d
BOD	25	mg/l
P	1	mg/l
MRP	0.5	mg/l

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WWTW DWF Effluent Discharges
Ortho P concentrations in Receiving River Waters

Table 4 Total P =10mg/l - smaller works

River Flow		WTTW PE =	50		WTTW PE =	75		WTTW PE =	100		WTTW PE =	150		WTTW PE =	200	
l/s		Dilution	BOD mg/l	MRP mg/l	Dilution	BOD mg/l	MRP mg/l	Dilution	BOD mg/l	MRP mg/l	Dilution	BOD mg/l	MRP mg/l	Dilution	BOD mg/l	MRP mg/l
5	Sample	43.20	0.58	0.116	28.80	0.87	0.174	21.60	1.16	0.231	14.40	1.74	0.347	10.80	2.31	0.463
10	95%ile	86.40	0.29	0.058	57.60	0.43	0.087	43.20	0.58	0.116	28.80	0.87	0.174	21.60	1.16	0.231
15	Flow	129.60	0.19	0.039	86.40	0.29	0.058	64.80	0.39	0.077	43.20	0.58	0.116	32.40	0.77	0.154
20		172.80	0.14	0.029	115.20	0.22	0.043	86.40	0.29	0.058	57.60	0.43	0.087	43.20	0.58	0.116
30		259.20	0.10	0.019	172.80	0.14	0.029	129.60	0.19	0.039	86.40	0.29	0.058	64.80	0.39	0.077
40		345.60	0.07	0.014	230.40	0.11	0.022	172.80	0.14	0.029	115.20	0.22	0.043	86.40	0.29	0.058
50		432.00	0.06	0.012	288.00	0.09	0.017	216.00	0.12	0.023	144.00	0.17	0.035	108.00	0.23	0.046
60		518.40	0.05	0.010	345.60	0.07	0.014	259.20	0.10	0.019	172.80	0.14	0.029	129.60	0.19	0.039
75		648.00	0.04	0.008	432.00	0.06	0.012	324.00	0.08	0.015	216.00	0.12	0.023	162.00	0.15	0.031
95	Expected	820.80	0.03	0.006	547.20	0.05	0.009	410.40	0.06	0.012	273.60	0.09	0.018	205.20	0.12	0.024
105	50%ile	907.20	0.03	0.006	604.80	0.04	0.008	453.60	0.06	0.011	302.40	0.08	0.017	226.80	0.11	0.022
115	Flow	993.60	0.03	0.005	662.40	0.04	0.008	496.80	0.05	0.010	331.20	0.08	0.015	248.40	0.10	0.020
150		1296.00	0.02	0.004	864.00	0.03	0.006	648.00	0.04	0.008	432.00	0.06	0.012	324.00	0.08	0.015
200		1728.00	0.01	0.003	1152.00	0.02	0.004	864.00	0.03	0.006	576.00	0.04	0.009	432.00	0.06	0.012
250		2160.00	0.01	0.002	1440.00	0.02	0.003	1080.00	0.02	0.005	720.00	0.03	0.007	540.00	0.05	0.009
300		2592.00	0.01	0.002	1728.00	0.01	0.003	1296.00	0.02	0.004	864.00	0.03	0.006	648.00	0.04	0.008
350		3024.00	0.01	0.002	2016.00	0.01	0.002	1512.00	0.02	0.003	1008.00	0.02	0.005	756.00	0.03	0.007
400		3456.00	0.01	0.001	2304.00	0.01	0.002	1728.00	0.01	0.003	1152.00	0.02	0.004	864.00	0.03	0.006
450		3888.00	0.01	0.001	2592.00	0.01	0.002	1944.00	0.01	0.003	1296.00	0.02	0.004	972.00	0.03	0.005
500		4320.00	0.01	0.001	2880.00	0.01	0.002	2160.00	0.01	0.002	1440.00	0.02	0.003	1080.00	0.02	0.005
600		5184.00	0.00	0.001	3456.00	0.01	0.001	2592.00	0.01	0.002	1728.00	0.01	0.003	1296.00	0.02	0.004
700		6048.00	0.00	0.001	4032.00	0.01	0.001	3024.00	0.01	0.002	2016.00	0.01	0.002	1512.00	0.02	0.003
800		6912.00	0.00	0.001	4608.00	0.01	0.001	3456.00	0.01	0.001	2304.00	0.01	0.002	1728.00	0.01	0.003

Per capita discharge	200	l/c/d
BOD	25	mg/l
P	10	mg/l
MRP	5	mg/l

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WWTW DWF Effluent Discharges
Ortho P concentrations in Receiving River Waters

Table 5 Total P =5mg/l - Larger Works

River Flow		WTTW PE = 2000			WTTW PE = 2500			WTTW PE = 3000			WTTW PE = 4000			WTTW PE = 5000		
l/s		Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP	Dilution	BOD	MRP
			mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l
40		8.64	2.89	0.289	6.91	3.62	0.362	5.76	4.34	0.434	4.32	5.79	0.579	3.46	7.23	0.723
50		10.80	2.31	0.231	8.64	2.89	0.289	7.20	3.47	0.347	5.40	4.63	0.463	4.32	5.79	0.579
60		12.96	1.93	0.193	10.37	2.41	0.241	8.64	2.89	0.289	6.48	3.86	0.386	5.18	4.82	0.482
75		16.20	1.54	0.154	12.96	1.93	0.193	10.80	2.31	0.231	8.10	3.09	0.309	6.48	3.86	0.386
100		21.60	1.16	0.116	17.28	1.45	0.145	14.40	1.74	0.174	10.80	2.31	0.231	8.64	2.89	0.289
125	Sample	27.00	0.93	0.093	21.60	1.16	0.116	18.00	1.39	0.139	13.50	1.85	0.185	10.80	2.31	0.231
150	95%ile	32.40	0.77	0.077	25.92	0.96	0.096	21.60	1.16	0.116	16.20	1.54	0.154	12.96	1.93	0.193
175	Flow	37.80	0.66	0.066	30.24	0.83	0.083	25.20	0.99	0.099	18.90	1.32	0.132	15.12	1.65	0.165
200		43.20	0.58	0.058	34.56	0.72	0.072	28.80	0.87	0.087	21.60	1.16	0.116	17.28	1.45	0.145
250		54.00	0.46	0.046	43.20	0.58	0.058	36.00	0.69	0.069	27.00	0.93	0.093	21.60	1.16	0.116
300		64.80	0.39	0.039	51.84	0.48	0.048	43.20	0.58	0.058	32.40	0.77	0.077	25.92	0.96	0.096
350		75.60	0.33	0.033	60.48	0.41	0.041	50.40	0.50	0.050	37.80	0.66	0.066	30.24	0.83	0.083
400		86.40	0.29	0.029	69.12	0.36	0.036	57.60	0.43	0.043	43.20	0.58	0.058	34.56	0.72	0.072
450		97.20	0.26	0.026	77.76	0.32	0.032	64.80	0.39	0.039	48.60	0.51	0.051	38.88	0.64	0.064
500		108.00	0.23	0.023	86.40	0.29	0.029	72.00	0.35	0.035	54.00	0.46	0.046	43.20	0.58	0.058
600		129.60	0.19	0.019	103.68	0.24	0.024	86.40	0.29	0.029	64.80	0.39	0.039	51.84	0.48	0.048
700		151.20	0.17	0.017	120.96	0.21	0.021	100.80	0.25	0.025	75.60	0.33	0.033	60.48	0.41	0.041
800		172.80	0.14	0.014	138.24	0.18	0.018	115.20	0.22	0.022	86.40	0.29	0.029	69.12	0.36	0.036
900		194.40	0.13	0.013	155.52	0.16	0.016	129.60	0.19	0.019	97.20	0.26	0.026	77.76	0.32	0.032
1000	Expected	216.00	0.12	0.012	172.80	0.14	0.014	144.00	0.17	0.017	108.00	0.23	0.023	86.40	0.29	0.029
1500	50%ile	324.00	0.08	0.008	259.20	0.10	0.010	216.00	0.12	0.012	162.00	0.15	0.015	129.60	0.19	0.019
2000	Flow	432.00	0.06	0.006	345.60	0.07	0.007	288.00	0.09	0.009	216.00	0.12	0.012	172.80	0.14	0.014
2500		540.00	0.05	0.005	432.00	0.06	0.006	360.00	0.07	0.007	270.00	0.09	0.009	216.00	0.12	0.012

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Per capita discharge	200	l/c/d
BOD	25	mg/l
P	5	mg/l
MRP	2.5	mg/l

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Phosphorous Standard for Wastewater Treatment Works

1.0 Introduction

Carlow County Council has to set a phosphorous discharge standard for the wastewater treatment works(WWTWs) in its region. To do so it must comply with current environmental legislation namely the Urban Wastewater Treatment Directive and the Phosphorous Regulations.

2.0 Legislation

The urban waste water treatment directive (UWWTD) is concerned with the collection, treatment and disposal of urban waste waters and the treatment and discharge of industrial waste waters.

The principal elements of the Directive are summarised as requiring:

- Collection systems (sewerage) in urban agglomerations designed and constructed in accordance *with Best Available Technology Not Entailing Excessive Cost* (**BATNEEC**) having regard to:
    - Volume and characteristics of urban waste water.
    - Prevention of leaks.
    - Limitation of pollution of receiving waters due to stormwater overflows.
- Collection systems to be in place by 31 December 1998, 2000 and 2005 for discharges to sensitive waters, populations of more than 15,000 and populations between 2,000 and 15,000 respectively.
- Waste water to be subjected to Secondary Treatment or equivalent prior to discharge.
- Treatment to be in place by 31 December 2000 and 2005 depending on size and location.
- **A higher level of treatment where discharge is to 'sensitive' waters.**
- The disposal of waste water be the subject of regulation.
- The discharge of industrial waste water into urban collection systems and treatment plants be the subject of regulation.
- The elimination of the disposal of sludge to surface waters by 31 December 1998.
- Sludge arising from waste water be reused whenever appropriate.
- **Discharges from treatment plants be monitored and reported.**
- A concession in relation to the classification of waters as *'less-sensitive'* and allowing treatment of a lower order than Secondary Treatment is included in the Directive.

The UWWT Directive was transposed into Irish Law by the Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations 1994 (SI 419 of 1994).

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The UWWTD sets P discharge consent standards of 2mg/l of total phosphorous for WWTW between 10,000 and 100,000 pe and 1mg/l total P for WWTW greater than 100,000 pe where the WWTW is discharging into 'sensitive waters'. An equivalent percentage reduction in inlet P concentrations is also permissible. A list of 'sensitive' receiving waters is included in the Regulations. All these waters are inland. No waters around Ireland are classified as 'less-sensitive'.

The implications of the UWWTD for P reduction in WWTW are as follows:

- There is no P standard required by the UWWTD for WWTW under 10,000 pe.
- For WWTW greater than 10,000 pe and less than 100,000 pe a 2mg/l total P standard is required if the receiving water is designated 'sensitive'
- For WWTW greater than 100,000 pe a 1mg/l total P standard is required if the receiving water is designated 'sensitive'
- Employ the principle of BATNEEC in treatment of wastewater.

The other legislation concerning control of P discharges from wastewater treatment works is the Phosphorous Regulations of 1998 (Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorous) Regulations, 1998). These regulations require that a Local Authority review the EPA's water quality data of inland river and lake waters and prepare a baseline report by 1998 of inland surface waters within their boundaries. The regulations require that the existing water quality or biological quality rating, as set out in this baseline report, be maintained if it is currently satisfactory or where the baseline biological rating is less than satisfactory that the rating is improved over time to a satisfactory condition and then is maintained. The Third Schedule of the Regulations defines various ratings and the improvements required. The Third Schedule uses both Biological Quality Ratings – Q Ratings and Molybdate Reactive Phosphate(MRP) concentrations. MRP concentrations are matched against Q Ratings. The LA is then required to plan, report and implement(under the BATNEEC principle) any measures required to maintain and/or improve the baseline water quality as required by the regulations.

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The MRP concentrations detailed in the Third Schedule are very low and range from 0.015 mgMRP/l to 0.07 mgMRP/l in the surface water. These are median concentrations and by the sampling regime required to measure the median concentration they are based on an annual variation in surface water conditions. The relationship between total P and MRP is not easily defined and a useful guide when assessing discharges from WWTW is that the MRP is taken as half of the total P concentration.

The implications of the Phosphorous Regulations of 1998 for P reduction in WWTW are as follows:

- Very low annual median concentrations of MRP are set depending on the baseline water quality of the surface water as set by the EPA data available up to 1998.
- There is no method proposed for relating median MRP concentrations in the surface waters to WWTW final effluent discharges.

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- Employ the principle of BATNEEC in maintaining/improving the baseline Biological Rating of the surface water.

3.0 Defining P Reduction Concentrations.

The UWWTD does not apply to WWTW under 10,000 pe with regard to P consent standards and for works greater than 10,000 pe it only applies if the receiving water has been designated sensitive. Therefore the principle environmental legislation that controls the discharges of phosphorous to surface water is the Phosphorous Regulations of 1998 (Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorous) Regulations, 1998).

To evaluate the requirements of the P Regulations with regard to effluent discharges from WWTW a spreadsheet has been developed that calculates the MRP concentration in a stream/river for various sizes of WWTW and for various total P discharges. Three tables from this spreadsheet demonstrate the impact of P reduction concentrations for WWTW from 500 pe up to 2000 pe for three different discharge levels of total P – 10mgP/l, 2mgP/l and 1 mgP/l. The MRP value has been taken as half the total P concentration for calculating the MRP concentration in the receiving water. For discussion purposes a stream with a low 95%ile flow(10l/s) has been used to examine the MRP concentrations, this is a small stream but one that dose not quite dry up in the summer usually. The median flows are based on estimates for similar sized streams using data from the EPA.

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Table 1 shows a total P discharge of 10 mg/l which is for a WWTW without any P reduction process in place. The light shading show the MRP concentrations at the 95% ile flow and at the estimated median flows. The P Regulations Third Schedule has the following MRP levels defined;

Existing Q Rating	Minimum Target Q Rating	MRP Median Concentration (mg/l)
5	5	0.015
4-5	4-5	0.020
4	4	0.030
3-4	4	0.030
3	3-4	0.050
2-3	3	0.070
<=2	3	0.070

Table 1 shows that WWTW discharges without P reduction can increase the level of MRP above the 0.070 mgMRP/l very quickly at median flows ie unless the river has a fairly high flow or the WWTW is small (<500 pe). The 0.070 MRP concentration is associated with seriously polluted waters as seen from the above data. For WWTW to require no P reduction the median flows would have to be very high as shown

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by the heavier shaded boxes on the table – 350l/s for a 500pe works, 600l/s for a 800 pe works and 700l/s for a 1000pe works and this would be without background P levels in the river being taken into account. Therefore P reduction is required at WWTW.

In deciding what level of P reductions is required the levels set in the UWWTD are used as a guide. These are 2 mg/l and 1 mg/l. Table 2 shows the impact of a 2mg/l total P discharge in the final effluent and clearly shows that the river water concentrations of MRP for a Q5 water quality are more readily achieved for small WWTW(500 pe). However for larger works of 1500pe and over the MRP level from the WWTW alone is above 0.030 mg/l which is equivalent to a slightly polluted water and when background levels of MRP are taken into account could be equivalent to a moderately polluted water with MRP values in excess of 0.05 mg/l. Also when the 95%ile flows are considered the MRP levels are an order of magnitude greater than those required at the median level in the river throughout the year by the regulations.

Table 3 shows the impact of a 1mg/l total P discharge in the final effluent from a range of WWTWs and the table demonstrates that the MRP levels(0.015 – 0.03 mg/l) associated with Q4, Q4-5 and Q5 is achievable for WWTW of 2,000pe and under discharging into a fairly small stream as represented by the lighter shaded area. The MRP levels at the 95%ile flows are also significantly reduced and while still high compared to the median values required they will only occur in the river/stream for a short period and statistically a high value that occurs in the lower 50 % of results does not affect the median value. P unlike BOD and ammonia is not immediately toxic and therefore relatively high levels for a short period will not cause a pollution incident. The relevance of an annual median value of MRP appears to be that it reflects or relates to the biological diversity and hence health of the river/stream over an annual cycle. As can be see from Table 3 for the smaller works the Q5 MRP value is being well exceeded in the receiving water, but it must be remembered that there will be background P levels which are unaccounted for in the table. It is very difficult to evaluate the background level of MRP as an existing small WWTW without P reduction will be contributing a significant amount to the MRP level in any given waterway as is demonstrated by Table 1.

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Reviewing Table 1 clearly shows that there is requirement for P reduction at WWTWs. Table 2 shows that a 2mg/l total P in the final effluent from a WWTW is insufficient to meet the requirements of the 1998 P Regulations on all but the smallest of WWTWs. Table 3 indicates that a 1mg/l level of total P in the final effluent will meet the requirements of the P Regulations unless there is a relatively large works (2,000 pe) discharging into a small stream with very low median flows.

Another consideration with regard to setting a P reduction standard is the process technology available to reduce the P to the required level. The traditional P reduction process is the use of an acid such as ferric chloride which changes the solubility of the P and makes it more readily settleable. Then more recently particularly on larger works there is biological P reduction which uses alternating anaerobic, anoxic and aerobic conditions to adsorb the soluble P. The third principle method is the use of membrane technology

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which physically removes the soluble P. To achieve a lower than 1 mg/l total P is not feasible using biological P reduction on its own. The chemical addition method can achieve lower concentrations but not without other process difficulties as the addition of the acid reduces the pH which will prevent nitrification if there is insufficient alkalinity. Also the acid addition significantly increases the sludge production from a works. Membrane technology can achieve lower P concentrations down to quite low values of less than 0.1 mg/l, however it is very expensive to install and operate. Under the principle of BATNEEC the cost of membrane technology is unacceptable on both capital and operating grounds for P reduction alone as it can more than double the cost of the treatment works. If there are other factors driving final effluent requirements such as very low BOD or Faecal Coliform standards then the use of membrane technology could be considered.

4.0 Selecting the P Concentration for Final Effluent Discharges

A 1 mg/l total P final effluent standard is therefore selected and set for all WWTWs in the Carlow County Council region as this will meet the requirements of the regulations and maintain the principle of BATNEEC. There are two exceptions to this that can apply:

- Where a WWTW is less than 200 pe and is demonstrated as discharging into a stream with suitable 95%ile and median flows, as shown in Table 4, for this exception to apply supporting data must be fully and clearly presented.
- Where a WWTW is discharging into a river with larger median flows as shown in Table 5, in this case P reduction will still be required however the standard can be increased to a total P of 5 mg/l provided that the river can sustain this and that that the river flow data is available to demonstrate this.

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The implications to Carlow County Council in setting a P reduction standard are as follows

- WWTW effluents will meet the 1998 P Regulations
- The UWWTD will be met in that the standard is greater than set by the UWWTD for P reduction into ‘sensitive waters’ unless one of the above exceptions are considered and then the UWWTD must be taken into account.
- There will be an increase in the amount of sludge produced from each works and this should be accounted for in the final design of the sludge handling stream and sludge treatment centre. For small works sludge treatment using sludge reed beds should be considered as these are more cost effective than transporting and treating sludge from these small works, particularly given the additional volumes expected.
- There will be an additional cost of treatment both in capital and operating costs at each WWTW.

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CARLOW COUNTY COUNCIL
COMHAIRLE CHONTAE CHEATHARLOCHA

Local Government (Water Pollution) Act, 1977
(Water Quality Standards for Phosphorus) Regulations, 1998

Implementation Report 2006

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Introduction

The Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations 1998 provide for specified improvements in water quality conditions in rivers and lakes based on molybdate-reactive phosphate levels (MRP) or the biological Q rating of the river water.

Each local authority is required to submit an implementation report to the Environmental Protection Agency in line with Article 4(3) of the Regulations. This report details the progress in implementing the Regulations in County Carlow to date (2006).

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SECTION 1

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WATER QUALITY

IN

COUNTY CARLOW

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1.0 Water Quality in County Carlow

In order to assess compliance with the requirements of the Phosphorus Regulations and for the purposes of monitoring improvements or deteriorations in the river water quality, the regulations permit local authorities to use either the biological quality (Q) rating or the median concentration for molybdate-reactive phosphate (MRP).

For the MRP values to be used, the regulations specify a minimum number of samples required when calculating the median MRP. (a minimum of 10 samples must be taken at intervals of four weeks or longer in any twelve consecutive month period - where there are insufficient samples taken in a 12 month period, the period may be extended to a period up to 24 months during which at least 15 samples were taken).

This minimum number of samples has not been taken in Carlow in 2004/2005 for the majority of stations and so the Biological or Q rating for the rivers have been used as the primary basis for measuring improvement or deterioration in the water quality standard.

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Carlow County Council commissions the Regional Water laboratory in Kilkenny to carry out the sampling and testing of river water quality in County Carlow. The laboratory prepares a yearly report on the physico/chemical and microbiological testing which is carried out during the year. For the purposes of this report, the "River Water Quality in County Carlow, 2005" report is used.

The Q values for each of the monitoring stations are assessed on a three yearly basis, with the country being divided into a number of hydrometric areas. Hydrometric areas 12 (River Slaney) and area 14 (River Barrow) include County Carlow. Biological surveys of each area are carried out every 3 years. For the purposes of this report, the biological data used is from the survey of Hydrometric area 14 carried out in 2003 and the survey of Hydrometric area 12 carried out in 2004.

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Biological surveys are usually undertaken in the summer-autumn period (June-September) when flows are likely to be relatively low and water temperatures highest. Surveys during this period are therefore likely to coincide with the worst conditions to be expected in rivers affected by waste inputs.

The Q value for a river is based on a biological assessment of the water quality. The biological classification of water quality is carried out by examining the different types of macroinvertebrates (crustaceans, insects, worms, mollusks, leeches etc) that live in a river. Some species are sensitive and some are tolerant to pollution and a system for classifying water quality depending on the different numbers of the various macroinvertebrate species has been developed. Depending on the diversity of species found and their numbers, the river is classified on a scale of Q1 to Q5 with 5 the cleanest water and 1 the most polluted.

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Biotic Quality Index (Q Value)	**Biological Quality Status**
Q5, Q4-5, Q4	Unpolluted
Q3-4	Slightly Polluted
Q3, Q2-3	Moderately Polluted
Q2, Q1-2, Q1	Seriously Polluted

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Table 1.1 – A synopsis of River Water Quality in Carlow in 2005

River	Change from 2004	Overall Quality
Aghalona (Tributary of the Burren/Barrow)	No significant change observed.	Nitrates are high but appear to have stabilised in recent years. The Aghalona has also been subject to intermittent agricultural discharges.
Barrow	Improvements have been observed over the past four years downstream of the Carlow Sugar Factory and downstream of the Carlow Municipal Sewage Treatment Plant. .	Overall water quality in the Barrow is fair with a background of slight/moderate pollution from diffuse agricultural sources and sewage discharges from the various towns.
Burren	While nitrates are still elevated, levels appear to have improved and stabilised since 1999.	The Burren flows through a high tillage area in N. Carlow – Nitrates are high , but recent data indicate that levels have stabilised. There is evidence of enrichment at the middle and lower sections, with increased signs of eutrophication in recent years.
River Clody	No significant change observed.	Generally satisfactory
River Derreen	No significant change observed.	The Derreen is shows elevated nitrates but otherwise quality is satisfactory.
River Derry	No significant change observed.	Quality is generally satisfactory. –however quality can be affected by run-off during rain.
River Douglas	No significant change observed.	Elevated nitrates in the lower reaches. Otherwise satisfactory.
Lerr	There are indications of a levelling off in nitrate levels since 1998.	Nitrates are high due to intensive tillage in South Kildare – recent data indicates that nitrate levels are levelling off. Biological data indicates borderline conditions. Overall quality is mediocre.
Mountain	No significant change observed.	Generally satisfactory.
Poulmounty	No significant change observed.	Mainly satisfactory – but slight loss of quality downstream of fish farm at times.
Clonmore Stream (Tributary of the Derreen/Slaney)	No significant change observed.	Generally satisfactory.
Slaney	No significant change observed.	Overall the Slaney is reasonably satisfactory

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Table 1.2 gives the overall trend in River Water Quality in County Carlow since the baseline year 1998. These results are graphed in Fig. 1.1. It is clear from this graph that the overall trend in river water quality is that it is improving on an ongoing basis.

Table 1.2 Overall trend in Water Quality in County Carlow

Year	Percentage samples in each category		
	Unpolluted	Moderately Polluted	Seriously Polluted
1998	61.6%	38.4%	0.0%
1999	80.6%	19.4%	0.0%
2000	76.4%	19.4%	4.2%
2001	86.7%	10.0%	3.3%
2002	81.5%	18.5%	0.0%
2003	90.2%	9.8%	0.0%
2004	89.9%	10.2%	0%
2005	91.2%	8.8%	0%

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Figure 1.1 Overall trend in Water Quality in County Carlow

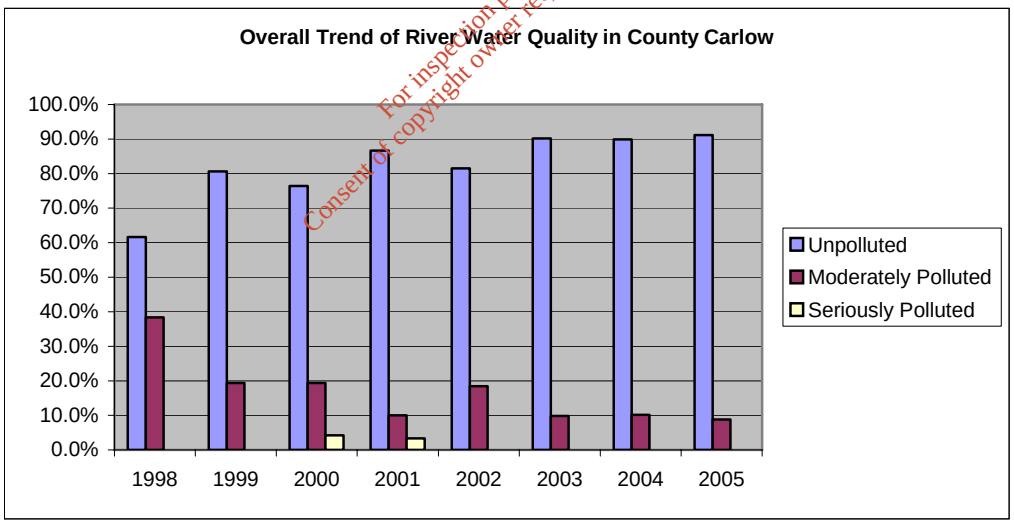

Table 1.3 gives the details of the current river water quality standards in County Carlow compared with the quality standards to be achieved by 2007. The Q values for the monitored stations are summarized in Figure 1.2.

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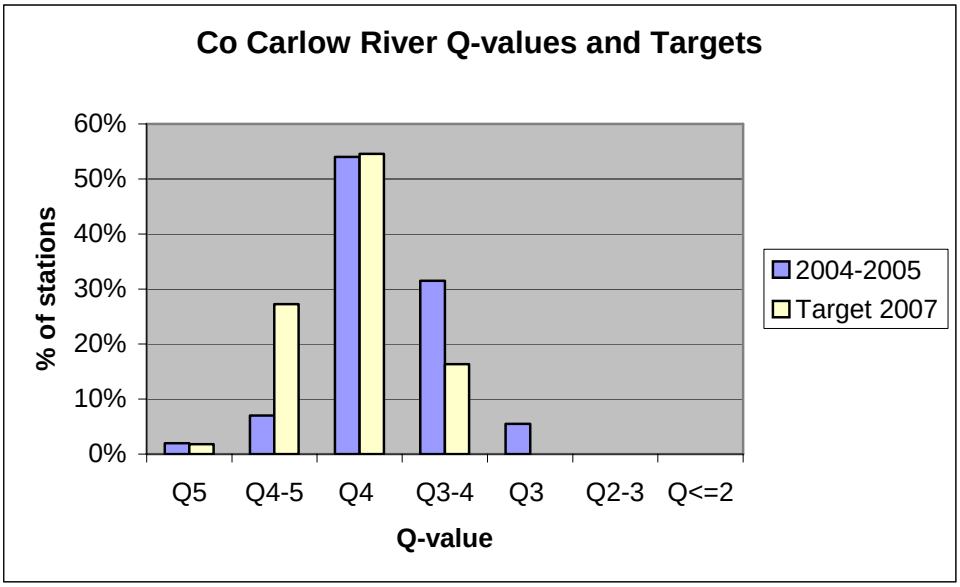
Fig. 1.2 Co. Carlow Q-value summary



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SECTION 2

IMPLEMENTATION OF PHOSPHORUS MEASURES

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2.0 Implementation of Phosphorus Measures

The Phosphorus Measures Report, submitted by Carlow County Council to the EPA in September 1999, outlined the measures, which Carlow County Council intended taking to ensure compliance with the Phosphorus Regulations. These measures are reviewed on an ongoing basis. The measures currently being implemented are listed in Table 2.1 – Implementation Programme Summary Table for County Carlow and Table 2.2 - Implementation Programme Summary Table for Rivers in County Carlow.

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SECTION 3

PROGRESS TO DATE

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3.0 Implementation Programme

3.1 Planning Control and Enforcement Measures

Where it is deemed to be necessary the Environment Section examines planning applications and appropriate conditions are placed on the planning permission. These conditions are aimed at eliminating environmental pollution.

As part of planning control, a farm survey is carried out on all agricultural developments that apply for planning permission. In addition, all intensive agricultural enterprises are subject to Nutrient Management Plan requirements as part of the planning process.

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3.2 Water Quality Management Plans

Carlow County Council is the lead Local Authority for the South Eastern River Basin District (SERBD) project Monitoring and Management System. The overall objectives of the project are to establish an integrated monitoring and management system for all waters within the river basin district, to develop a programme of management measures and to produce a River Basin Management Strategy to achieve 'Good' river water quality in all waters.

3.3 Groundwater Protection Plans

Groundwater characterisation and monitoring is included as part of the SERBD Management System. A ground water protection plan has previously been prepared by Carlow County Council for the boreholes in Bagenalstown. Draft groundwater protection plans have been prepared for the five other groundwater sources of drinking water in County Carlow. These plans will be finalised at the end of September 2006 (Bagenalstown, Leighlinbridge, Old Leighlin, Ballinkillen, Tynock and Bilboa).

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3.4 Point Sources

3.4.1 Section 4 & 16 Licences

Continued reviewing of existing Section 4 & 16 discharges licenses has taken place since the last Implementation Report and license conditions have been changed where necessary to take consideration of the Phosphorus Regulations.

Since January 2004, Carlow County Council has issued 65 new/revised Section 4 licenses (including the trade and domestic effluents) and 14 new/revised Section 16 licenses under the Water Pollution Act. An inspection of all food outlets in Carlow, Bagenalstown and Tullow was conducted this summer. Where necessary premises are applying for licences to discharge into the public sewer (a minimum of 30 premises have been identified to date, with a target to have these facilities licensed by the end of 2006).

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3.4.2 Urban Wastewater Discharges Treatment Plants

Progress has been made by Carlow County Council in relation to the improvement of discharges from Wastewater Treatment works, with particular reference to Phosphorus.

Existing treatment plants in both the Barrow and Slaney Catchments have been examined with a view to installing phosphorus removal facilities. Initial priority was directed towards the River Barrow. The “Scoping report for Identification of Water Quality Improvements to the River Barrow with particular reference to the Discharge of Wastewater from Existing Wastewater Treatment Plants” identified required improvements in the Barrow Catchment as follows: -

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Table 3.0 - Sewerage Needs: 2000 – 2006

Waste Water Treatment Plant	Existing p.e.	Description	Timeframe	Completed
Mortarstown	36,000	Tertiary	2000/2001	Yes
Leighlinbridge	450	Secondary –To be pumped to Bagenalstown	End 2006	No
Muinebeag	4,000	Tertiary	End 2006	No

In addition, Carlow County Council is currently working on the upgrading of the following WWTP's, which affect both the Barrow and Slaney River Catchments.

Ballon, Myshall & Palatine

Existing plants are to be upgraded to provide additional capacity and improved treatment, including Phosphorus removal. These plants have been designed to achieve the following standard of effluent :

BOD	10 mg/l
SS	10 mg/l
Ammonia	5 mg/l
Phosphorus	1 mg/l

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Ballon and Myshall upgrades shall be completed by the end of September 2006. Palatine is currently awaiting funding.

Raheendoran

The existing communal septic tank was replaced with a WWTP, including phosphorus removal in the summer of 2005. This effluent discharges directly to the River Barrow.

3.4.3 Septic Tanks

Carlow County Council continues to supervise groundwater and sub-soil percolation tests in relation to septic tank treatment systems, in accordance with the requirements of SR6 /

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EPA guidelines for “Treatment Systems for Single Houses”. Discharges to groundwater have been further controlled by the insertion of a maintenance clause for all small-scale treatment systems in planning permissions. Details of final sludge removal are also required to be submitted.

3.4.4 Agricultural Point-Sources

Where a pollution incident occurs legal proceedings will be brought against a person who allows polluting matter to enter a watercourse. In addition to this Notices are served under Section 12 and/or Section 23 of the Local Government (Water Pollution) Acts, 1977-1990 requesting information and/or specifying measures to be taken to prevent pollution of watercourses where required.

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3.5 Diffuse Sources

3.5.1. Agriculture

The need for Byelaws to be enacted under Section 21 of the Local Government (Water Pollution) (Amendment) Act 1990 will be considered through the SERBD project. It is thought that any proposed Byelaws would address such topics as soil P testing, phosphate application limits, Code of Good Agriculture Practice etc. The introduction of such a Byelaw will not take place until the SERBD Management Plan has been completed.

It is proposed to carry out a review of the catchments in which it is considered that agriculture is the primary source of pollution, and that additional surveys of farms may be carried out in these areas.

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3.6 Monitoring Measures

3.6.1 Regional Water Laboratory

The Regional Water Laboratory (EPA Kilkenny) is commissioned by Carlow County Council to carry out physico/chemical and biological sampling and analysis of the rivers in County Carlow. A yearly report is prepared by the laboratory giving details of all sampling and analysis carried out and also includes an assessment of the results.

3.6.2 South Eastern River Basin District (SERBD) Project

The establishment of appropriate monitoring systems for both surface and groundwater is one of the key tasks of the South Eastern River Basin District Project, which was set up for the purpose of implementing the Water Framework Directive.
A characterization report was produced by the SERBDM in 2005. The completeion of this intital characterization and analysis provides the baseline necessary to begin the next phase of the river basin management process.

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The general objective of the Water Framework Directive (WFD) is to prevent deterioration of water status and to secure at least "good status" in relation to all waters by 2015.

The WFD requires management of water bodies on the basis of river catchment management, rather than each local authority looking after the section of a river in their administrative area only. The establishment of the SERBD project has provided the necessary structure for Carlow County Council to liaise with the other local authorities who have responsibilities in the Barrow and Slaney River Catchments in relation to River Water Quality.

3.6.3 LabInfo

Carlow County Council has commenced using the LabInfo computer package. The package in use for drinking water and wastewater treatment discharges only. It is intended to extend the database to include the sampling and testing of river water if compatibility with the EPA database can be achieved. This will allow all information

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to be easily assessed with regard to the implementation of the Phosphorus Regulations.

3.7 Public Education and Advisory Measures

Carlow County Council participate in the Rural Environmental Protection Scheme (REPS) lectures organised by Teagasc and deliver lectures/talks on an ongoing basis to the Farming community on topics in relation to Water Quality issues and measures which they can take to protect water quality.

Public Participation has been highlighted as being a key requirement of the implementation of the Water Framework Directive with all stakeholders to be represented. The SERBD project includes amongst its interest groups Teagasc, Irish Farmers Association (IFA), Coillte, Fishery Boards and Community Groups. Their involvement in the project is a very important and effective way of keeping these organisations informed of the issue of Water Quality Management. The SERBD project has had information stands at agricultural events such as the ploughing championships, which have helped to make individual farmers more aware of water quality issues.

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The SERBD project also has information available on a website, which can be accessed from the Carlow County Council website.

It is intended that further information in relation to Water Quality issues will be added to the Carlow County Council website including a link to the Implementation report and the EPA website.

Carlow County Council, through the SERBD project has developed a website has which provides environmental information on the Barrow and Slaney catchments. Interactive maps are provided allowing for the interrogation of all relevant data relating to water quality.

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3.8 Financial & Other Measures

Funding has been secured for the following projects & infrastructural works :

- Catchment Based Monitoring and Management System (SERBD project).
- Leighlinbridge Sewerage Scheme– to pump wastewater to Bagenalstown WWTP.
- Ballon and Myshall WWTP– upgrade each of these WWTP to include Phosphorus removal.
- Fenagh WWTP- contractor has been appointed
- Rathoe WWTP – currently undergoing site selection
- Tullow WWTP – consultant has been appointed to produce a preliminary report for upgrade

Funding/approval is also being sought for the upgrading of the following WWTP – Rathvilly, Hacketstown, Palatine and Bagenalstown WWTP – upgrade to provide Tertiary Treatment

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Agglomeration details

Leading Local Authority	Carlow County Council
Co-Applicants	
Agglomeration	Clonegal
Population Equivalent	200
Level of Treatment	Secondary Treatment
Treatment plant address	Clonegal Wastewater Treatment Plant, Clonegal, Co. Carlow
Grid Ref (12 digits, 6E, 6N)	291674 / 160800 (Verifed using GPS)
EPA Reference No:	

Contact details

Contact Name:	Gerard O'Brien
Contact Address:	Water Services Section, Assembly Rooms, 40 Dublin Street, Carlow
Contact Number:	0599136265
Contact Fax:	0599164232
Contact Email:	go'brien@carlowcoco.ie

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Table D.1(i)(a): EMISSIONS TO SURFACE/GROUND WATERS (Primary Discharge Point)

Discharge Point Code: SW-1

Local Authority Ref No:	SW1	
Source of Emission:	Clonegal WWTW	
Location:	150 meters downstream of Clonegal Bridge	
Grid Ref (12 digits, 6E, 6N)	291707 / 160773 (Verifed using GPS)	
Name of Receiving waters:	Derry River	
Water Body:	River Water Body	
River Basin District	South Eastern RBD	
Designation of Receiving Waters:	Normal	
Flow Rate in Receiving Waters:	0.25	$m^3.sec^{-1}$ Dry Weather Flow
	1.006	$m^3.sec^{-1}$ 95% Weather Flow
Additional Comments (e.g. commentary on zero flow or other information deemed of value)	There is no outlet flow meter on the site, flow figures were calculated using inlet flow meter readings and population calculation using geodirectry figures.	

Emission Details:

(i) Volume emitted			
Normal/day	72 m^3	Maximum/day	90 m^3
Maximum rate/hour	10.8 m^3	Period of emission (avg)	60 min/hr 24 hr/day 365 day/yr
Dry Weather Flow	0.0006 m^3/sec		

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Table D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
pH	pH	Grab	= 7.07	
Temperature	°C	Grab	= 10.13	
Electrical Conductivity (@ 25°C)	µS/cm	Grab	= 639	
Suspended Solids	mg/l	Grab	= 86.39	6.22
Ammonia (as N)	mg/l	Grab	= 16.7	1.2
Biochemical Oxygen Demand	mg/l	Grab	= 63.9	4.6
Chemical Oxygen Demand	mg/l	Grab	= 173.57	12.5
Total Nitrogen (as N)	mg/l	Grab	= 34.29	2.47
Nitrite (as N)	mg/l	Grab	= 0.71	0.05
Nitrate (as N)	mg/l	Grab	= 3.36	0.24
Total Phosphorous (as P)	mg/l	Grab	= 5.69	0.41
OrthoPhosphate (as P)	mg/l	Grab	= 2.84	0.2
Sulphate (SO_4)	mg/l	Grab	= 52.3	3.77
Phenols (Sum)	µg/l	Grab	< 0.05	0.0000036

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

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Table D.1(i)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
Atrazine	µg/l	Grab	< 0.01	0.00000072
Dichloromethane	µg/l	Grab	< 5	0.00036
Simazine	µg/l	Grab	< 0.1	0.0000072
Toluene	µg/l	Grab	< 0.02	0.00000144
Tributyltin	µg/l	Grab	< 0.02	0.00000144
Xylenes	µg/l	Grab	< 0.1	0.0000072
Arsenic	µg/l	Grab	= 0.675	0.0000486
Chromium	µg/l	Grab	= 3.15	0.0002268
Copper	µg/l	Grab	= 11.6	0.0008352
Cyanide	µg/l	Grab	< 5	0.00036
Flouride	µg/l	Grab	= 0.47	0.00003384
Lead	µg/l	Grab	= 1.35	0.0000972
Nickel	µg/l	Grab	= 1.52	0.00010944
Zinc	µg/l	Grab	= 45.5	0.003276
Boron	µg/l	Grab	= 0.04	0.00000288
Cadmium	µg/l	Grab	= 0.1	0.0000072
Mercury	µg/l	Grab	< 0.02	0.00000144
Selenium	µg/l	Grab	= 0.45	0.00324
Barium	µg/l	Grab	= 5.95	0.0004284

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

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Table D.1(iii)(a): EMISSIONS TO SURFACE/GROUND WATERS (Storm Overflow)

Discharge Point Code: SW-2

Local Authority Ref No:	SW2	
Source of Emission:	Clonegal Wastewater Treatment Plant	
Location:	140	
Grid Ref (12 digits, 6E, 6N)	291704 / 160802 (Verifed using GPS)	
Name of Receiving waters:	Derry River	
Water Body:	River Water Body	
River Basin District	South Eastern RBD	
Designation of Receiving Waters:	Normal	
Flow Rate in Receiving Waters:	0.25	$m^3.sec^{-1}$ Dry Weather Flow
	1.006	$m^3.sec^{-1}$ 95% Weather Flow
Additional Comments (e.g. commentary on zero flow or other information deemed of value)	Details of storm overflows unknown at this time, frequency of storm overflow events not recorded, there is no storm water storage provided at the site and volumes discharged not recorded.	

Emission Details:

(i) Volume emitted			
Normal/day	72 m^3	Maximum/day	90 m^3
Maximum rate/hour	10.8 m^3	Period of emission (avg)	0 min/hr 0 hr/day 0 day/yr
Dry Weather Flow	0.0006 m^3/sec		

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TABLE E.1(i): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Primary and Secondary Discharge Points

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
SW-1	365	26280

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TABLE E.1(ii): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Storm Water Overflows

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow
SW-2	0	0	No

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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	291707 / 160753

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	23/04/09	29/04/09	13/05/09	21/05/09			
pH	= 7.3	= 7.5	= 7.3	= 7.2	Grab	10	Metod Ref:1041
Temperature					Grab	0	0
Electrical Conductivity (@ 25°C)	= 178	= 164	= 179	= 175	Grab	9030	Metod Ref:3011
Suspended Solids	= 7	= 10	< 1	= 2	Grab	2	Metod Ref:1049
Ammonia (as N)	= 0.091	= 0.055	= 0.285		Grab	1	Colorimetric
Biochemical Oxygen Demand					Grab	2	Metod Ref:1003
Chemical Oxygen Demand					Grab	8	Metod Ref:1009
Dissolved Oxygen					Grab	0	0
Hardness (as $CaCO_3$)	= 67.3	= 60.3	= 71.8	= 59.6	Grab	33	Metod Ref:3001
Total Nitrogen (as N)					Grab	5	Metod Ref:3000
Nitrite (as N)	= 0.046	< 0.013	= 0.196	= 0.053	Grab	0.66	Metod Ref:3000
Nitrate (as N)	= 2.3		= 4.14	= 3.63	Grab	0.01	Metod Ref:3000
Total Phosphorous (as P)					Grab	0.05	Metod Ref:3001
OrthoPhosphate (as P)					Grab	0.025	Metod Ref:3000
Sulphate (SO_4)	= 17.9	= 2.39	= 17.1	= 14.8	Grab	20	Colorimetric
Phenols (Sum)	< 0.5	= 0	< 0.5		Grab	0.5	Gc/MS Detection

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For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	25/01/13	20/02/13	13/03/13	19/04/13			
pH	= 7.28	= 7.29	= 7.49	= 7.46	Grab	10	Metod Ref:1041
Temperature	= 6.7	= 6.3	= 5.6		Grab	0	0
Electrical Conductivity (@ 25°C)					Grab	9030	Metod Ref:3011
Suspended Solids					Grab	2	Metod Ref:1049
Ammonia (as N)	= 0.08	< 0.01	= 0.01	= 0.03	Grab	1	Colorimetric
Biochemical Oxygen Demand	< 2	= 2	= 2	= 2	Grab	2	Metod Ref:1003
Chemical Oxygen Demand	= 23	= 11	= 12	= 24	Grab	8	Metod Ref:1009
Dissolved Oxygen	= 11.6	= 11.9	= 12.4		Grab	0	0
Hardness (as $CaCO_3$)					Grab	33	Metod Ref:3001
Total Nitrogen (as N)	= 3.9	= 4.4	< 10	< 10	Grab	5	Metod Ref:3000
Nitrite (as N)					Grab	0.66	Metod Ref:3000
Nitrate (as N)					Grab	0.01	Metod Ref:3000
Total Phosphorous (as P)	= 0.16	< 0.08	< 0.05	= 0.05	Grab	0.05	Metod Ref:3001
OrthoPhosphate (as P)	< 0.025	< 0.025	< 0.025	= 0.028	Grab	0.025	Metod Ref:3000
Sulphate (SO_4)					Grab	20	Colorimetric
Phenols (Sum)					Grab	0.5	Gc/MS Detection

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	29/04/13	21/05/13	18/06/13	18/09/13			
pH			= 7.15	= 7.71	Grab	10	Metod Ref:1041
Temperature			= 10.3	= 9.9	Grab	0	0
Electrical Conductivity (@ 25°C)					Grab	9030	Metod Ref:3011
Suspended Solids					Grab	2	Metod Ref:1049
Ammonia (as N)			= 0.05	= 0.05	Grab	1	Colorimetric
Biochemical Oxygen Demand			= 2	= 2	Grab	2	Metod Ref:1003
Chemical Oxygen Demand			= 22	= 35	Grab	8	Metod Ref:1009
Dissolved Oxygen				= 8.2	Grab	0	0
Hardness (as $CaCO_3$)					Grab	33	Metod Ref:3001
Total Nitrogen (as N)			= 3.53	< 10	Grab	5	Metod Ref:3000
Nitrite (as N)					Grab	0.66	Metod Ref:3000
Nitrate (as N)	= 2.27				Grab	0.01	Metod Ref:3000
Total Phosphorous (as P)			= 0.11	= 0.21	Grab	0.05	Metod Ref:3001
OrthoPhosphate (as P)			= 0.029	= 0.028	Grab	0.025	Metod Ref:3000
Sulphate (SO_4)					Grab	20	Colorimetric
Phenols (Sum)		< 0.5			Grab	0.5	Gc/MS Detection

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	11/10/13						
pH	= 7.56				Grab	10	Metod Ref:1041
Temperature	= 9.7				Grab	0	0
Electrical Conductivity (@ 25°C)					Grab	9030	Metod Ref:3011
Suspended Solids					Grab	2	Metod Ref:1049
Ammonia (as N)	= 0.06				Grab	1	Colorimetric
Biochemical Oxygen Demand	< 2				Grab	2	Metod Ref:1003
Chemical Oxygen Demand	= 20				Grab	8	Metod Ref:1009
Dissolved Oxygen	= 9.7				Grab	0	0
Hardness (as $CaCO_3$)					Grab	33	Metod Ref:3001
Total Nitrogen (as N)	= 3.21				Grab	5	Metod Ref:3000
Nitrite (as N)					Grab	0.66	Metod Ref:3000
Nitrate (as N)					Grab	0.01	Metod Ref:3000
Total Phosphorous (as P)	= 0.06				Grab	0.05	Metod Ref:3001
OrthoPhosphate (as P)	= 0.034				Grab	0.025	Metod Ref:3000
Sulphate (SO_4)					Grab	20	Colorimetric
Phenols (Sum)					Grab	0.5	Gc/MS Detection

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	291707 / 160753

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	23/04/09	29/04/09	13/05/09	21/05/09			
Atrazine	< 0.01		< 0.01	< 0.01	Grab	0.01	EO129
Dichloromethane	< 5	< 5	< 5	< 5	Grab	5	EO025
Simazine	< 0.01		< 0.01	< 0.01	Grab	0.01	EO129
Toluene	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EO025
Tributyltin	= 1.86	< 0.02	< 0.02	< 0.02	Grab	0.02	EO141
Xylenes	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EO129
Arsenic	= 0.6	= 0.4	= 0.6	= 1.1	Grab	0.2	EM130
Chromium	< 1	< 1	= 3.8	= 6.8	Grab	1	EM130
Copper	< 3	< 3	= 18.6	= 21.9	Grab	3	EM130
Cyanide	< 5	< 5	< 5	< 5	Grab	5	EW050
Flouride	= 0.2	= 0.5	= 0.6	= 0.6	Grab	0.1	EW137
Lead	= 1.7	= 0.9	= 1.6	= 1.2	Grab	0.3	EM130
Nickel	= 0.9	< 0.5	= 2	= 2.7	Grab	0.5	EM130
Zinc				= 34.9	Grab	1	EM130
Boron	= 0.04	= 0.05	= 0.05	< 0.02	Grab	0.02	EM130
Cadmium	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EM130
Mercury	< 0.02	< 0.02	< 0.02	< 0.02	Grab	0.02	EM130
Selenium	< 0.02	< 0.02	= 0.8	= 0.6	Grab	0.2	EM130
Barium	= 8.5	= 7.8	= 4.3	= 3.2	Grab	0.2	EM130

Additional Comments:	

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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	291676 / 160800

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	23/04/09	29/04/09	13/05/09	21/05/09			
pH					Grab	10	Method Ref:1041
Temperature					Grab	0	0
Electrical Conductivity (@ 25°C)	= 179	= 179	= 176	= 9	Grab	9030	Method Ref:3011
Suspended Solids					Grab	2	Method Ref:1049
Ammonia (as N)					Grab	1	Colorimetric
Biochemical Oxygen Demand					Grab	2	Method Ref:1003
Chemical Oxygen Demand					Grab	8	Method Ref:1009
Dissolved Oxygen	= 9.8	= 10.6	= 9.1	= 8.9	Grab	0	0
Hardness (as $CaCO_3$)	= 69.2	= 63.3	= 72.3	= 61.6	Grab	33	Method Ref:3001
Total Nitrogen (as N)					Grab	5	Method Ref:3000
Nitrite (as N)	= 0.021	< 0.013	= 0.019	= 0.018	Grab	0.66	Method Ref:3000
Nitrate (as N)	= 2.62	= 2.86	= 3.84	= 3.12	Grab	0.01	Method Ref:3000
Total Phosphorous (as P)					Grab	0.05	Method Ref:3001
OrthoPhosphate (as P)	= 0.009	= 0.026	< 0.009	< 0.009	Grab	0.025	Method Ref:3000
Sulphate (SO_4)	= 14.5	= 2.55	= 16	= 9.78	Grab	20	Colorimetric
Phenols (Sum)	< 0.5	< 0.5	< 0.5	< 0.5	Grab	0.5	Gc/MS Detection

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For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	25/01/13	20/02/13	13/03/13	03/04/13			
pH	= 7.67	= 7.69	= 7.07	= 6.83	Grab	10	Method Ref:1041
Temperature	= 6.7	= 6.5	= 5.6		Grab	0	0
Electrical Conductivity (@ 25°C)					Grab	9030	Method Ref:3011
Suspended Solids	= 50	= 60	= 57	= 17	Grab	2	Method Ref:1049
Ammonia (as N)	= 22.64	= 27	= 12.33	= 0.4	Grab	1	Colorimetric
Biochemical Oxygen Demand	= 21	= 49	= 21	= 8	Grab	2	Method Ref:1003
Chemical Oxygen Demand	= 104	= 142	= 91	= 56	Grab	8	Method Ref:1009
Dissolved Oxygen					Grab	0	0
Hardness (as $CaCO_3$)					Grab	33	Method Ref:3001
Total Nitrogen (as N)	= 30	= 37	= 30.63	= 19.41	Grab	5	Method Ref:3000
Nitrite (as N)					Grab	0.66	Method Ref:3000
Nitrate (as N)					Grab	0.01	Method Ref:3000
Total Phosphorous (as P)	= 3.1	= 4.4	= 5.14	= 4.35	Grab	0.05	Method Ref:3001
OrthoPhosphate (as P)					Grab	0.025	Method Ref:3000
Sulphate (SO_4)					Grab	20	Colorimetric
Phenols (Sum)					Grab	0.5	Gc/MS Detection

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	19/04/13	18/06/13	18/09/13	11/10/13			
pH	= 7.1				Grab	10	Method Ref:1041
Temperature		= 10.2	= 9.9	= 9.7	Grab	0	0
Electrical Conductivity (@ 25°C)					Grab	9030	Method Ref:3011
Suspended Solids	= 4				Grab	2	Method Ref:1049
Ammonia (as N)	= 0.04				Grab	1	Colorimetric
Biochemical Oxygen Demand	= 5				Grab	2	Method Ref:1003
Chemical Oxygen Demand	= 30				Grab	8	Method Ref:1009
Dissolved Oxygen					Grab	0	0
Hardness (as $CaCO_3$)					Grab	33	Method Ref:3001
Total Nitrogen (as N)	= 10.46				Grab	5	Method Ref:3000
Nitrite (as N)					Grab	0.66	Method Ref:3000
Nitrate (as N)					Grab	0.01	Method Ref:3000
Total Phosphorous (as P)	= 1.47				Grab	0.05	Method Ref:3001
OrthoPhosphate (as P)					Grab	0.025	Method Ref:3000
Sulphate (SO_4)					Grab	20	Colorimetric
Phenols (Sum)					Grab	0.5	Gc/MS Detection

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	291676 / 160800

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	23/04/09	29/04/09	13/05/09	21/05/09			
Atrazine	< 0.01	< 0.01	< 0.01	< 0.01	Grab	0.01	EO129
Dichloromethane	< 5	< 5	< 5	< 5	Grab	5	EO125
Simazine	< 0.01	< 0.01	< 0.01	< 0.01	Grab	0.01	EO129
Toluene	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EO125
Tributyltin	< 0.02	< 0.02	< 0.02	< 0.02	Grab	0.02	EO141
Xylenes	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EO129
Arsenic	= 0.7	= 1	= 0.8	= 1.4	Grab	0.2	EM130 ICP-MS
Chromium	< 1	< 1	< 1	< 1	Grab	1	EM130 ICP-MS
Copper	< 3	< 3	= 4	< 3	Grab	3	EM130 ICP-MS
Cyanide	< 5	< 5	< 5	< 5	Grab	5	EW050
Flouride	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EW137
Lead	< 0.3	< 0.3	= 0.5	= 0.3	Grab	0.3	EM130 ICP-MS
Nickel	= 1.2	= 0.6	= 1	= 1.2	Grab	0.5	EM130 ICP-MS
Zinc	= 10.5	= 5.6	= 15.6	= 4.4	Grab	1	EM130 ICP-MS
Boron	< 0.02	< 0.02	< 0.02	< 0.02	Grab	0.02	EM130 ICP-MS
Cadmium	< 0.1	< 0.1	< 0.1	< 0.1	Grab	0.1	EM130 ICP-MS
Mercury	< 0.02	< 0.02	< 0.02	< 0.02	Grab	0.02	EM130 ICP-MS
Selenium	< 0.2	< 0.2	< 0.2	< 0.2	Grab	0.2	EM130 ICP-MS
Barium	= 9.6	= 10.9	= 6.9	= 8.1	Grab	1	EM130 ICP-MS

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Additional Comments:	

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Annex 2: Check List For Regulation 16 Compliance

Regulation 16 of the waste water discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007) sets out the information which must, in all cases, accompany a discharge licence application. In order to ensure that the application fully complies with the legal requirements of regulation 16 of the 2007 Regulations, all applicants should complete the following.

In each case, refer to the attachment number(s), of your application which contains(s) the information requested in the appropiate sub-article.

Regulation 16(1) **In the case of an application for a waste water discharge licence, the application shall -**		**Attachment Number**	**Checked by Applicant**
(a)	give the name, address, telefax number (if any) and telephone number of the applicant (and, if different, of the operator of any treatment plant concerned) and the address to which correspondence relating to the application should be sent and, if the operator is a body corporate, the address of its registered office or principal office,	Annex 1 & B1	Yes
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	None	Yes
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the waste water treatment plant and/or the waste water discharge point or points to which the application relates,	B3	Yes
(d)	state the population equivalent of the agglomeration to which the application relates,	B9	Yes
(e)	specify the content and extent of the waste water discharge, the level of treatment provided, if any, and the flow and type of discharge,	D1 & Annex 1	Yes
(f)	give details of the receiving water body, including its protected area status, if any, and details of any sensitive areas or protected areas or both in the vicinity of the discharge point or points likely to be affected by the discharge concerned, and for discharges to ground provide details of groundwater protection schemes in place for the receiving water body and all associated hydrogeological and geological assessments related to the receiving water environment in the vicinity of the discharge.	F1	Yes
(g)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and, if Regulation 17 does not apply, provide details of the likely environmental consequences of any such discharges,	B3	Yes
(h)	in the case of an existing waste water treatment plant, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,	F1	Yes
(i)	describe the existing or proposed measures, including emergency procedures, to prevent unintended waste water discharges and to minimise the impact on the environment of any such discharges,	G4	Yes
(j)	give particulars of the nearest downstream drinking water abstraction point or points to the discharge point or points,	F2	Yes
(k)	give details, and an assessment of the effects, of any existing or proposed emissions on the environment, including any environmental medium other than those into which the emissions are, or are to be made, and of proposed measures to prevent or eliminate or, where that is not practicable, to limit any pollution caused in such discharges,	F1	Yes
(l)	give detail of compliance with relevant monitoring requirements and treatment standards contained in any applicable Council Directives of Regulations,	E	Yes
(m)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work.	G1	Yes
(n)	Any other information as may be stipulated by the Agency.	Yes	Yes
Regulation 16(3) **Without prejudice to Regulation 16 (1) and (2), an application for a licence shall be accompanied by -**		**Attachment Number**	**Checked by Applicant**
(a)	a copy of the notice of intention to make an application given pursuant to Regulation 9,	B8	Yes
(b)	where appropriate, a copy of the notice given to a relevant water services authority under Regulation 13,	None	Yes
(c)	Such other particulars, drawings, maps, reports and supporting documentation as are necessary to identify and describe, as appropriate -	B3 & B5	Yes
(c) (i)	the point or points, including storm water overflows, from which a discharge or discharges take place or are to take place, and	B3 & B5	Yes
(c) (ii)	the point or points at which monitoring and sampling are undertaken or are to be undertaken,	B3 & B5	Yes
(d)	such fee as is appropriate having regard to the provisions of Regulations 38 and 39.	B9(iii)	Yes

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Regulation 16(4) An original application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under Regulation 16(3) in hardcopy or in an electronic or other format as specified by the Agency.		Attachment Number	Checked by Applicant
1	An Original Application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under regulation 16(3) in hardcopy or in electronic or other format as specified by the agancy.	Yes	Yes
Regulation 16(5) **For the purpose of paragraph (4), all or part of the 2 copies of the said application and associated documents and particulars may, with the agreement of the Agency, be submitted in an electronic or other format specified by the Agency.**		**Attachment Number**	**Checked by Applicant**
1	Signed original.	Yes	Yes
2	2 hardcopies of application provided or 2 CD versions of application (PDF files) provided.	Yes	Yes
3	1 CD of geo-referenced digital files provided.	Yes	Yes
Regulation 17 **Where a treatment plant associated with the relevant waste water works is or has been subject to the European Communities (Environmental Impact Assessment) Regulations 1989 to 2001, in addition to compliance with the requirements of Regulation 16, an application in respect of the relevant discharge shall be accompanied by a copy of an environmental impact statement and approval in accordance with the Act of 2000 in respect of the said development and may be submitted in an electronic or other format specified by the Agency**		**Attachment Number**	**Checked by Applicant**
1	EIA provided if applicable	No	Yes
2	2 hardcopies of EIS provided if applicable.	No	Yes
3	2 CD versions of EIS, as PDF files, provided.	No	Yes
Regulation 24 **In the case of an application for a waste water discharge certificate of authorisation, the application shall –**		**Attachment Number**	**Checked by Applicant**
(a)	give the name, address, telefax number (if any) and telephone number of the applicant and the address to which correspondence relating to the application should be sent and, if the operator of the waste water works is a body corporate, the address of its registered office or principal office	B1	Yes
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	B1	Yes
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the discharge point or points to which the application relates,	B3	Yes
(d)	state the population equivalent of the agglomeration to which the application relates,	B.8	Yes
(e)	in the case of an application for the review of a certificate, specify the reference number given to the relevant certificate in the register,	N/A	Yes
(f)	specify the content and extent of the waste water discharge, the level of treatment provided and the flow and type of discharge,	Annex 1	Yes
(g)	give details of the receiving water body, its protected area status, if any, and details of any sensitive areas or protected areas, or both, in the vicinity of the discharge point or points or likely to be affected by the discharge concerned,	F1 & G2	Yes
(h)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and of the likely environmental consequences of any such discharges,	B5	Yes
(i)	in the case of an existing discharge, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,	Annex 1	Yes
(j)	describe the existing or proposed measures, including emergency procedures, to prevent unauthorised or unexpected waste water discharges and to minimise the impact on the environment of any such discharges,	C1	Yes
(k)	give particulars of the location of the nearest downstream drinking water abstraction point or points to the discharge point or points associated with the waste water works,	N/A	Yes
(l)	give details of any designation under any Council Directive or Regulations that apply in relation to the receiving waters,	F2	Yes
(m)	give details of compliance with any applicable monitoring requirements and treatment standards,	Annex 1	Yes
(n)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work,	N/A	Yes
(o)	give any other information as may be stipulated by the Agency, and	Yes	Yes
(p)	be accompanied by such fee as is appropriate having regard to the provisions of Regulations 38 and 39.	Yes	Yes

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EPA Export 07-01-2014:23:20:57