Comhairle Contae Chorcaí
Cork County Council

Halla an Chontae,
Corcaigh, Éire.
Fón: (021) 4276891 • Faics: (021) 4276321
Suíomh Gréasáin: www.corkcoco.ie
County Hall,
Cork, Ireland.
Tel: (021) 4276891 • Fax: (021) 4276321
Web: www.corkcoco.ie

Administration,
Environmental Licencing programme,
Office of Climate,Licencing & Resource Use,
Environmental Protection Agency,
Regional Inspectorate,
Inniscarra,
County Cork.

October 18th 2010

D0134-01

Re: Notice in accordance with Regulation 18(3)(b) of the Waste Water Discharge (Authorisation) Regulations 2007

Dear Mr Huskisson,

With reference to the notice received for the Castlemartyr Waste Water Discharge Licence Application on 20th of August last and Cork County Council's response by email seeking a revised submission date of the 12th of October 2010, please find our response attached.

Yours Faithfully

Patricia Power
Director of Services,
Area Operations South,
Floor 5,
County Hall,
Cork

Castlemartyr Regulation 18 Further Information Response

Question 1 **Assess the likelihood of significant effect of the waste water discharges from the above agglomerations on the relevant European sites by referring to Circular L8/08 "Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments" issued by the Department of Heritage and Local Government. In particular, the flow diagram in Appendix 1 should be completed and the results of each section recorded. Provide details of the results of this assessment within one month of the date of this notice and provide a reasoned response for the decision. If significant effects are likely then and appropriate assessment must be carried out and a report of this assessment forwarded to the Agency by the date specified below.**
You are advised to provide the requested information in accordance with the "Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. 684 of 2007)".

Circular L8/08 2 September 2008
Water Services Investment and Rural Water Programmes –
Protection of Natural Heritage and National Monuments

APPENDIX 1
Water Services Schemes - Natural Heritage Checklist for Local Authorities

What projects must be screened?

For new projects and significant changes to any existing operations, if the answer is 'yes' to any of the following, the project (i.e. construction, operation and maintenance) must be screened for its impacts:	
1. Is the development in or on the boundary of a nature conservation site NHA/SAC/SPA?	No
2. Will nationally protected species be directly impacted? Wildlife Acts (1976 and 2000), Flora Protection order (S.I. 94 of 1999)?	No
3. Is the development a surface water discharge or abstraction in the surface water catchment, or immediately downstream of a nature conservation site with water dependant qualifying habitats/ species?	yes
4. Is the development a groundwater discharge or abstraction in the ground water catchment or within 5 km of a nature conservation site with water-dependant qualifying habitats/species2?	No
5. Is the development in the surface water or groundwater catchment of salmonid waters?	No
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?	No
7. Is the development a surface discharge or abstraction to or from marine waters and within 3km of a marine nature conservation site?	No
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?	No

Habitats Directive Assessment (Screening Report) in respect of Application by Cork County Council to the EPA for Wastewater Discharge License for Castlemartyr Agglomeration.

October 2010

1 Introduction

1.1 Castlemartyr is a village in East Cork located on the N25 national route approximately 25km east of Cork City. The current population served by the WWTP is approx. 1700 with transient and commercial population bringing the population equivalent to 2000. Future development based on planning permissions granted could bring this to approx 2800 over the lifetime of this licence.

1.2.1 The plant is located within a wooded area just to the south of the N25 within walking distance of the village centre and the adjoining Castlemartyr Resort Hotel. The WWTP is designed to cater for 2000pe and thus is currently operating at capacity. The effluent discharged is treated to a secondary stage and is discharged to the adjoining Kiltha river which is a tributary of the Womanagh river.

Castlemartyr is served by a partially combined sewer network and thus in times of heavy rain the WWTP is not able to treat the volumes pumped down from the village. Excess of the design volume bypasses the treatment plant and joins the treated effluent line downstream of the plant and is discharged into the Kiltha.

The Kiltha is a tributary of the Womanagh River which flows into Youghal Bay at the site of the Clonpriest/Ballymacoda SPA/SAC. This is a designated site under the **EU Birds Directive (79/409/EEC)** as transposed into Irish Law under the European Union (Natural Habitats) Regulations SI 94/1997. As this is the case, and in accordance with requirements under this Directive, the potential impacts of proposed developments that have the potential to impact on Special Protection Areas must be assessed. The procedure to do this is called a **Habitats Directive Assessment**. The purpose of such an assessment is to identify whether there may be potential for elements of the project to have a significant impact on nature conservation sites within its impact zone, and if so, to predict the potential for such impacts to affect the overall integrity of such nature conservation sites. The European Union has provided guidance as to how to make a Habitats Directive Assessment which identifies four main stages in the process as follows:

Stage One: Screening
The process which identifies the likely impacts upon a Natura 2000 site of a project or plan, wither alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant.

Stage Two: Appropriate assessment
The consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.

Stage Three: Assessment of alternative solutions
The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain.
An assessment of compensatory measures, where in the light of an assessment of imperative reasons of overriding public interest, it is deemed that the project or plan should proceed.

1.3 This document brings together all of the information necessary to make determination as to whether there are likely to be significant impacts arising from the discharge from Castlemartyr WWTP on the designated site at Ballymacoda/Clonpriest.

Step 1:
Provide a description of the plan and other plans and projects that, in combination, have the potential to have significant effects on Natura 2000 sites within the potential impact zone;

Step 2:
Identify Natura 2000 sites which may be impacted by the plan, and compile information on their qualifying interests and conservation objectives;

Step 3:
Determine whether the plan needs to be screened for potential impacts on Natura 2000 sites;

Step 4:
Carry out an assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary;

Step 5:
Assess the significance of any such effects on the Natura 2000 sites within the impact zone.

1.4 The assessment has been prepared in accordance with the following guidance:

European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the Habitats Dreictive 92/43/EEC.

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habtiats Directive 92/43/EEC.

Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Environment, Heritage and Local Government, 2009.

2 Appropriate Assessment Screening Matrix

2.1 Description of project	
Location	Castlemartyr, East Cork. See location maps in application.
Description of the key components of the project	Castlemartyr WWTP consists of a conventional aeration treatment system which treats the waste generated to the standards set down by the Urban Wastewater Treatment Regulations. This treated waste combines with any excess screened volumes overflowed from the inlet works and discharges to the Kiltha river. On average approx. 440cu.m./day is discharged to the stream.
Distance from designated sites in potential impact zone*	Approx. 12km

2.2 Description of the Natura 2000 sites within the potential impact zone[1]	
Name	Ballymacoda Clonpriest
Site Code	000077 (SAC)/004023 (SPA)
Site Description	The site comprises the estuary of the Womanagh River, a substantial river which drains a large agricultural catchment. Part of the tidal section of the river is included in the site and, on the seaward side of the boundary, the site extends to the low tide mark. The inner part of the estuary is well sheltered by a stabilised sandy peninsula (Ring peninsula).
Qualifying Interests of designated site	**SAC** The macro invertebrate fauna of the intertidal flats is well developed, with the following species occurring: *Corophium volutator,Hediste diversicolor, Arenicola marina, Macoma balthica, Scrobicularia plana, Cerastoderma edule and Lanice conchilega*. In the more sheltered areas the intertidal flats are colonised by mats of green algae (mostly *Enteromorpha* spp) with brown seaweeds occurring on the rocky shores of the shingle spits. Common Cord-grass (*Spartina anglica*) has spread within the estuary since the 1970's The main channel is flanked by salt marshes and wet fields, much of the latter being improved for agriculture. The salt marshes are mainly classified as Atlantic salt meadows, with such species as Sea Purslane (*Halimione portulacoides*), Sea Lavender (*Limonium humile*)band Sea Milkworth (*Glaux maritime*) Glassworth (*Salicornia* spp) and Sea Blite (*Suaeda maritima*) can also be found on the lower levels of the marshes **SPA** The main interests of the site are waterfowl with up to 20,000 regularly present during winter. Golden Plover, Bar-tailed Godwit, Teal, Ringed Plover,Grey Plover,Lapwing, Sanderling,Dunlin, Curlew, Knot, Redshank, Black-tailed Godwit and Turnstone
Other Notable Features of site	Ballymacoda is one of the most important bird sites in the country and supports a higher number of waders than any other Cork estuary of its size. The salt marshes at the site are of particular note as they

[1] Natura 2000 sites within the potential impact zone of the proposed development have been identified in accordance with guidance provided in the NPWS circular L8/08.

	are of the scarce "lagoon" type. They are also of good quality and parts of them are in active growth. See appendix 4 for bird count data for Ballymacoda
Conservation Objectives	To avoid deterioration of the habitats of the qualifying species and species of special conservation interest, or significant disturbance to these species, thus ensuring that the integrity of the site is maintained. To ensure for the qualifying species and species of special conservation interest that the following are maintained in the long-term. o the population of the species as a viable component of the site; o the distribution and extent of habitats supporting the species; o the structure, function and supporting processes of habitats supporting the species; *Source – National Parks and Wildlife Service*

2.3 Assessment Criteria

Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.

Discharge from Castlemartyr WWTP:
Treated effluent from the Castlemartyr Waste Water Treatment Plant is discharged to Kiltha river. The Kiltha/Womanagh confluence is approx 10 km upstream of the Ballymacoda SAC/SPA

The discharge consists primarily of treated effluent from the Castlemartyr Waste Water Treatment Plant but can also include screened but untreated overflow volumes in times of heavy rain.

Other Discharges in the catchment

LadysbridgeWWTP, MogeelyWWTP Killeagh WWTP, Ballymacoda Septic tank, Dairygold WWTP at Mogeely

Mogeely discharges are upstream of Castlemartyr on the Kiltha. The rest discharge into the Womanagh except for Killeagh which discharges into the Dissour.

Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site taking into account the following:

- Size and scale
- Land-take
- Distance from the Natura 2000 site or key features of the site:
- Resource requirements (water abstraction etc.)
- Emissions (disposal to land, water or air)
- Excavation Requirements
- Transportation Requirements

Discharges could give rise to elevated nutrients entering the Kiltha river. EPA water quality monitoring on the Kiltha/Womanagh shows a deterioration in quality around Castlemartyr.

Station	Location	1989	1994	1997	1999	2002	2005	2008
0700	Second Br N of Mogeely	4	4	4-5	4	4	4	4
1000	Br in Castlemartyr	3-4	4	3-4	3	3-4	3-4	3-4

Station 1000 is upstream of the WWTP but downstream of the Mogeely discharges. The next monitoring site (1300) is downstream of Ladysbridge WWTP – on the Womanagh - south of Ballynohock lake. However the last recorded readings taken there were in 2005 and a Q rating of 3 was applied which is moderately polluted. However since these readings were taken a new WWTP has been constructed and is operating at Ladysbridge.

The above data would indicate that water quality is moderately polluted in the vicinity of Castlemartyr since the mid 1990's but the attached data from Birdwatch Ireland would indicate that the water dependent species on the SPA at Ballymacoda are not affected.

o Duration of construction, operation, decommissioning o Other.	
Describe any likely changes to the site arising as a result of: o Reduction in habitat area o Disturbance to key species o Habitat or species fragmentation o Reduction in species density o Changes in key indicators of conservation value (water quality etc) o Climate Change	**Reduction in habitat area:** *No significant impacts are evident or predicted on habitats within the Ballymacoda/Clonpriest SPA/SAC arising from the operation of this facility.* **Disturbance to key species:** *The operation of the WWTP does not cause any disturbance to species within the SPA.* **Habitat or species fragmentation:** *No habitat fragmentation has been caused as a result of the operation of this facility.* **Reduction in species density:** *Treated effluent complies with standards laid down in the Urban Waste Water Treatment Regulations. No significant impacts are evident or predicted on species for which the SPA is designated.* **Changes in key indicators of conservation value eg water quality:** Water quality data immediately upstream and downstream of the discharge location were submitted with the original application. This data shows no obvious change in water quality. Q values have been consistent in last 10 years No changes evident in numbers of water dependent species at SPA.
Describe any likely impacts on the Natura 2000 site as a whole in terms of: o Interference with the key relationships that define the structure of the site o Interference with key relationships that define the function of the site	**Interference with the key relationships that define the structure of the site:** *The structure of the SPA is not impacted by the operation of this facility.* **Interference with key relationships that define the function of the site:** *The function of the SPA is not impacted by the operation of this facility.*

Describe from the above those elements of the project of plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	No significant impacts are predicted.

3. Finding of No Significant Effects Report Matrix

3.1 Report	
Name of project or plan	Castlemartyr WWTP discharge
Name and location of Natura 2000 site	Ballymacoda Special protection Area
Description of the project or plan	Castlemarttyr WWTP consists of a conventional aeration treatment system which treats the waste generated to the standards set down by the Urban Wastewater Treatment Regulations.This treated waste combines with any excess screened volumes overflowed from the inlet works and discharges to the Kiltha river. On average approx. 440cu.m./day is discharged to the river.
Is the project or plan directly connected with or necessary to the management of the site (provide details)?	No

3.2 The assessment of significance of effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 Site.	Discharges from Castlemartyr WWTP either alone or in combination with discharges from other sources could give rise to elevated nutrients entering the designated site Increased nutrient levels may impact on the ecology of an area by changing the composition of floral communities and reducing the ability of less robust plants to survive. Increased nutrient levels may also result in increasing the invertebrate populations in the estuary, thereby increasing bird population levels. Though the effluent discharged from Castlemartyr is to a high standard. The discharge to the Kiltha can often include screened waste that has overflowed the inlet and has received no treatment. As can be seen from the comparisons done with the latest EQS standards the Kiltha river is in breach of the limits set for BOD and ammonia upstream of the WWTP and has very little capacity for orthophosphates.

Explain why these effects are not considered significant.	Treated effluent complies with standards laid down in the Urban Waste Water Treatment Regulations. The designated site is 12 km downstream Though there is little or no assimilative capacity in the Kiltha, the waste receives adequate dilution in the Womanagh. Records from Birdwatch Ireland indicate no reduction in numbers of designated species.
List of agencies consulted: provide contact name and telephone or email address	National Parks and Wildlife Service – Natureconservation@environ.ie, cyril.saich@environ.ie Birdwatch Ireland – Data request.
Response to consultation	Draft Conservation Objectives were sent from NPWS Birdwatch Ireland sent on Bird count data.

Data collected to carry out the assessment			
Who carried out the assessment	**Sources of data**	**Level of assessment completed**	**Where can the full results of the assessment be accessed and viewed**
Madeleine Healy	IWebs Bird Data supplied by BirdWatch Ireland; Water Quality Monitoring Data CCC; Womanagh catchment Assessment – Dixon Brosnan 2006	Desktop review of cited data.	This report.

Proposed Special Conservation Interests for Ballymacoda Bay SPA (4023)

Site is selected for:
Golden Plover
Grey Plover
Dunlin
Black-tailed Godwit
Bar-tailed Godwit
Curlew
Lesser Black-backed Gull
20,000 wintering waterbirds

Additional Special Conservation Interests:
Wigeon
Teal
Ringed Plover
Lapwing
Sanderling
Redshank
Turnstone
Black-headed Gull
Common Gull
Wetland & Waterbirds

Main conservation objective:
To maintain the special conservation interests for this SPA at favourable conservation status: Golden Plover, Grey Plover, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Lesser Black-backed Gull, 20,000 wintering waterbirds, Wigeon, Teal, Ringed Plover, Lapwing, Sanderling, Redshank, Turnstone, Black-headed Gull, Common Gull, Wetland & Waterbirds.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and
- the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

SITE SYNOPSIS

SITE NAME: BALLYMACODA BAY SPA

SITE CODE: 004023

This coastal site stretches north-east from Ballymacoda to within several kilometres north-east of Youghal, Co. Cork. It comprises the estuary of the Womanagh River, a substantial river which drains a large agricultural catchment. Part of the tidal section of the river is included in the site and on the seaward side the boundary extends to the low tide mark. The inner part of the estuary is well sheltered by the Ring peninsula, a stabilised sand spit with sand dunes at its northern end and salt marshes on the landward side. Sediment types vary from muds to muddy sands in the inner part to fine rippled sands in the outer exposed part. The macro-invertebrate fauna of the intertidal flats is well-developed, with the following species occurring: Ragworm (*Hediste diversicolor*), the crustacean *Corophium volutator*, Lugworm (*Arenicola marina*), Baltic Tellin (*Macoma balthica*), Peppery Furrow-shell (*Scrobicularia plana*), Common Cockle (*Cerastoderma edule*) and the tubeworm *Lanice conchilega*. In the more sheltered areas the intertidal flats are colonised by mats of green algae (mostly *Enteromorpha* spp.), with brown seaweeds occurring on the rocky shores of the shingle spits. Common Cord-grass (*Spartina anglica*) has spread within the estuary since the late 1970s. The main channel is flanked by salt marshes and wet fields, much of the latter being improved for agriculture.

The site is of high ornithological importance, supporting an excellent diversity of wintering waterfowl. The habitats present provide both important feeding and roosting areas for the birds. The site qualifies for international importance on the basis that it regularly supports in excess of 20,000 birds (mean of 23,388 in 5 winters 1994/95 to 1998/99). It also qualifies for international importance for its population of Black-tailed Godwit (899). In addition, it supports nationally important populations of a further 15 species (all figures are average peaks for 5 winters 1995/96 to 1999/2000): Shelduck (150), Wigeon (1,232), Teal (1,170), Ringed Plover (236), Golden Plover (14,480), Grey Plover (688), Lapwing (5,893), Knot (378), Sanderling (147), Dunlin (4,410), Bar-tailed Godwit (792), Curlew (1,621), Redshank (511), Greenshank (24) and Turnstone (191). The presence of large flocks of Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the E.U. Birds Directive. A number of other species occur in populations of regional or local importance, including Brent Goose (100), Shoveler (29) and Oystercatcher (682). The site is also notable for supporting large concentrations of gulls in autumn and winter. Principal species are Black-headed Gull (2,320), Common Gull (1,220), Lesser Black-backed Gull (6,285), Herring Gull (128) and Great Black-backed Gull (455). A total of 107 wetland species were recorded from this site between 1971 and 1988.

Much of the land adjacent to the estuary has been reclaimed and is subject to intensive agriculture, with cattle grazing and silage being the most common land uses.

Ballymacoda Bay SPA is one of the most important sites in the country for wintering waterfowl. It qualifies for international importance on the basis of regularly exceeding 20,000 wintering birds but also for its Black-tailed Godwit population. In addition, it supports nationally important populations of a further 15 species and also is an important site for gulls. Two of the species which occur, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive. The site has been well-studied, with detailed counts extending back to 1971.

6.10.2004

EPS Results for Castlemartyr WWTP 2010

Parameter	04/01/2010	07/01/2010	12/01/2010	14/01/2010	19/01/2010	21/01/2010	26/01/2010	28/01/2010	Jan Average
pH	7.25	7.6	7.21		7.32				7.35
COD (mg/l)	116.4	34	26.2		18.7		31.2		45.30
BOD(mg/l)		8		6				5	6.33
TP(mg/l)		0.7							0.68
Sus Solids(mg/l)	42	5	6		4		4		12.20

Parameter	01/02/2010	04/02/2010	08/02/2010	11/02/2010	15/02/2010	18/02/2010	22/02/2010	25/02/2010	Feb Average
pH	7.32	7.4	7.24		7.22		7.22		7.28
COD (mg/l)	19.9	21	20.2		53.5		31		29.12
BOD(mg/l)		4		2		14		7	6.75
TP(mg/l)		0.2							0.23
Sus Solids(mg/l)	4	5	4		8		6		5.40

Parameter	01/03/2010	05/03/2010	08/03/2010	12/03/2010	15/03/2010	19/03/2010	22/03/2010	26/03/2010	29/03/2010	Mar Average
pH	7.2	7.1	7.27		7.31		7.22		7.21	7.22
COD (mg/l)	26.6	62	20.2		32.7		28.5		29.1	33.18
BOD(mg/l)		24		8		14		2		12.00
TP(mg/l)		2.7								2.70
Sus Solids(mg/l)	4	36	4		4		24		6	13.00

Parameter	01/04/2010	06/04/2010	08/04/2010	12/04/2010	15/04/2010	19/04/2010	22/04/2010	26/04/2010	29/04/2010	Apr Average
pH	7.3	7.2		7.21		7.11		7.82		7.33
COD (mg/l)	22	41.7		53.1		86.4		54.1		51.46
BOD(mg/l)	4		4		13		4		4	5.80
TP(mg/l)	0.39									0.39
Sus Solids(mg/l)	5	2		4		6		4		4.20

Parameter	04/05/2010	06/05/2010	10/05/2010	14/05/2010	17/05/2010	20/05/2010	24/05/2010	28/05/2010	31/05/2010	May Average
pH	7.22	7.1	7.32		7.21				7.2	7.21
COD (mg/l)	60.8	54	50.3		24.1		63.8		85.8	56.47
BOD(mg/l)		13		2		2		28		11.25
TP(mg/l)		2.2								2.17
Sus Solids(mg/l)	6	23	6		8		18		12	12.17

Parameter	03/06/2010	08/06/2010	10/06/2010	14/06/2010	17/06/2010	21/06/2010	24/06/2010	28/06/2010	June Average
pH		7.44		7.44		7.77		7.88	7.63
COD (mg/l)		449		601		379		728	539.25
BOD(mg/l)	280		180		105		210		193.75
TP(mg/l)								15	15.25
Sus Solids(mg/l)		194		234		198		266	223.00

Parameter	01/07/2010	05/07/2010	08/07/2010	12/07/2010	15/07/2010	19/07/2010	22/07/2010	26/07/2010	29/07/2010	July Average
pH	7		7.22		7.24		7.12		7.32	7.18
COD (mg/l)	26		42.1		61.9		128		36.1	58.82
BOD(mg/l)	5		6		5		5		6	5.40
TP(mg/l)	2.65									2.65
Sus Solids(mg/l)	10	12		12		20		4		11.60

Parameter	03/08/2010	05/08/2010	09/08/2010	12/08/2010	16/08/2010	19/08/2010	23/08/2010	26/08/2010	Aug Average
pH	7.22	7.7	7.2		7.3		7.35		7.35
COD (mg/l)	35.4	87	48.2		26.2		15		42.36
BOD(mg/l)		28		5		5		3	10.25
TP(mg/l)		4.01							4.01
Sus Solids(mg/l)	6	16	2		8		8		8.00

I-WeBS

The Gearagh

Species	1% National	1% International	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	Mean (04/05-08/09)	Peak (04/05-08/09)
Mute Swan	110		43	40	60	130	82	80	78	130
Whooper Swan	130	210	67	46	38	72	70	64	58	72
Pink-footed Goose		2,250						2	0	2
Greenland White-fronted Goose	110	270		1					0	1
Greylag Goose	50	870		63	143	143	143	26	104	143
Barnacle Goose	90	560						1	0	1
Shelduck	150	3,000				1			0	1
Wigeon	820	15,000	550	760	270	750	830	1,100	742	1,100
Gadwall	20	600	4	14	5	5	3	20	9	20
Teal	450	5,000	650	2,000	425	1,000	1,000	1,400	1,165	2,000
Mallard	380	20,000	350	300	140	480	700	800	484	800
Pintail	20	600	2	20	2	2	2	6	6	20
Shoveler	25	400	12	50	35	75	130	130	84	130
Pochard	380	3,500	65	40	1	2	2	2	9	40
Ring-necked Duck				1				1	0	1
Tufted Duck	370	12,000	240	600	233	400	320	410	393	600
Scaup	45	3,100		5		3	2	8	4	8
Goldeneye	95	11,500	30	15	27	25	30	37	27	37
Goosander							3	1	1	3
Ruddy Duck			5	1					0	1
Great Crested Grebe	55	3,600		3	1	5	2	4	3	5
Cormorant	140	1,200	12	7		14	4	5	6	14
Little Egret		1,300				5	3	4	2	5
Grey Heron	30	2,700	4	4	2	11	3	3	5	11
Water Rail								1	0	1
Moorhen	20			2		1		4	1	4
Coot	330	17,500	33	276	135	450	80	400	268	450
Golden Plover	1,700	9,300	3,000	3,000	3,000	6,000	2,500	2,000	3,300	6,000
Lapwing	2,100	20,000	750	1,500	2,000	2,000	1,000	2,500	1,800	2,500
Dunlin	880	13,300	4	120	150	200	1	120	118	200
Snipe		20,000	3	10		3	1	2	3	10
Black-tailed Godwit	140	470		54		4			12	54
Curlew	550	8,500	150	250	2	150	92	140	127	250
Common Sandpiper				1					0	1
Green Sandpiper				2		1		2	1	2
Greenshank	20	2,300		1				1	0	1
Redshank	310	3,900		7		2		1	2	7
Little Gull				1					0	1
Black-headed Gull		20,000	8	10		30	10	35	17	35
Common Gull		16,000						2	0	2
Lesser Black-backed Gull		4,500	14	70	10	300	32	280	138	300
Kingfisher				1		1	2	1	1	2

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

I-WeBS

Ballymacoda

Species	1% National	1% International	2003/04	2004/05	2005/06	2006/07	2007/08	Mean (03/04-07/08)	Peak (03/04-07/08)
Kittiwake							20	4	20
Mute Swan	110		8	5	5	6	3	5	8
Bewick's Swan	20	200	6					1	6
Whooper Swan	130	210	4	5	1		4	3	5
Pink-footed Goose		2,250				2	1	1	2
Greenland White-fronted Goose	110	270	6					1	6
Greylag Goose	50	870	6			4		2	6
Barnacle Goose	90	560				1		0	1
Light-bellied Brent Goose		260	94	176	183	124	248	165	248
Black Brant						1		0	1
Shelduck	150	3,000	131	146	57	46	70	90	146
Wigeon	820	15,000	1,376	1,040	1,303	910	834	1,093	1,376
Gadwall	20	600	5		6		2	3	6
Green-winged Teal			1	1				0	1
Teal	450	5,000	953	976	1,082	826	376	843	1,082
Mallard	380	20,000	70	467	17	39	29	124	467
Pintail	20	600	8	12	15	5	1	8	15
Shoveler	25	400	14	24	23	44	27	26	44
Goldeneye	95	11,500			1	1		0	1
Red-breasted Merganser	35	1,700	4	2	4	1	1	2	4
Red-throated Diver	20	3,000		15			1	3	15
Great Northern Diver		50		1			1	0	1
Little Grebe	25	4,000	3	2	2		3	2	3
Great Crested Grebe	55	3,600	8	9	4	2	13	7	13
Cormorant	140	1,200	38	27	34	23	24	29	38
Little Egret		1,300	9	28	26	28	32	25	32
Grey Heron	30	2,700	7	13	11	11	14	11	14
Water Rail				1			2	1	2
Moorhen	20		5				2	1	5
Oystercatcher	680	10,200	742	440	657	405	396	528	742
Little Ringed Plover					1			0	1
Ringed Plover	150	730	57	84	138	146	97	104	146
Golden Plover	1,700	9,300	8,400	8,780	9,800	8,150	8,500	8,726	9,800
Grey Plover	65	2,500	524	337	396	474	482	443	524
Lapwing	2,100	20,000	2,600	2,610	1,520	2,230	1,603	2,113	2,610
Knot	190	4,500	211	334	125	130	305	221	334
Sanderling	65	1,200	133	164	132	151	122	140	164
Little Stint						1	1	0	1
Pectoral Sandpiper						1	1	0	1
Curlew Sandpiper					7	2	4	3	7
Dunlin	880	13,300	2,640	1,865	1,085	825	1,882	1,659	2,640
Ruff		12,500			1	7	13	4	13
Snipe		20,000	125	25	100	100	105	91	125
Black-tailed Godwit	140	470	820	1,480	801	827	535	893	1,480
Bar-tailed Godwit	160	1,200	592	458	468	436	445	480	592
Whimbrel		2,000		1	1	1	1	1	1
Curlew	550	8,500	1,033	486	770	726	545	712	1,033
Common Sandpiper					6	1		1	6
Green Sandpiper						2		0	2
Greenshank	20	2,300	16	17	9	23	14	16	23
Redshank	310	3,900	251	318	251	257	167	249	318
Turnstone	120	1,500	133	86	85	68	76	90	133
Mediterranean Gull			1	2			1	1	2
Black-headed Gull		20,000	3,325					665	3,325
Common Gull		16,000	361					72	361

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

Lesser Black-backed Gull	4,500	6,500	445	434	233	460	1,614	6,500
Herring Gull	13,000	31	22	41	64	24	36	64
Yellow-legged Gull				1			0	1
Glaucous Gull					1		0	1
Great Black-backed Gull	4,800	140	31	141	79	62	91	141
Sandwich Tern		28	82				22	82
Common Tern		2					0	2
Kingfisher			2	1	2	1	1	2

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

Question 2 **Review the assessment of the impact of the discharge in relation to the requirements of the Environmental Quality Objectives regulations (S.I. No. 272 of 2009) and resubmit and update where relevant**

The River Kiltha into which the WWTP discharges has a “moderate status”. Therefore the lower “good” standard contained in the surface water regulations was used for comparison purposes.

The upstream and downstream sampling results for 2008 at aSW01CMYRd were compared to the relevant EQR/S from the surface water regulations in the following tables. The sample results and the EQR/S were included only if there were values for both, to allow comparison.

The upstream and downstream sample results incorporated in the following tables are those laid out in the upstream and downstream sheets of the Revised Table E. However many of these results are at the limit of detection, or are results based on averages that include assumed figures. Therefore additional upstream and downstream tables which incorporate actual results for analysis below the Limit of Detection have been included. This “Analysis below the Limit of Detection” is laid out on a separate sheet in the Revised Table E.

UPSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard***	***2008 upstream ambient sampling results at aSW01CMYRu***
	Good boundary	
	Rivers (All Types)	
Oxygenation conditions Table 9	***River water body***	***Ambient sampling results***
Biochemical Oxygen Demand (BOD) (mgO_2/l)	Good status≤1.5 (mean) or ≤2.6(95%ile)	1.66mg/L (mean) 3.8mg/L (95%ile)
Acidification Status Table 9	***River Water Body***	***Ambient sampling results***
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.9-8.1
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	0.1mg/L (mean) 0.265mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.033mg/L (mean) 0.057mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.6	<20µg/L
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	<20µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	16.429µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	0.8 µg/L

Note the following:

The black results are within the EQR/S.
The red results break the EQR/S.
The blue results may break the EQR/S.
The results highlighted grey are at the limit of detection.
Water hardness in the Kiltha River is 250mg$CaCO_3$/L

UPSTREAM COMPARISON TABLE
(ANALYSIS BELOW THE LIMIT OF DETECTION)

Physico-chemical conditions	***Ecological quality ratio/standard***	***2008 upstream ambient sampling results at aSW01CMYRu***
	Good boundary	
	Rivers (All Types)	
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	0.089mg/L (mean) 0.352mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.038mg/L (mean) 0.065mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	1.423µg/L
Copper (depending on water hardness)	5	<1.0µg/L
Zinc (depending on water hardness)	50	0.86µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	7.632µg/L
Nickel and its compounds	20	1.385µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.08	<1.0µg/L

DOWNSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2008 Downstream ambient sampling results at aSW01CMYRd***
Oxygenation conditions Table 9	***River water body***	***Ambient sampling results***
Biochemical Oxygen Demand (BOD) (mgO_2/l)	Good status≤1.5 (mean) or ≤2.6(95%ile)	1.76mg/L (mean) 2.884mg/L (95%ile)
Acidification Status Table 9	***River Water Body***	***Ambient sampling results***
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.6-7.9 (range)
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	<0.1mg/L (mean) <0.1mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.047mg/L (mean) 0.092mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.6	<20µg/L Chromium
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	14.0µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	0.8 µg/L

Note the following:

The black results are within the EQR/S.
The red results break the EQR/S.
The blue results may break the EQR/S.
The results highlighted grey are at the limit of detection.
Water hardness in the Kiltha River is 250mg $CaCO_3/L$

DOWNSTREAM COMPARISON TABLE
(ANALYSIS BELOW THE LIMIT OF DETECTION)

Physico-chemical conditions	***Ecological quality ratio/standard***	***2009 Downstream ambient sampling results at aSW01d***
	Good boundary	
	Rivers (All Types)	
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	0.071mg/L (mean) 0.17mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.071mg/L (mean) 0.17mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	2.1µg/L
Copper (depending on water hardness)	5	0.533µg/L
Zinc (depending on water hardness)	50	1.0µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	7.42µg/L
Nickel and its compounds	20	1.29µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.08	<1.0µg/L

PREDICTED IMPACTS

MASS BALANCE EQUATIONS FOR BOD:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum BOD in Discharge.

Flow of River (95%ile) = 0.033m3/sec
Mean BOD in River (upstream) = 1.66mg/L
Max volume of discharge = 0.0081m3/sec
Max value for BOD in discharge = 25mg/L (Max from Online Tables)

$$C_{final} = \frac{(0.033 \times 1.66) + (0.0081 \times 25)}{(0.033 + 0.0081)}$$

C_{final} = 6.26mg/l BOD

This is in breach of the 1.5 mg/L Mean and 2.6mg/L 95%ile EQS for BOD.

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean BOD in Discharge.

Flow of River (Median) = 0.224m3/sec
Mean BOD in River (upstream) = 1.66mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for BOD in discharge = 7.59mg/L (2008 Mean from Outlet Table E4)

$$C_{final} = \frac{(0.224 \times 1.66) + (0.0049 \times 7.59)}{(0.224 + 0.0049)}$$

C_{final} = 1.79mg/l BOD

This is in breach of the 1.5 mg/L Mean and 2.6mg/L 95%ile EQS for BOD.

However it is worth noting that the mean upstream BOD value is 1.66mg/L, which is already in breach of the EQS of 1.5mg/L. The 95%ile upstream BOD value is 3.8, which also breaches the EQS of 2.6mg/L.

Theoretical Scenario:

Normal Discharge, 95%ile Flow in the River, Mean BOD in Discharge, Theoretical value for BOD in the River. This "Theoretical value for BOD" in the River is used because the conditions upstream are failing to meet "Good Status". This scenario assesses the impact of the discharge separately from the impacts upstream. (As suggested in the "Implications of the Surface Water and Groundwater Environmental Objectives Regulations for the EPA" slideshow).

Flow of River (95%ile) = 0.0.033m3/sec
Theoretical BOD in River (upstream) = 0.260mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for BOD in discharge = 7.59mg/L (2008 Mean from Outlet Table E4)

$$C_{final} = \frac{(0.033 \times 0.260) + (0.0049 \times 7.59)}{(0.033 + 0.0049)}$$

C_{final} =1.2 mg/l BOD

This is within the 1.5 mg/L Mean and 2.6mg/L 95%ile EQS for BOD.

MASS BALANCE EQUATIONS FOR AMMONIA:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum Ammonia in Discharge.

Flow of River (95%ile) = 0.033m3/sec
Mean Ammonia in River (upstream) = 0.089mg/L
Max volume of discharge = 0.0081m3/sec
Max value for Ammonia in discharge = 5mg/L (Max from Online Tables)

$$C_{final} = \frac{(0.033 \times 0.089) + (0.0081 \times 5)}{(0.033 + 0.0081)}$$

C_{final} = 1.06mg/l Ammonia

This is in breach of the 0.065mg/L Mean and 0.14mg/L 95%ile EQS for Ammonia.

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean Ammonia in Discharge.

Flow of River (Median) = 0.224m3/sec
Mean Ammonia in River (upstream) = 0.089mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for Ammonia in discharge = 3.16mg/L (2008 Mean from Outlet Table E4)

$$C_{final} = \frac{(0.224 \times 0.089) + (0.0049 \times 3.16)}{(0.224 + 0.0049)}$$

C_{final} = 0.15mg/l Ammonia

This is in breach of the 0.065mg/L Mean and 0.14mg/L 95%ile EQS for Ammonia.

However it is worth noting that the mean upstream Ammonia value is 0.089mg/L, which is already in breach of the EQS of 0.065mg/L. The 95%ile upstream Ammonia value is 0.352, which also breaches the EQS of 0.14mg/L.

Theoretical Scenario:

Normal Discharge, 95%ile Flow in the River, Mean Ammonia in Discharge, Theoretical value for Ammonia in the River. This "Theoretical value for Ammonia" in the River is used because the conditions upstream are failing to meet "Good Status". This scenario assesses the impact of the discharge separately from the impacts upstream. (As suggested in the "Implications of the Surface Water and Groundwater Environmental Objectives Regulations for the EPA" slideshow).

Flow of River (95%ile) = 0.033m3/sec
Theoretical Ammonia in River (upstream) = 0.008mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for Ammonia in discharge = 3.16mg/L (2008 Mean from Outlet Table E4)

$$C_{final} = \frac{(0.033 \times 0.008) + (0.0049 \times 3.16)}{(0.033 + 0.0049)}$$

C_{final} = 0.415mg/l Ammonia

This is in breach of the 0.065mg/L mean EQS and the 0.14mg/l 95%ile EQS for Ammonia.

Note: 2008 was a very wet year and hence a lot of overflows at the WWTP. The composite sampler on the outlet samples effluent downstream of the overflow combining with treated waste.
The location was not noticed at the time samples were taken and has since bee relocated to upstream of the overflow.
This <u>may</u> account for high ammonia readings in samples.

MASS BALANCE EQUATIONS FOR ORTHOPHOSPHATE:

Worst Case Scenario:

Maximum Discharge, Low Flow in the River, Maximum Orthophosphate in Discharge.

Flow of River (95%ile) = 0..033m3/sec
Mean Orthophosphate in River (upstream) = 0.038mg/L
Max volume of discharge = 0.0081m3/sec
Max value for Orthophosphate in discharge = 3mg/L (Max from Online Tables)

$$C_{final} = \frac{(0.033 \times 0.038) + (0.0081 \times 3)}{(0.033 + 0.0081)}$$

C_{final} = 0.62mg/l Orthophosphate

This is in breach of the 0.035mg/L Mean and 0.075mg/L 95%ile EQS for Orthophosphate

Normal Scenario:

Normal Discharge, Median Flow in the River, Mean Orthophosphate in Discharge.

Flow of River (Median) = 0.224m3/sec
Mean Orthophosphate in River (upstream) = 0.033mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for Orthophosphate in discharge = 1.48mg/L (2008 Mean from Outlet Table E4)

$$C_{final} = \frac{(0.224 \times 0.038) + (0.0049 \times 1.48)}{(0.224 + 0.0049)}$$

C_{final} = 0.069mg/l Orthophosphate

This is in breach of the 0.035mg/L Mean EQS for Orthophosphate. However this is within the 0.075mg/L 95%ile EQS for Orthophosphate

However it is worth noting that the mean upstream Orthophosphate value is 0.038mg/L, which is in breach of the EQS of 0.035mg/L. The 95%ile upstream Orthophosphate value is 0.065, which is close to the EQS of 0.075mg/L. This means that there is very little capacity in the river.

Theoretical Scenario:

Normal Discharge, Median Flow in the River, Mean Orthophosphate in Discharge, Theoretical value for Orthophosphate in the River. This "Theoretical value for Orthophosphate" in the River is used because the conditions upstream are failing to meet "Good Status". This scenario assesses the impact of the discharge separately from the impacts upstream. (As suggested in the "Implications of the Surface Water and Groundwater Environmental Objectives Regulations for the EPA" slideshow).

Flow of River (Median) = 0.224m3/sec
Theoretical Orthophosphate in River (upstream) = 0.005mg/L
Normal volume of discharge = 0.0049m3/sec
Mean value for Orthophosphate in discharge = 1.48mg/L (**2008 Mean** from Outlet Table E4)

$$C_{final} = \frac{(0.224 \times 0.005) + (0.0049 \times 1.48)}{(0.224 + 0.0049)}$$

C_{final} = 0.037mg/l Orthophosphate

This is in breach of the 0.035mg/L mean EQS for Orthophosphate. However this is within the 0.075mg/L 95%ile EQS for Orthophosphate.

Note: The WWTP effluent is marginally in breach of the mean EQS standard.
Again some of the samples taken are likely to have included untreated overflow waste and thus would not be representative of WWTP effluent alone.

Using 2010 data (Very dry year and sample line relocated)

Mean value of Orthophosphates – 1.38mg/l (ortho – P taken as 70% TP)

$$C_{final} = \frac{(0.224 \times 0.005) + (0.0049 \times 1.38)}{(0.224 + 0.0049)}$$

C_{final} = 0.034mg/l

This is within the 0.035mg/L mean EQS and the 0.075mg/l 95%ile EQS for Orthophosphate.

Attatchment E4-Castlemartyr 2009 Urban Wastewater Monitoring Data

Sample Date		19/02/2009	26/03/2009	03/04/2009	02/07/2009	30/07/009	20/08/2009	13/10/2009	22/10/2009	26/11/2009	01/12/2009	18/12/2009	30/12/2009	**Mean**	**Median**
Sample Type		Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	**n/a**	**n/a**
Lab Code		GT219	GT367	GT454	GT845	GT919	GT1023	GT1246	GT1293	GT1445	GT1465	GT1506	GT1515	**n/a**	**n/a**
pH		7.4	*	*	7.1	*	*	*	*	*	*	*	7.3	**7.267**	**7.3**
SS mg/L		7	11	6	16	1.25	1.25	41	23	14	61	16	11	**17.375**	**12.5**
BOD mg/L		5.0	5.0	4.0	8.0	3.0	2.0	70.0	7.0	6.0	27.0	4.0	8.0	**12.4**	**5.5**
COD mg/L		40	31	10.5	25.0	10.5	25	120	49	27	73	16	40	**38.917**	**29**

half of LOD for statistical purposes

Attatchment E4-Castlemartyr Upstream Revised D0134-01--actual results for metals 2008

Sample Date	07/02/2008	28/02/2008	13/03/2008	03/04/2008	22/05/2008	10/07/2008	17/07/2008	03/09/2008	Average
Sample	River	River	River	River	River	River	River	River	2008
Chromium ug/L	2	2	2	2.5	0		2	1	1.64285714
Lead ug/L	13.5	8.5	14	12.5	21.5		9	7.8	12.4
Copper ug/L	0	0	0	0	0		2	1	0.42857143
Nickel ug/L	1.7	3.3	3.3	0.7	1		1.7	1.83	1.93285714
Zinc ug/L	0	0	0	0	9.7		0	1.5	1.6
Boron ug/L	1	0	10	0	0		62	0	12.1667
Cadmium ug/L	0	0	0	0	0		0	0	0
Barium ug/L	9.5	9	10.5	8.5	35		28	17.3	16.75

Attatchment E4-Castlemartyr Downstream Revised D0134-01-actual results for metals 2008

Sample Date	07/02/2008	28/02/2008	13/03/2008	03/04/2008	22/05/2008	10/07/2008	17/07/2008	03/09/2008	Average
Sample	river	river	river	river	river	river	river	river	2008
Chromium ug/L	2.5	4.0	3.0	3.5	2.5	2.5	2.5	1.75	2.78125
Copper ug/L	0	0	0	0	0	0	0	0.3	0.0375
Lead ug/L	12.5	16.5	14.0	9.0	12.0	7.5	9.0	7.2	10.9625
Nickel ug/L	1.3	3.0	3	0.7	1.3	1.7	2	2.4	1.925
Zinc ug/L	0.7	0	0	0	0	10	3.3	4.7	2.338
Boron ug/L	3	0	0	0	19.3	11.3	22	0	7.9428571
Cadmium ug/L	0	0	0	0	0	0	0	0	0
Barium ug/L	10	14.5	10	10	27	29	24	21.8	18.2875

NOTE ALL UNITS ARE ug/l

10/07/08-no metal results available for upstream

Attatchment E4-Castlemartyr Inlet Revised D0134-01

Sample Date	05/09/2007	08/08/2007	17/10/2007	22/11/2007	28/02/2007	07/02/2008	03/04/2008	22/05/2008	17/07/2008	Average
Sample	influent	influent	influent	influent	Influent	Influent	Influent	Influent	Influent	
Flow M^3/Day	*	*	*	*	*	*	*	*	*	
pH	*	*	7.6	*	*	*	*	*	7.3	7.45
Temperature °C	*	*	*	*	*	*	*	*	*	
Cond 20°C	*	*	*	*	*	*	797	*	889	843
SS mg/L	*	*	*	*	88	*	*	*	418	253
NH_3 mg/L	11.4	*	21.4	*	*	27.7	*	*	53.1	28.4
BOD mg/L	*	*	*	*	*	*	*	*	356	356
COD mg/L	1476	*	507	571	340	294	1177	*	1083	778.285714
TN mg/L	*	*	37	*	*	43	*	*	91	57
Nitrite mg/L	*	*	*	*	*	*	*	*	0.0069	0.0069
Nitrate mg/L	*	*	*	*	*	*	*	*	0.678	0.678
TP mg/L	33	*	*	*	*	5.23	*	*	13.8	17.3433333
O-PO4-P mg/L	12.44	*	*	*	4.9	3.23	4.52	*	9.63	6.944
SO4 mg/L	43.7	*	49.1	*	*	41.7		*	62.4	49.225
Phenols µg/L	*	*	*	*	*	*	*	*	<0.1	<0.1
Atrazine µg/L	*	*	*	*	*	*	*	*	<0.01	<0.01
Dichloromethane µg/L	*	*	*	*	*	*	*	*	<1.0	<1.0
Simazine µg/L	*	*	*	*	*	*	*	*	<0.01	<0.01
Toluene µg/L	*	*	*	*	*	*	*	*	<1.0	<1.0
Tributyltin µg/L	*	*	*	*	*	*	*	*	not required	*
Xylenes µg/L	*	*	*	*	*	*	*	*	<1.0	<1.0
Arsenic µg/L	*	*	*	*	*	*	*	*	1	1
Chromium ug/L	10	56	10	10	*	10	*	10	*	17.6666667
Copper ug/L	1153	1950	10	165	*	135	*	187	*	600
Cyanide µg/L	*	*	*	*	*	*	*	*	5	5
Fluoride ug/l	*	*	*	*	*	*	*	*	<100	<100
Lead ug/L	51	152	10	96	*	10	*	37	*	59.3333333
Nickel ug/L	32	45	10	10	*	10	*	10	*	19.5
Zinc ug/L	727	1568	10	74	*	61	*	91	*	421.833333
Boron ug/L	*	*	*	*	*	24	*	68	*	46
Cadmium ug/L	20	20	20	20	*	20	*	20	*	
Mercury µg/L	*	*	*	*	*	*	*	*	0.4	0.4
Selenium µg/L	*	*	*	*	*	*	*	*	2	2
Barium ug/L	165	304	10	10		21	*	23	*	88.8333333

half of LOD for statistical purposes

Attatchment E4-Castlemartyr Outlet Revised D0134-01

Sample Date	07/02/2008	28/02/2008	13/03/2008	03/04/2008	22/05/2008	10/07/2008	17/07/2008	21/08/2008	03/09/2008	09/10/2008	02/12/2008	10/12/2008	Average	Kg/Day	Kg/year	17/01/2007	########	04/04/2007	30/05/2007	06/06/2007	########	#######	05/09/2007	17/10/2007	22/11/2007	12/12/2007	13/12/2007	Average
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	2008	2008	2008	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	effluent	2007
Flow M^3/Day	266.6	219.5	405.5	260.6	126.7	253.2	244.4	*	*	*	*	*	253.79	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
pH	7.2	7.3	*	*	7.6	*	7.3	7.4	7.7	*	7.2	*	7.35	*	*	7.1	7.1	7.1	7.2	8	7.3	7.4	7.4	7.2	7.1	7.7	7	7.3
Temperature °C	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20°C	*	*	*	715	644	1208	683	*	594	*		*	812.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
SS mg/L	6	10	19	14	15	16	14	19	16	9	7	10	12.9	3.278	1196.4939	61	15	11	300	3	11	5	3	16	34	102	29	49.1666667
NH_3 mg/L	1.2	0.3	3.7	12.3	1.5	2.6	0.5	*	0.2	*	*	*	3.157	0.801	292.4518	*	*	*	*	*	0.05	0.05	0.1	0.2	0.5	1.1	*	0.33333333
BOD mg/L	5.23	8	8.11	10.72	7.47	12	3.28	10.6	7.8	6.5	3.4	8.0	7.5925	1.927	703.3068	11	5.7	4.1	90	1.2	2.6	2.7	1.7	5.04	*	29.9	5.41	14.4863636
COD mg/L	10.5	50	34	70	32	61	29	47	27	21	25	30	36.4	9.231	3369.4812	62	32	36	441	10.5	26	25	10.5	37	51	131	44	75.5
TN mg/L	2.4	2.37	*	15.6	3.7	11.3	5.3	*	11	*	*	*	6.78	1.720	627.8891	13	11.7	24.2	18.5	7.55	*	11.2	4.9	7.6	26	17.1	18.9	14.6045455
Nitrite mg/L	*	*	*	*	*	*	1.07	*	*	*	*	*	1.07	0.272	99.1160	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nitrate mg/L	*	*	*	*	*	*	3.96	*	*	*	*	*	3.96	1.005	366.8219	*	*	*	*	*	*	*	*	*	*	*	*	*	*
TP mg/L	2.1	1.99	1.3	4.75	1.32	0.68	1.19	1.05	2.05	*	*	*	1.83	0.463	169.1045	1.71	0.97	10.53	15.6	<0.2	3.3	1.29	1.41	*	3.83	2.47	2.49	4.36
O-PO4-P mg/L	*	1.9	0.82	4.02	1.16	0.27	0.72		1.57	*	*	*	1.482	0.376	137.2494	*	*	*	*	*	*	0.4	1.28	1.86	*	*	*	1.18
SO4 mg/L	48.4	55.9	*	*	*	*	49.5	*	*	*	*	*	51.3	13.011	4748.9229	*	*	*	*	*	*	58.8	65.8	59.1	42	50	48.7	54.0666667
Phenols µg/L	*	*	*	*	*	*	<0.1	*	*	*	*	*	<0.1	<0.025379	<9.263335	*	*	*	*	*	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	*	*	<0.01	*	*	*	*	*	<0.01	<0.0025379	<0.9263335	*	*	*	*	*	*	*	*	*	*	*	*	*
Dichloromethane µg/L	*	*	*	*	*	*	<1.0	*	*	*	*	*	<1.0	<0.25379	<92.63335	*	*	*	*	*	*	*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	*	*	<0.01	*	*	*	*	*	<0.01	<0.0025379	<0.9263335	*	*	*	*	*	*	*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	*	*	<1.0	*	*	*	*	*	<1.0	<0.25379	<92.63335	*	*	*	*	*	*	*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	*	not required	*	*	*	*	*	not required	not required	not required	*	*	*	*	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	*	*	<1.0	*	*	*	*	*	<1.0	<0.25379	<92.63335	*	*	*	*	*	*	*	*	*	*	*	*	*
Arsenic µg/L	*	*	*	*	*	*	1	*	*	*	*	*	1	0.000254	0.0926	*	*	*	*	*	*	*	*	*	*	*	*	*
Chromium ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	*	*	<20	<0.005076	<1.8526	*	*	*	*	*	<20	<20	<20	<20	<20	*	*	<20
Copper ug/L	10	10	135	10	10	10	10	10	*	*	*	*	27.8571	7.069745	2580.4569	*	*	*	*	*	<20	<20	<20	<20	43	*	*	43
Cyanide µg/L	*	*	*	*	*	*	6	*	*	*	*	*	6	0.001523	0.5558	*	*	*	*	*	*	*	*	*	*	*	*	*
Fluoride ug/l	*	*	*	*	*	*	190	*	*	*	*	*	190	0.048219	17.6000	*	*	*	*	*	*	*	*	*	*	*	*	*
Lead ug/L	10	10	34	10	10	25	48	35	30	*	*	*	23.5556	5.978063	2181.9932	*	*	*	*	*	<20	<20	<20	<20	48	*	*	48
Nickel ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	*	*	<20	<0.005076	<1.8526	*	*	*	*	*	<20	<20	<20	<20	<20	*	*	<20
Zinc ug/L	25	25	10	25	10	10	10	10	*	*	*	*	15.6250	3.965402	1447.3717	*	*	*	*	*	27	<20	<20	<20	51	*	*	39
Boron ug/L	53	53	48	53	111	127	95	27	91.3	*	*	*	73.1444	18.563	6775.5005	*	*	*	*	*	*	*	*	*	*	*	*	*
Cadmium ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	*	*	<20	<0.005076	<1.8526	*	*	*	*	*	<20	<20	<20	<20	<20	*	*	<20
Mercury µg/L	*	*	*	*	*	*	0.5	*	*	*	*	*	0.5	0.000127	0.0463	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	*	*	3	*	*	*	*	*	3	0.000761	0.2779	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Barium ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	*	*	<20	<0.005076	<1.8526	*	*	*	*	*	<20	<20	<20	<20	<20	*	*	<20

half of LOD for statistical purposes

Attatchment E4-Castlemartyr Upstream Revised D0134-01

Sample Date	17/01/2007	07/03/2007	04/04/2007	30/05/2007	06/06/2007	04/07/2007	08/08/2007	05/09/2007	17/10/2007	22/11/2007	Average	07/02/2008	28/02/2008	13/03/2008	03/04/2008	22/05/2008	10/07/2008	17/07/2008	03/09/2008	Average
Sample	river	river	river	river	river	river	river	river	river	river	2007	River	River	River	River	River	River	River	River	2008
Flow M^3/Day	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
pH	7.9	7.6	*	7.8	7.2	*	*	8	7.8	7.9	7.74285714	7.9	8.1	*	*	7.9	*	8.0	7.9	7.975
Temperature °C	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20°C	*	*	*	*	*	*	*	*	*	*	*	*	*	*	332	262	234	318	247	278.6
SS mg/L	6	11	13	5	10	3	8	6	1.25	1.25	6.45	7	5	5	4	11	13	3	7	6.8750
NH_3 mg/L	0.05	0.05	0.05	0.4	0.05	0.05	0.05	0.4	0.05	0.05	0.12	0.3	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.1000
BOD mg/L	0.5	0.5	0.5	3.2	4.1	0.5	0.5	1.1	1.44	1.03	1.337	0.5	0.5	1.61	0.5	2.61	1.39	1.73	4.44	1.6600
COD mg/L	*	*	*	<21	*	*	*	*	<21	*	<21	<21	*	*	*	*	*	<21	<21	<21
TN mg/L	5.9	6.4	6.6	7.06	5.66	<1	13.3	12	5.2	9.5	7.958	7	6.64	*	*	3.9	6.5	6.1	6.0	6.02333333
Nitrite mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0.0219	*	0.0219
Nitrate mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	5.44	*	5.44
TP mg/L	.	.	.	.	.	.	.	.	.	0.1	0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
O-PO4-P mg/L	*	*	*	*	*	*	0.025	*	0.07	0.025	0.04	0.025	0.025	0.025	0.025	0.05	0.025	0.025	0.06	0.03250
SO4 mg/L	*	*	*	*	*	<30	<30	<30	<30	<30	<30	<30	<30	*	*	*	*	<30	*	<30
Phenols µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.1	*	<0.1
Atrazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.01	*	<0.01
Dichloromethane µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1.0	*	<1.0
Simazine µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.01	*	<0.01
Toluene µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1.0	*	<1.0
Tributyltin µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	not required	*	*
Xylenes µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<1.0	*	<1.0
Arsenic µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<0.96	*	<0.96
Chromium ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	<20	<20	<20
Copper ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	<20	<20	<20
Cyanide µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<5	*	<5
Fluoride ug/l	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<100	*	<100
Lead ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	10	10	26	10	39	*	10	10	16.4285714
Nickel ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	<20	<20	<20
Zinc ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	<20	<20	<20
Boron ug/L	*	*	*	*	*	*	*	*	*	*	*	10	10	10	10	10	*	62	10	18.6667
Cadmium ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*	<20	<20	<20
Mercury µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0.8	*	0.8
Selenium µg/L	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	*	1
Barium ug/L	*	*	*	*	*	<20	<20	<20	<20	<20	<20	10	10	10	10	35	*	28	10	17.1666667

Attatchment E4-Castlemartyr Downstream Revised D0134-01

Sample Date	07/02/2008	28/02/2008	13/03/2008	03/04/2008	22/05/2008	10/07/2008	17/07/2008	03/09/2008	Average	Median	17/01/2007	07/03/2007	########	30/05/2007	########	08/08/2007	05/09/2007	17/10/2007	22/11/2007	Average	Median
Sample	river	river	river	river	river	river	river	river	**2008**	**2008**	river	river	river	river	river	river	river	river	river	**2007**	2007
Flow M^3/Day	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	
pH	7.8	7.9	*	*	7.9	*	7.8	7.6	7.85		7.7	7.6	*	7.8	*	*	7.8	7.7	7.8	7.7333333	
Temperature °C	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	
Cond 20°C	*	*	*	349	303	286	289	244	294.2		*	*	*	*	*	*	*	*	*	*	
SS mg/L	6	9	15	3	7	5	6	15	8.250		*	*	*	*	*	*	*	*	*	*	
NH_3 mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		0.05	0.05	0.05	0.4	0.1	0.05	0.05	0.1	0.05	0.1	
BOD mg/L	1.6	0.5	1.97	1.31	2.41	1.97	2.34	3.2	1.9125		0.5	0.5	2.1	3.8	1.7	0.5	2.7	2.07	1.84	1.74556	
COD mg/L	<21	<21	*	*	*	*	<21	<21	<21		*		*	<21	*	*	*	<21	*	<21	
TN mg/L	4.8	6.19	*	*	3.4	4.5	4.5	14	6.2317		5.6	6.1	9.7	7.14	0.5	12.6	5.9	3.6	*	6.3925	
Nitrite mg/L	*	*	*	*	*	*	0.053	*	0.053		*	*	*	*	*	*	*	*	*	*	
Nitrate mg/L	*	*	*	*	*	*	5.43	*	5.43		*	*	*	*	*	*	*	*	*	*	
TP mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.1	0.1	0.1	0.21	0.2	0.1	0.24	*	0.1	0.14375	0.1
O-PO4-P mg/L	0.025	0.1	0.025	0.025	0.06	0.025	0.06	0.08	0.0457	0.0250	*	*	*	*	*	0.025	*	0.21	0.15	0.1283333	0.15
SO4 mg/L	<30	<30	*	*	*	*	<30	*	<30		*	*	*	*	<30	<30	<30	<30	<30	<30	
Phenols µg/L	*	*	*	*	*	*	<0.1	*	<0.1		*	*	*	*	*	*	*	*	*	*	
Atrazine µg/L	*	*	*	*	*	*	<0.01	*	<0.01		*	*	*	*	*	*	*	*	*	*	
Dichloromethane µg/L	*	*	*	*	*	*	<1.0	*	<1.0		*	*	*	*	*	*	*	*	*	*	
Simazine µg/L	*	*	*	*	*	*	<0.01	*	<0.01		*	*	*	*	*	*	*	*	*	*	
Toluene µg/L	*	*	*	*	*	*	<1.0	*	<1.0		*	*	*	*	*	*	*	*	*	*	
Tributyltin µg/L	*	*	*	*	*	*	not required	*	*		*	*	*	*	*	*	*	*	*	*	
Xylenes µg/L	*	*	*	*	*	*	<1.0	*	<1.0		*	*	*	*	*	*	*	*	*	*	
Arsenic µg/L	*	*	*	*	*	*	<0.96	*	<0.96		*	*	*	*	*	*	*	*	*	*	
Chromium ug/L	<20	*	<20	<20	<20	<20	<20	<20	<20		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Copper ug/L	<20	*	<20	<20	<20	<20	<20	<20	<20		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Cyanide µg/L	*	*	*	*			<5	*	<5		*	*	*	*	*	*	*	*	*	*	
Fluoride ug/l	*	*	*	*			<100	*	<100		*	*	*	*	*	*	*	*	*	*	
Lead ug/L	<20	*	<20	<20	<20	<20	<20	<20	<20		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Nickel ug/L	<20	*	<20	<20	<20	<20	<20	<20	<20		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Zinc ug/L	23	*	29	10	10	10	10	10	14.571		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Boron ug/L	10	*	10	10	10	10	22	*	12		*	*	*	*	*	*	*	*	*	*	
Cadmium ug/L	<20	*	<20	<20	<20	<20	<20	<20	<20		*	*	<20	*	<20	<20	<20	<20	<20	<20	
Mercury µg/L	*	*	*	*	*	*	0.8	*	0.8		*	*	*	*	*	*	*	*	*	*	
Selenium µg/L	*	*	*	*	*	*	1	*	1		*	*	*	*	*	*	*	*	*	*	
Barium ug/L	10	*	10	10	27	29	24	21.5	18.7857143		*	*	<20	*	<20	<20	<20	<20	<20	<20	

half of LOD for statistical purposes