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

28 Sept 2010

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

Register No. D0330-01

Dear Mr Huskisson,

With reference to the notice received for the Cloughduv Waste Water Discharge Licence Application on May 24th last and the Cork County Council response of 24th June seeking a revised submission date of Thursday 30 Sept 2010 please find attached our response as follows:

- Question 1 & 2
  - Assessment of the likelihood of significant effects of the wastewater discharge on the relevant European sites
  - Review of the impact of the discharge in relation to the requirements of the Environmental Quality objectives.

- Revised Non-Technical Summary

- Attachment E4 July 2010

I trust that this addresses the queries raised. The information on the accompanying CD-ROM is a true copy of the original hard copy response.

Yours faithfully,

p/p Patricia Power
Director of Services
Area Operations South
Floor 5
County Hall
Cork.

Cork county Council

Southern Division

Licence Register Number D0330-01

Cloughduv Waste Water Treatment Plant

Response to EPA Notice in accordance with Regulation 18(3)(b) of the waste Water Discharge (Authorisation) Regulations 2007 of 21 May 2010.

Question 1: Assess the likelihood of significant effects of the waste water discharge on the relevant European sites...

1 Introduction

1.1 Cloughduv is a small village approximately 17 miles from Cork City and 8.5 miles from Macroom. It is located to the south of the N22 national primary road. The Cloughduv Waste Water Treatment Plant is located to the north west of Cloughduv village. The existing WWTP is designed to treat waste water for a 1,500 population equivalent. Current figures indicate the plant is treating waste of a PE of on average 213 based on BOD loading. The Waste water is treated to a tertiary treatment standard including nutrient removal. Having undergone treatment in a conventional aeration system the treated effluent is further treated by passing through a sand filtration system. The discharged treated waste water is in compliance with the Urban Waste water Treatment Regulations. The treated waste water discharges into the River Bride some 15Km upstream of its confluence with the River Lee.

1.2 The River Bride is not a designated Special Area of Conservation. It does not flow through any Natural Heritage Areas (NHA). There are no designated special protected areas located along the River Bride and there are no designated SPA sites within 2Km of the discharge from Cloughduv. However the River Bride is a tributary of the River Lee which flows into Cork Harbour and sections of the harbour are designated an SPA (Code 004030). The closest section of the SPA to the discharge from the Cloughduv WWTP lies some 33kms downstream.

The River Bride is not a designated Shellfish area under the Shellfish Waters Regulations, S.I.200 of 1994. It is not designated a Bathing Water under the Bathing Water Regulations, S.I. 178 of 1998 as amended. It is not a designated Sensitive Area under the Urban Waste water Treatment Regulations 2001 (S.I. 254 of 2001).

The River Bride is not designated as a Salmonid Water under Salmonid Water Regulations, S.I. 293 of 1988. The Lee River, into which the water from the Bride ultimately discharges, is designated a Salmonid Water.

1.3 It is required to assess the likelihood of significant effects of the waste water discharge on the relevant European sites by referring to Circular L8/08 'Water Services Investment Programmes – Protection of Natural Heritage and National Monuments' issued by the DEHLG and in particular to complete the flow diagram in Appendix 1. This is set out below:

1. Is the development in a nature conservation site – **No**

→

2. (a) (if the development involves a surface water abstraction / discharge) Is the development in the surface water catchment of a nature conservation site (or part of such a site) – **Yes**

→

3. Are the qualifying habitats and species of the site water dependant – **Yes**

→

5. Is there a WFD sub-basin plan for the site or its protected habitats / species – **No**

→

Assess Impacts

Thus based on the DEHLG Circular L8/08 there is a need to undertake an assessment of impacts.

The plant is located approx. 33km upstream from the Cork Harbour Special Protection Area which is designated 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.

1.4 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 Cloughduv WWTP on the adjacent Cork Harbour Special Protection Area and represents the first stage of this process (Screening).

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.

1.5 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 Directive 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 Habitats 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	Cloughduv WWTP, Cloughduv, County Cork.
Description of the key components of the project	The waste water generated in Cloughduv village (Domestic, Commercial, School and Infiltration) is collected in a foul sewerage collection system. The waste water flows by gravity to the waste water treatment plant. There is one pumping station located within the village. A new WWTP has been constructed in Cloughduv. It underwent process proving in July / August 2010 and is now operational. It is designed for a population equivalent of 1500 with waste water discharges of approximately 338m¤/day, based on a daily demand of 225l/head/day. The discharge location from the plant is the River Bride some 15Km upstream of its confluence with the River Lee. The new WWTP includes the following: - Inlet pumping station - Inlet screening and grit removal - Forward feed pumping station - Aeration tank - Clarifier and RAS/WAS pumps - Phosphorus removal (Ferric storage tank and dosing system) - Tertiary treatment using a sand filtration system - Sludge pumping and sludge holding tank - Final effluent pumping station and outfall to the River Bride - Storm holding facility - Control / Staff Facilities Building The Design Effluent Standards for the new WWTP are as set out below: Biological Oxygen Demand (BOD) - 10mg/l Suspended Solids (SS) - 10mg/l Ortho Phosphorus - 1mg/l The treated effluent from the Cloughduv Waste Water Treatment Plant discharges to the River Bride which is a tributary of the River Lee. The main channel of the Lee is designated Salmonid. On the basis of its salmon population and spawning grounds the Bride is included in a 'shadow list' of proposed Special Areas of Conservation submitted to the European Commission (DGXI Natura, 2000) under a group NGO initiative sponsored by The Heritage Council for Ireland. However this is not a formal designation.

	A storm tank is provided at the WWTP and where the retention time of the storm tank is exceeded the storm flow will overflow to the River Brouen a tributary of the River Bride, similarly any emergency overflows from the plant will flow to the River Brouen (duty / standby pumping arrangements and a standby generator have been provided on site to reduce the possibility of emergency overflows). The collection system serving the pumping station in Cloughduv is a separate system. The overflow from the pumping station operates on an emergency basis only, discharging to a nearby stream which in turn flows to the River Bride.
Distance from designated sites in potential impact zone*	Approx. 33 Km distance from the Discharge point to the Cork Harbour SPA.

2.2 Description of the Natura 2000 sites within the potential impact zone[1]	
Name	Cork Harbour Special Protection Area
Site Code	004030
Site Description	The Cork Harbour SPA is an estuarine complex which is primarily comprised of intertidal habitats, mainly mudflats as well as some other coastal and marine habitats. These habitats support very high numbers of wintering waterfowl that feed on the macro invertebrates inhabiting the mudflats. The Harbour regularly supports in excess of 20,000 wintering birds, making it an internationally important site and the fifth most important wintering waterfowl site in the country. Cloughduv WWTP discharges to the River Bride at a point approx 33Km upstream from the Cork Harbour SPA. The River Bride is a tributary of the River Lee which ultimatly flows into the Cork Harbour SPA at the North Western end of the Lough Mahon estuary where the main habitats of importance are intertidal mudflats. More information on the Cork Harbour SPA is contained in Appendix 1 of this document. Bird count data is provided in Appendix 3.
Qualifying Interests of Cork Harbour SPA.	Internationally important numbers of Black-tailed Godwit and Redshank; Nationally important numbers of Cormorant, Shelduck, Oystercatcher, Golden Plover, Lapwing, Dunlin and Curlew; 20,000 wintering water birds. *Source* -

[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.

	National Parks and Wildlife Service See Appendix 3 for bird count data for Cork Harbour 1998/2000 - 2007/2008.
Other Notable Features of Cork Harbour SPA	Little Grebe, Great-crested Grebe, Grey Heron, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Grey Plover, Black-headed Gull, Common Gull, Lesser Black-backed Gull, wetland and water birds. Source - *National Parks and Wildlife Service* See Appendix 3 for bird count data for Cork Harbour 1998/2000 - 2007/2008.
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 Cloughduv WWTP:** The treated effluent discharges from the WWTP to the River Bride which is a tributary of the River Lee. The Cork Harbour SPA is approx 33 km from the point of discharge. The effluent is treated to a high standard prior to discharge from the Cloughduv WWTP. **Other Significant Discharges:** Other discharges to the River Bride include the settlements of Kilmurry, Crookstown, Aherla, Farran and Farnanes, Kilumney and Ovens. Additionally there are several licensed industrial / commercial discharges to the River Bride. The impact of the proposed discharge from Cloughduv WWTP into the Bride has been assessed in tandem with these discharges (Ref River Bride Assessment by Dixon Brosnan dated 26 Jan 2006, submitted as Attachment F1 of the initial WWDL application). The assessment addressed waste assimilative capacity, BOD, suspended solids, nitrogen, phosphorus, pathogens and ecology / fisheries. The maximum population equivalents at the various settlements

for different treatment standards were detailed based on the background concentrations of various parameters, estimated flows and the relevant limits. In the case of Cloughduv the following were determined as the potential maximum population equivalents based on 95%ile flows:

BOD (allowing 5mg/l limit in river) - 6,477 PE
BOD (allowing 4mg/l limit in river) - 4,322 PE
BOD (allowing only a 1mg/l increase in river) - 2,161 PE
Suspended solids (allowing 25mg/l limit in river) - >8,000 PE
Nitrate as N (allowing 11.3mg/l in river) - 6,300 PE
Nitrate as N (allowing 5.65 mg/l in river i.e. guide level) - 2,000 PE
Orthophosphate (allowing 0.03mg/l limit) - 230 PE
Orthophosphate (allowing 0.05mg/l limit) - 690 PE

However Ortho-P is more appropriately calculated on the basis of mean flows and a re-calculation on that basis leaving the other parameters as per the Dixon Brosnan report results in the following:

Orthophosphate (allowing 0.03mg/l limit)-9,888 PE
Orthophosphate (allowing 0.05mg/l limit)-29,664 PE

In addition a comparison of the previous discharge from the now decommissioned 500PE WWTP, the current discharge and the proposed design discharge shows the following:

Previous BOD discharge - 6.235kg/day
Current BOD discharge - 0.43kg/d
Design BOD discharge - 3.38kg/day

Previous SS discharge - 11.567kg/day
Current SS discharge - 0.43kg/d
Design SS discharge - 3.38kg/day

Previous Ortho P discharge - 0.39044kg/day
Current Ortho P discharge - 0.043kg/d
Design Ortho P discharge - 0.338kg/day

The above calculations are based on utilising the current average daily flow to determine the previous and current discharges with the normal design flow (DWF) utilised to determine the design discharge. It is evident that under normal operating conditions even increasing the plant to its 1,500PE capacity will result in lower emissions than the previous plant operating at a much lower PE.

Treated Wastewater from the Ballincollig agglomeration discharges to the River Lee approx 13Km upstream of the Cork Harbour SPA. It should be noted that this facility has a Waste Water Discharge Licence (D0043-01).

Treated Wastewater from the Blarney agglomeration discharges to the Shournagh River which combines with the

	River Lee approx 19Km upstream of the Cork Harbour SPA. It should be noted that this facility has a Waste Water Discharge Licence (D0049-01). Treated Wastewater from Dripsey village discharges to the river Dripsey which combines to the River Lee approx 27Km upstream of the Cork Harbour SPA. Treated Wastewater from Coachford discharges to the River Lee approx 32Km upstream of the Cork Harbour SPA.
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: o Size and scale o Land-take o Distance from the Natura 2000 site or key features of the site: o Resource requirements (water abstraction etc.) o Emissions (disposal to land, water or air) o Excavation Requirements o Transportation Requirements o Duration of construction, operation, decommissioning o Other.	Discharges could give rise to elevated nutrients entering the Western portion of Cork Harbour. 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. However the potential for the WWTP discharge to result in elevated nutrients within the harbour is reduced by the following factors: 1. The quality of the treated effluent is high. 2. From the monitoring data available there is no deterioration in water quality in the rivers downstream of the discharge. 3. The discharge from the plant is approx 33Km upstream from Cork Harbour SPA and the River Lee enters the Cork Harbour SPA at the North Western end of Lough Mahon which is a large and well exchanged body of water with unlimited dilution capacity. 1 **The standard of treated effluent is high.** Treated effluent from the Cloughduv WWTP is monitored on an ongoing basis. The old 500PE WWTP has been decommissioned and the new 1500PE plant is now operational. Ref Appendix 2 for effluent quality results taken during the process proving period (July / August 2010) for the new WWTP. It is noted that storm overflows may occur in times of heavy rain, however the assumption must be made that what is discharged at these times is diluted. Similarly it is possible for emergency overflows to occur from the inlet pumping station however measures have been put in place to significantly reduce the risk of such overflows i.e. duty / standby pumps, standby generator in case of electricity failure and a dial out alarm system to alert the operator. **2 No deterioration in water quality in the Rivers downstream.** According to the upstream and downstream monitoring already carried out as part of the WWDL application process, there is no deterioration in the water quality of the River Bride associated with the Cloughduv WWTP discharge.

	It should also be noted that at the closest downstream EPA monitoring station (19B040900, Coolmucky Bridge) the Q value was measured as Q4-5 in 2005 and as Q5 in 2008. **3 Treated effluent discharges into Harbour body** The treated effluent discharge from the plant is approx 33Km upstream from Cork Harbour SPA. The River Lee enters the Cork Harbour SPA at the North Western end of Lough Mahon which is a large and well exchanged body of water with unlimited dilution capacity. The endless dilution capability of the harbour body of water means that the discharge is properly diluted once within the SPA
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:** Effluent is discharging to a large well-exchanged body of water where dilution and dispersion potential is high. No significant impacts are evident or predicted on habitats within the Cork Harbour 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:** Effluent is discharging to a large well-exchanged body of water where dilution and dispersion potential is high. No significant impacts are evident or predicted on species for which the SPA is designated. **Changes in key indicators of conservation value e.g. water quality:** Monitoring of the rivers water quality indicates that there is no deterioration in water quality associated with the Cloughduv discharge. This is confirmed by the EQS comparison tables attached. It should also be noted that at the closest downstream EPA monitoring station (19B040900, Coolmucky Bridge) the Q value was measured as Q4-5 in 2005 and as Q5 in 2008.
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.

4. Finding of No Significant Effects Report Matrix
Cork Harbour Special Protection Area

Name of project or plan	Cloughduv WWTP.
Name and location of Natura 2000 site	Cork Harbour Special Protection Area
Description of the project or plan	The waste water generated in Cloughduv village (Domestic, Commercial, School and Infiltration) is collected in a foul sewerage collection system. The waste water flows by gravity to the waste water treatment plant. There is one pumping station located within the village. A new WWTP has been constructed in Cloughduv. It underwent process proving in July / August 2010 and is now operational. It is designed for a population equivalent of 1500 with waste water discharges of approximately 338m³/day, based on a daily demand of 225l/head/day. The discharge location from the plant is the River Bride some 15Km upstream of its confluence with the River Lee. The new WWTP includes the following: - Inlet pumping station - Inlet screening and grit removal - Forward feed pumping station - Aeration tank - Clarifier and RAS/WAS pumps - Phosphorus removal (Ferric storage tank and dosing system) - Tertiary treatment using a sand filtration system - Sludge pumping and sludge holding tank - Final effluent pumping station and outfall to the River Bride - Storm holding facility - Control / Staff Facilities Building The Design Effluent Standards for the new WWTP are as set out below: Biological Oxygen Demand (BOD) - 10mg/l Suspended Solids (SS) - 10mg/l Ortho Phosphorus - 1mg/l

	The treated effluent from the Cloughduv Waste Water Treatment Plant discharges to the River Bride. A storm tank is provided at the WWTP and where the retention time of the storm tank is exceeded the storm flow will overflow to the River Brouen a tributary of the River Bride, similarly any emergency overflows from the plant will flow to the River Brouen (duty / standby pumping arrangements and a standby generator have been provided on site to reduce the possibility of emergency overflows). The collection system serving the pumping station in Cloughduv is a separate system. The overflow from the pumping station operates on an emergency basis only, discharging to a nearby stream which in turn flows to the River Bride.
Is the project or plan directly connected with or necessary to the management of the site (provide details)?	No
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 the Cloughduv WWTP either alone or in combination with discharges from other sources could give rise to elevated nutrients entering the Western portion of Cork Harbour. 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. Effluent discharged from Saleen Septic tank or from the discharge points from the Whitegate/Aghada agglomeration may be having a negative impact on the Cork Harbour SPA, it is considered that the discharge from Cloughduv WWTP is not contributing to this impact because of its distance from Cork Harbour SPA and because of the large dilution capacity of the River Lee.
Explain why these effects are not considered significant.	Treated effluent discharges approx 33Km upstream of the SPA and the river discharges to a large well-exchanged body of water where dilution and dispersion potential is high. No significant impacts are evident or predicted on species for which the SPA is designated.
List of agencies consulted: provide contact name and telephone or email address	Contacted for other licence applications incorporating discharge to the Cork Harbour SPA: National Parks and Wildlife Service - Natureconservation@environ.ie, cyril.saich@environ.ie Birdwatch Ireland - Data request.
Response to consultation	Draft Conservation Objectives and a copy of Intention to Designate Cork Harbour as SPA was received previously from the NPWS. Bird count data was received previously from Birdwatch Ireland.

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**
Denise Barnett, Cork County Council	IWebs Bird Data supplied by BirdWatch Ireland; Water Quality Monitoring Data CCC;	Desktop review of cited data.	This report.

Question 2: Review the assessment of the impact of the discharge in relation to the requirements of the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 SI No 272/2009.

Licence Register Number D0330-01

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

The upstream and downstream sampling results for 2008/2009 at ***aSW01u*** and ***aSW01d*** 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 with actual results for metals have been included that include data for actual results that are below LOD. These "actual results for metals" are laid out on a separate "metal analysis" sheet in the Revised Table E and are attached to this document.

Section A – Tables

UPSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009 upstream ambient sampling results at aSW01u***
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)	0.5 mg/L (mean) 0.885 mg/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	7.7
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)	0.045 mg/L (mean) 0.050 mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.031 mg/L (mean) 0.0447 mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1 µg/L
Toulene	10	<1.0 µg/L
Xylene	10	<1.0 µg/L
Arsenic	25	<0.96 µg/L
Total Chromium	8.1	<20 µg/L
Copper (depending on water hardness)	30	<20 µg/L
Cyanide	10	5 µg/L
Fluoride	500	33 µg/L
Zinc (depending on water hardness)	100	<20 µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01 µg/L
Dichloromethane	20	<1.0 µg/L
Simazine	1	<0.01 µg/L
Lead and its compounds	7.2	<20 µg/L
Nickel and its compounds	20	<20 µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.15	<20 µg/L
Mercury and its compounds	0.05	<0.2 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 in grey are at the limit of detection.
Water hardness (mean) in the River Bride (Bride South at Coolmuckey Br) is 112 $mgCaCO_3/L$

UPSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009 upstream ambient sampling results at aSW01u***
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	<1 µg/L
Copper (depending on water hardness)	30	<1 µg/L
Zinc (depending on water hardness)	100	<1 µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	<1 µg/L
Nickel and its compounds	20	<1 µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.15	<1 µg/L*

* While Cadmium is reported as <1 µg/L it is actually zero.

DOWNSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2008/2009 Downstream ambient sampling results at aSW01d***
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)	0.625 mg/L (mean) 0.87 mg/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
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)	0.02 mg/L (mean) 0.028 mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.031 mg/L (mean) 0.0446 mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1 µg/L
Toulene	10	<1.0 µg/L
Xylene	10	<1.0 µg/L
Arsenic	25	<0.96 µg/L
Total Chromium	8.1	<20 µg/L Chromium
Copper (depending on water hardness)	30	<20 µg/L
Cyanide	10	<5 µg/L
Fluoride	500	36 µg/L
Zinc (depending on water hardness)	100	<20 µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01 µg/L
Dichloromethane	20	<1.0 µg/L
Simazine	1	<0.01 µg/L
Lead and its compounds	7.2	<20µg/L
Nickel and its compounds	20	<20 µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.15	<20 µg/L
Mercury and its compounds	0.05	< 0.2 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 (mean) in the River Bride is 112mg $CaCO_3$/L

DOWNSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2008/2009 Downstream ambient sampling results at aSW01d***
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	<1 µg/L
Copper (depending on water hardness)	30	<1 µg/L
Zinc (depending on water hardness)	100	<1 µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	3.5 µg/L
Nickel and its compounds	20	<1 µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.15	<1 µg/L*

* While Cadmium is reported as <1 µg/L it is actually zero.

Section 2 –Equations / 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) = 0.045 m3/sec[2]
Mean BOD in River (upstream) = 0.5mg/L[3]
Max volume of discharge (3DWF) = 0.0117 m3/sec[4]
Max value for BOD in discharge = 10mg/L[5]

$$C_{final} = \frac{(0.045 \times 0.5) + (0.0117 \times 10)}{(0.045 + 0.0117)}$$

C_{final} = 2.46 mg/l BOD

This is not in breach of the 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) = 2.42m3/sec
Mean BOD in River (upstream) = 0.5 mg/L
Normal volume of discharge (DWF) = 0.0039m3/sec
Mean value for BOD in discharge = 10 mg/L

$$C_{final} = \frac{(2.42 \times 0.5) + (0.0039 \times 10)}{(2.42 + 0.0039)}$$

C_{final} = 0.515mg/l BOD

This is not in breach of the 1.5mg/L mean 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) = 0.045m3/sec
Mean Ammonia in River (upstream) = 0.045mg/L
Max volume of discharge (3DWF) = 0.0117m3/sec
Max value for Ammonia in discharge = 5mg/L

$$C_{final} = \frac{(0.045 \times 0.045) + (0.0117 \times 5)}{(0.045 + 0.0117)}$$

C_{final} = 1.067mg/l Ammonia

This is in breach of the 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) = 2.42m3/sec
Mean Ammonia in River (upstream) = 0.045mg/L
Normal volume of discharge (DWF) = 0.0039m3/sec
Mean value for Ammonia in discharge = 5mg/L

$$C_{final} = \frac{(2.42 \times 0.045) + (0.0039 \times 5)}{(2.42 + 0.0039)}$$

C_{final} = 0.053mg/l Ammonia

This is in not in breach of the 0.065mg/L mean EQS for Ammonia

MASS BALANCE EQUATIONS FOR ORTHOPHOSPHATE:

Worst Case Scenario:

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

Flow of River (95%ile) = 0.045m3/sec
Mean Orthophosphate in River (upstream) = 0.031mg/L
Max volume of discharge (3DWF) = 0.0117m3/sec
Max value for Orthophosphate in discharge = 1mg/L

$$C_{final} = \frac{(0.045 \times 0.031) + (0.0117 \times 1)}{(0.045 + 0.0117)}$$

C_{final} = 0.23mg/l Orthophosphate

This is in breach of the 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) = 2.42m3/sec
Mean Orthophosphate in River (upstream) = 0.031mg/L
Normal volume of discharge (DWF) = 0.0039m3/sec
Mean value for Orthophosphate in discharge = 1mg/L

$$C_{final} = \frac{(2.42 \times 0.031) + (0.0039 \times 1)}{(2.42 + 0.0039)}$$

C_{final} = 0.033mg/l Orthophosphate

This is not in breach of the 0.035mg/L mean EQS for Orthophosphate.

Appendix 1: Ecological Data

Cork Harbour SPA - Site Synopsis (National Parks and Wildlife Service)

Site Code 004030

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas and Owenacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, theDouglas Estuary, inner Lough Mahon, Lough Beg, Whitegate Bay and the Rostellaninlet. Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nepthys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva lactua* and *Enteromorpha* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Salt marsh species present include Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Plantain (*Plantago maritima*), Laxflowered Sea-lavender (*Limonium humile*) and Sea Arrowgrass (*Triglochin maritima*).

Some shallow bay water is included in the site. Cork Harbour is adjacent to a major urban centre and a major industrial centre. Rostellan lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country. The five-year average annual core count for the entire harbour complex was 34,661 for the period 1996/97-2000/01. Of particular note is that the site supports an internationally important population of Redshank (1,614) - all figures given are average winter means for the 5 winters 1995/96-1999/00. A further 15 species have populations of national importance, as follows: Great Crested Grebe (218), Cormorant (620), Shelduck (1,426), Wigeon (1,750), Gadwall (15), Teal (807), Pintail (84), Shoveler (135), Red-breasted Merganser (90), Oystercatcher (791), Lapwing (3,614), Dunlin (4,936), Black-tailed Godwit (412), Curlew (1,345) and Greenshank (36). The Shelduck population is the largest in the country (9.6% of national total), while those of Shoveler (4.5% of total) and Pintail (4.2% of total) are also very substantial. The site has regionally or locally important populations of a range of other species, including Whooper Swan (10), Pochard (145), Golden Plover (805), Grey Plover (66) and Turnstone (99). Other species using the site include Bat-tailed Godwit (45), Mallard (456), Tufted Duck (97), Goldeneye (15), Coot (77), Mute Swan (39), Ringed Plover (51),Knot (31), Little Grebe (68) and Grey Heron (47). Cork Harbour is an important site for gulls in winter and autumn, especially Common Gull (2,630) and Lesser Black-backed Gull (261); Black-headed Gull (948) also occurs.

A range of passage waders occur regularly in autumn, including Ruff (5-10),

Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.
The wintering birds in Cork Harbour have been monitored since the 1970s and are counted annually as part of the I-WeBS scheme.

Cork Harbour has a nationally important breeding colony of Common Tern (3-year mean of 69 pairs for the period 1998-2000, with a maximum of 102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Extensive areas of estuarine habitat have been reclaimed since about the 1950s for industrial, port-related and road projects, and further reclamation remains a threat. As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Inner Harbour being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. Oil pollution from shipping in Cork Harbour is a general threat. Recreational activities are high in some areas of the harbour, including jet skiing which causes disturbance to roosting birds.

Cork Harbour has is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its population of Redshank. In addition, there are at least 15 wintering species that have populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it.

Appendix 2: Treated Effluent Quality Data 2010.

DATE	COD (mg/l)		BOD_5 (mg/l)		SS (mg/l)		TP (mg/l)		OP (mg/l)	
	Inlet	Eff	Inlet	Eff	Inlet	Eff	Inlet	Eff	Inlet	Eff
Standard		50		10		10		1		1
05/07/2010	743	19	310	<5	310	8	9.6	0.50	1.9	0.2
06/07/2010	1020	26	455	<5	382	9	12.7	0.35	2.3	0.3
07/07/2010	143	21	65	<5	84	8	5.2	0.07	4.7	0.1
08/07/2010	188	22	78	<5	116	7	4.4	0.08	4.0	0.1
09/07/2010	190	25	79	<5	98	9	4.5	0.08	3.7	0.04
09/07/2010	178	27	95	<2	117	<5	4.0	0.19	2.4	<0.03
12/07/2010	485	50	210	8	167	10	6.1	0.18	5.6	0.1
13/07/2010	525	17	210	<5	123	8	7.2	0.15	6.7	0.1
14/01/1900	416	27	210	<5	103	9	5.3	0.11	2.4	0.0
15/07/2010	159	22	79	<5	41	5	4.3	0.07	3.1	0.1
16/07/2010	235	44	129	16	150	5	4.6	0.10	3.4	0.1
16/07/2010	256	41	170	21	176	<5	4.8	<0.05	3.2	<0.03
19/07/2010	375	36	180	7	146	7	7.2	0.49	6.4	0.1
20/07/2010	625	48	308	9	139	5	7.8	0.69	6.3	0.3
21/07/2010	230	39	108	8	144	18.5	3.7	0.59	2.7	0.1
22/07/2010	205	63	99	13	150	15	4.1	0.60	3.7	0.1
23/07/2010	497	88	189	14	142	24	5.3	0.90	2.5	0.3
23/07/2010	547	93	208	16	270	25	8.6	0.96	4.8	0.3
26/07/2010	292	38	144	<5	164	8	6.4	0.48	4.5	0.1
27/07/2010	294	48	140	7	154	9	6.2	0.40	5.6	0.1
28/07/2010	576	47	267	6	202	7	6.5	0.39	4.1	0.0
29/07/2010	733	38	320	<5	168	7	8.0	0.43	5.9	0.0
30/07/2010	463	44	266	5	275	6	7.9	0.38	4.9	0.3
30/07/2010	434	46	258	6	288	8	8.0	0.52	4.7	0.3
03/08/2010	743	43	355	6	235	7	10.4	0.90	8.7	0.6
04/08/2010	578	48	267	7	183	9	7.4	0.89	5.8	0.7
05/08/2010	432	42	210	5	171	7	6.8	0.98	5.6	0.7
06/08/2010	819	47	407	5	445	12	6.8	1.00	5.5	0.6
06/08/2010	838	50	370	8	450	14		0.97	5.5	0.6
09/08/2010	204	28	99	<5	139	9	5.6	0.32	4.1	0.2
10/08/2010	326	30	166	7	145	10	6.7	0.42	5.5	0.3
11/08/2010	463	24	227	<5	118	9	8.6	0.17	6.7	0.1
12/08/2010	428	18	209	<5	105	8.5	8.0	0.19	6.9	0.1
13/08/2010	540	19	166	<5	127	6.5	11.7	0.16	10.4	0.1
13/08/2010	512	18	149	<2	149	<5	12.9	0.14	9.9	0.1
16/08/2010	588	15	277	<5	196	6.5	9.0	0.15	8.7	0.1
17/08/2010	503	14	220	<5	72	9	8.5	0.17	7.6	0.1
18/08/2010	321	12	166	<5	169	7.5	5.0	0.11	12.2	0.02
19/08/2010	390	24	177	7	176	8	6.1	0.10	5.9	0.03
20/08/2010	385	17	126	<5			6.3	0.09	3.6	0.03
20/08/2010										

Compliant results
Non compliant results
Independent Analysis

Appendix 3: Bird Count Data.

I-WeBS

Cork Harbour

Species	1% National	1% International	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Mean (03-07)	Peak (03-07)
Mute Swan	110	110	46	42	25	15	42	56	71	54	73	68	64	73
Bewick's Swan	20	200	6					2					0	2
Whooper Swan	130	210			12	14	12	15	7			3	5	15
Black Swan			3								2		0	2
Pink-footed Goose		2,250			1							2	0	2
Greenland White-fronted Goose	110	270			1								0	0
Greylag Goose	50	870			3	4	4	1	1	3	1	6	2	6
Canada Goose			10	6	13	8	2	21	23	11	13	22	18	23
Light-bellied Brent Goose	220	260			1		6	12	16	26	11	17	16	26
Feral/hybrid Goose									2			5	1	5
Shelduck	150	3,000	1,875	1,870	722	1,108	1,903	1,946	1,391	1,350	918	823	1,286	1,946
Wigeon	820	15,000	1,683	1,402	1,272	1,519	1,931	2,926	2,043	2,332	1,492	1,259	2,010	2,926
Gadwall	20	600	4		6	8	67	17	13	13	7		10	17
Green-winged Teal					1	1	1						0	0
Teal	450	5,000	778	1,214	1,139	1,079	1,492	1,611	1,169	1,302	667	644	1,079	1,611
Mallard	380	20,000	671	572	431	362	489	539	628	406	423	484	496	628
Pintail	20	600	52	41	2	74	73	46	20	14	2		16	46
Shoveler	25	400	103	148	74	48	103	33	24	45	62	51	43	62
Red Crested Pochard			1										0	0
Pochard	380	3,500	38	11	19	21	27	18	7	7	2	3	7	18
Ring-necked Duck							1						0	0
Tufted Duck	370	12,000	34	20	46	36	29	33	14	14	19	16	19	33
Scaup	45	3,100	2							2			0	2
Long-tailed Duck		20,000					2						0	0
Eider	30	12,830						1		15	1		3	15
Common Scoter	230	16,000		2			1	1	3	7		1	2	7
Surf Scoter			2										0	0
Velvet Scoter												3	1	3
Goldeneye	95	11,500	18	14	18	28	11	14	7	10	5	14	10	14
Red-breasted Merganser	35	1,700	110	128	64	77	95	88	85	80	68	72	79	88
Red-throated Diver	20	3,000								1	1		0	1
Black-throated Diver		3,750											0	0
Great Northern Diver		50	1	8	3	1	1	1			4	3	2	4
Pied-billed Grebe			1										0	0

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

Little Grebe	25	4,000	56	50	58	59	60	88	80	69	58	65	72	88
Great Crested Grebe	55	3,600	166	218	171	287	240	132	105	137	63	106	109	137
Slavonian Grebe		55	4		1			3	1	2			1	3
Black-necked Grebe			3	3	2	2							0	0
Cormorant	140	1,200	283	556	244	392	326	357	370	308	163	285	297	370
Shag									2		2	8	2	8
Little Egret		1,300	20	18	27	39	61	83	166	126	143	151	134	166
Grey Heron	30	2,700	54	61	114	57	97	68	135	76	84	72	87	135
Spoonbill												1	0	1
Water Rail			3	3		1	1	1	2	2	2	2	2	2
Moorhen	20		28	21	21	19	24	46	24	33	55	25	37	55
Coot	330	17,500	34	96	24	13	26	31	23	16	19	7	19	31
Oystercatcher	680	10,200	1,584	1,421	1,698	1,061	1,570	2,021	1,857	2,076	1,061	1,590	1,721	2,076
Ringed Plover	150	730	59	52	78	66	28	68	25	67	17	27	41	68
Golden Plover	1,700	9,300	3,000	3,432	4,009	6,888	4,262	5,102	6,200	3,002	3,266	5,232	4,560	6,200
Grey Plover	65	2,500	72	44	5	6	108	37	4	24	12	39	23	39
Lapwing	2,100	20,000	4,386	4,116	7,267	2,816	4,176	4,864	4,133	4,096	3,321	3,321	3,947	4,864
Knot	190	4,500	16	17	80	79	306	114	85	117	124	111	110	124
Sanderling	65	1,200					135	350		33			77	350
Curlew Sandpiper				15		2	1		3	4	1		2	4
Dunlin	880	13,300	8,277	8,240	6,632	5,155	3,979	4,785	4,325	3,874	4,456	3,579	4,204	4,785
Ruff		12,500		1			1	1		1		3	1	3
Snipe		20,000	43	47	5	20	20	54	14	49	32	75	45	75
Long-billed Dowitcher						1	1						0	0
Black-tailed Godwit	140	470	2,508	1,692	1,615	2,128	3,162	1,518	2,937	3,337	1,433	2,823	2,410	3,337
Bar-tailed Godwit	160	1,200	16	52	351	419	477	405	298	218	383	257	312	405
Whimbrel		2,000	2	1		1	1	3	1	4	1	1	2	4
Curlew	550	8,500	2,927	2,223	1,297	1,329	1,817	1,083	2,317	1,809	1,363	1,607	1,636	2,317
Common Sandpiper			3	3	1	2	2	2	2	2	1	4	2	4
Green Sandpiper			2	1		1	1	1	1	1			1	1
Spotted Redshank		900	3	2	1	1	2	1	2	1	1	1	1	2
Greenshank	20	2,300	46	61	31	25	60	47	83	68	72	71	68	83
Redshank	310	3,900	2,243	2,269	1,005	1,138	2,170	1,591	2,295	1,543	1,459	1,725	1,723	2,295
Turnstone	120	1,500	166	146	93	66	145	131	161	136	129	214	154	214
Mediterranean Gull			5	7	1	2	12	11	13	15	24	48	22	48
Sabine's Gull								1					0	1
Bonaparte's Gull											1		0	1
Black-headed Gull		20,000	2,493	1,609	2,288	1,180	1,811	2,954	2,170	2,627	2,010	2,103	2,373	2,954

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

Ring-billed Gull		2	3	2	1		1	1				0	1
Common Gull	16,000	676	378	1,264	1,725	459	200	290	188	214	207	220	290
Lesser Black-backed Gull	4,500	753	118	177	106	63	254	496	31	630	72	297	630
Herring Gull	13,000	53	68	36	16	37	32	36	40	123	51	56	123
Iceland Gull			1	1								0	0
Glaucous Gull											1	0	1
Great Black-backed Gull	4,800	120	238	141	76	110	150	385	157	137	98	185	385
Unidentified gull					2,123							0	0
Sandwich Tern		2	12	2	34	5		2	225	2	17	49	225
Common Tern			18			2	1		1	1	1	1	1
Arctic Tern											1	0	1
Unidentified Tern							3					1	3
Kingfisher			1	1	2	1	3	3	3	1	2	2	3

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

Saleen

Species	1% National	1% International	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Mean (03-07)	Peak (03-07)
Mute Swan	110	110	1	2	2	2	1	1		3			1	3
Canada Goose									13				3	13
Light-bellied Brent Goose	220	260			4								0	0
Shelduck	150	3,000	59	75	42	52	30	41	60	44	34	29	42	60
Wigeon	820	15,000	129	95	122	73	173	102	97	179	149	124	130	179
Green-winged Teal							1						0	0
Teal	450	5,000	72	101	81	168	199	223	188	248	184	226	214	248
Mallard	380	20,000	29	26	28	56	41	46	39	46	91	82	61	91
Shoveler	25	400					4	7		4			2	7
Goldeneye	95	11,500		2									0	0
Red-breasted Merganser	35	1,700			2		8	9	2	1	2		3	9
Red-throated Diver	20	3,000								1			0	1
Black-throated Diver		3,750											0	0
Little Grebe	25	4,000	11	13	9	11	9	9	5	8	14	8	9	14
Great Crested Grebe	55	3,600	13	6	5	8	6	16	7	13	4	5	9	16
Slavonian Grebe		55			1								0	0
Cormorant	140	1,200	7	7	6	4	6	3	6	6	7	7	6	7
Little Egret		1,300	9	4	7	10	10	10	23	17	17	18	17	23
Grey Heron	30	2,700	7	4	8	6	5	7	6	6	4	5	6	7
Moorhen	20						2			1			0	1
Oystercatcher	680	10,200	129	172	136	150	175	147	135	137	94	176	138	176
Ringed Plover	150	730	14		14		19		13	41			11	41
Lapwing	2,100	20,000	36	8	7	2		2	12		1		3	12
Knot	190	4,500								5		1	1	5
Curlew Sandpiper				9									0	0
Dunlin	880	13,300	256	31	26	10	164	28	64	6	37	54	38	64
Ruff		12,500										1	0	1
Snipe		20,000						2	6	2	5	1	3	6
Long-billed Dowitcher							1						0	0
Black-tailed Godwit	140	470	61	22	16	55	75	52	121	72	129	101	95	129
Bar-tailed Godwit	160	1,200	1	2	4	4	2	1	13	5	1	1	4	13
Whimbrel		2,000				1	1						0	0
Curlew	550	8,500	121	81	82	89	96	91	103	90	115	152	110	152
Common Sandpiper										1	1		0	1

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

Spotted Redshank		900	3	2								1	0	1
Greenshank	20	2,300	8	10	13	11	12	4	9	12	8	10	9	12
Redshank	310	3,900	123	106	135	129	116	116	144	126	173	161	144	173
Turnstone	120	1,500	61	26	52	33	35	12	26	73	54	17	36	73
Mediterranean Gull						1		4	4	5	6	48	13	48
Bonaparte's Gull											1		0	1
Black-headed Gull		20,000	190	177	167	107	176	57	187	184	221	212	172	221
Ring-billed Gull					1								0	0
Common Gull		16,000	7	47	41	88	264	39	103	21	65	84	62	103
Lesser Black-backed Gull		4,500	7	42	3	77	1	1	2	1	5	9	4	9
Herring Gull		13,000	2	3	4	1	6	3	7	3	5	3	4	7
Great Black-backed Gull		4,800	1	4	1	14	4	9	8	4	3	4	6	9
Sandwich Tern				2		22			2	6		3	2	6
Kingfisher					1		1		1	1	1	1	1	1

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

Owenboy Estuary

Species	1% National	1% International	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Mean (03-07)	Peak (03-07)
Mute Swan	110	110	5	2	2				2			4	2	4
Feral/hybrid Goose									2				1	2
Shelduck	150	3,000	111	122	97		167	206	141	76		45	117	206
Wigeon	820	15,000	13										0	0
Teal	450	5,000	88	50	5		80	50	75	29		25	45	75
Mallard	380	20,000	58	49	36		51	115	77	18		49	65	115
Red-breasted Merganser	35	1,700	15	5			12	12	7	9		3	8	12
Little Grebe	25	4,000					1					7	2	7
Great Crested Grebe	55	3,600						1				1	1	1
Cormorant	140	1,200	10	38	20		9	8	6	1		5	5	8
Little Egret		1,300		1				1	6			8	4	8
Grey Heron	30	2,700	4	6	18		6	13	12	6		11	11	13
Oystercatcher	680	10,200	119	54	40		91	80	82	27		105	74	105
Ringed Plover	150	730			6								0	0
Golden Plover	1,700	9,300	450	60	1,050								0	0
Lapwing	2,100	20,000	426	200	150		150	30	117	73		94	79	117
Knot	190	4,500			1				16			10	7	16
Curlew Sandpiper									1				0	1
Dunlin	880	13,300	460	115	55		120	63	170	107		125	116	170
Snipe		20,000		8				3		10		1	4	10
Black-tailed Godwit	140	470	75	194	145		210	100	233			250	146	250
Curlew	550	8,500	98	85	99		54	39	51	31		83	51	83
Common Sandpiper								1	1			2	1	2
Greenshank	20	2,300	4	9	2		30	12	23	17		11	16	23
Redshank	310	3,900	138	92	152		150	148	280	120		370	230	370
Turnstone	120	1,500	10	4			20	20	76	10		10	29	76
Black-headed Gull		20,000	397	156	147		80	200	226	253		305	246	305
Common Gull		16,000	82	90	65		80	50	50	90		183	93	183
Lesser Black-backed Gull		4,500	158	15					40			51	23	51
Herring Gull		13,000	6		1		5		2			17	5	17
Iceland Gull					1								0	0
Great Black-backed Gull		4,800	5	1	2		8		20			3	6	20
Sandwich Tern												2	1	2
Kingfisher							1						0	0

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.

SECTION A: REVISED NON-TECHNICAL SUMMARY

The Waste Water Works and the Activities Carried Out Therein

Cloughduv is a small village approximately 17 miles from Cork City and 8.5 miles from Macroom. It is located to the south of the N22 national primary road.

The waste water in Cloughduv village is collected in a separate foul sewerage collection system. The waste water flows by gravity to the waste water treatment plant. There is one pumping station located within the village. The waste water enters the WWTP via a 225mm gravity sewer.

A new WWTP has been constructed to cater for a PE of 1500 (the old WWTP which had a design PE of 500 has been decommissioned and removed). The new plant has a design wastewater discharge of approximately 338m³/day (based 225l/head/day). The treated effluent discharges to the River Bride downstream of Ryecourt Bridge. The River Bride is a tributary of the River lee which in turn flows into Cork harbour. The WWTP site has an area of 5,170m² (1.28 acres).

The new plant was commissioning and underwent process proving in July / August 2010.

The WWTP includes the following:

- New inlet pumping station
- New inlet screening
- New pumping station and storm holding facility
- New aeration tank
- New clarifier and RAS/WAS pumps
- Provision of a ferric storage tank and dosing system (phosphorus removal)
- New Tertiary treatment using a filtration system
- New Sludge pumping and sludge holding tank
- New Final effluent pumping station and outfall to the Bride River
- Miscellaneous Mechanical and Electrical Works
- New Control / Staff Facilities Building
- New Site Roads and Footpaths
- New Site Fencing
- Landscaping and screen planting

The sources of emissions from the waste water works

The pollution load for the Cloughduv agglomeration arises from the following areas:

- Domestic population
- Commercial premises
- School
- Infiltration

The sewage from all commercial activities is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP.

The nature and quantities of foreseeable emissions from the waste water works into the receiving aqueous environment as well as identification of significant effects of the emissions on the environment

The design population equivalent for the WWTP is 1,500. At design capacity the plant would discharge 338m3/day (DWF) to the Bride River based on 225 l/head/day. The operation of this plant has removed the primary discharge from the Brouen River (secondary discharge for storm overflows will continue to discharge to the Brouen) which will be beneficial and reduce the negative impacts on the environment.

The proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the waste water works

Technology

The WWTP has a sufficient number of standby pumps, storm holding facilities, sludge holding facilities, etc to ensure continuation of the wastewater treatment.

The plant incorporates tertiary treatment in the form of sand filters and phosphorus removal facilities. Both of these technologies significantly improve the quality of the effluent.

The discharge location for the Primary Discharge from the plant has been re-located from the Brouen River to the Bride River where significant addition dilutions are available.

The plant includes the following elements:

- New inlet pumping station
- New inlet screening works
- Forward feed and storm pumping
- Aeration tank
- Clarifier and RAS/WAS pumps with 2 No. sludge pumps and a scum pump
- Tertiary treatment sand filter system
- Sludge and storm water holding tanks
- Final effluent pumping
- Phosphorus Removal System

Techniques

The WWTP shall be operated and managed in accordance with the Performance Management System, developed by the Water Service National Training Group (WSNTG).

Further measures planned to comply with the general principle of the basic obligations of the operator i.e. that no significant pollution is caused.

Standby power generation has been provided as part of the WWTP. It is of sufficient capacity to maintain the effluent discharge standards during periods when mains electricity is not available.

Chemical storage tanks and dosing equipment are bunded.

An instrumentation and control system together with on site monitoring and sampling is provided to ensure satisfactory operation of the plant.

Measures planned to monitor emissions into the environment

The Cork County Council Environmental Laboratory carried out sampling of the influent and effluent in the waste water treatment plant for the purposes of this waste water discharge licence application.

Response Engineering, the contractor for the new WWTP, are undertaking the monitoring during commissioning, process proving and for the initial 6 month operate contract thereafter monitoring will be undertaken by Cork County Council. Response undertook monitoring of the influent and effluent on a daily basis during the process proving period. It is now proposed to monitor once every two months for pH, BOD, COD, SS and TP. The primary discharge point has composite sampling (time and flow proportional capabilities) and continuous flow monitoring.

The Cork County Council Environmental Department located in Inniscarra takes samples from the Bride River upstream and downstream of the proposed discharge point from the wastewater treatment plant approximately 4 times per year.

The EU Water Framework Directive Monitoring Programme is to be fully operational by the year 2012. This monitoring programme was prepared by the EPA to meet the requirements of the EU Water Framework Directive (2000/60/EC) and National Regulations implementing the Water Framework Directive (S.I. No. 722 of 2003) and National Regulations implementing the Nitrates Directive (S.I. No. 788 of 2005). The Bride River is to have a number of operational monitoring sites under this monitoring programme.

List of Attachments include the following:

- Location Map Scale 1:25,000 — Attachment A1 Map 1
- Site Location Map of WWTP & Pumping Station — Attachment A1 Map 2
- Proposed Site Layout — Attachment A1 Map 4

Note: The above attachments were submitted with the initial WWDL application and are not re-submitted with this response.

Attachment E4 Cloughduv Inlet Table E4

Sample Date	15/01/2009	Average	Kg/Day	Kg/year
Sample	Influent	maximum		
Sample Code	GT058	na	na	na
Flow M^3/Day	*	1008	na	na
pH	7.4	7.4	na	na
Temperature ℃	*	*	na	na
Cond 20℃	616	616	na	na
SS mg/L	174	174	175.4	64021
NH_3 mg/L	27.8	27.8	28.02	10228.2
BOD mg/L	180	180	181.44	66225.6
COD mg/L	437	437	440.5	160781.04
TN mg/L	32.2	32.2	32.46	11847.02
Nitrite mg/L	0.00951	0.00951	0.00959	3.499
Nitrate mg/L	3.3	3.3	3.326	1214.14
TP mg/L	8.6	8.6	8.669	3164.1
O-PO4-P mg/L	4.51	4.51	4.546	1659.32
SO4 mg/L	49.1	49.1	49.493	18064.87
Phenols µg/L	5.22	5.22	0.0053	1.92
Atrazine µg/L	<0.01	<0.01	<0.000011	<0.0037
Dichloromethane µg/L	<1	<1		
Simazine µg/L	<0.01	<0.01	<0.000011	<0.0037
Toluene µg/L	30.52	30.52	0.0308	11.229
Tributyltin µg/L	*	*	*	*
Xylenes µg/L	<1	<1	<0.001	<0.368
Arsenic µg/L	<0.96	<0.96		
Chromium mg/L	<0.02	<0.02	<0.0202	<7.358
Copper mg/L	0.124	0.124	0.12499	45.622
Cyanide µg/L	5	5	0.00504	1.8396
Fluoride µg/L	40	40	0.0403	14.72
Lead mg/L	<0.02	<0.02	<0.0202	<7.358
Nickel mg/L	<0.02	<0.02	<0.0202	<7.358
Zinc mg/L	0.062	0.062	0.0625	22.811
Boron mg/L	<0.02	<0.02	<0.0202	<7.358
Cadmium mg/L	<0.02	<0.02	<0.0202	<7.358
Mercury µg/L	<0.2	<0.2	0.000202	0.0736
Selenium µg/L	1	1	0.001	0.368
Barium mg/L	<0.02	<0.02	<0.0202	<7.358

Note Maximum volume is 1008 m3 per day

Attachment E4 Cloughduv Discharge Outlet Table E4

Sample Date	10/07/2008	24/09/2008	09/10/2008	18/12/2008	15/01/2009			
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Average	Kg/Day	Kg/year
Sample Code	GS626	GS995	GS1029	GS1403	GT059	mg/L		
Flow M^3/Day	*	*	*	*	*	1008		
pH	*	*	*	*	7.4	7.4	*	*
Temperature ℃	*	*	*	*	*	*	*	*
Cond 20℃	857	*	*	*	583	720	725.76	264902.4
SS mg/L	269	102	89	61	63	116.8	117.7344	42973.056
NH_3 mg/L	42.9	*	*	*	30.7	36.8	37.0944	13539.456
BOD mg/L	145	75	54.2	65.5	39	75.74	76.34592	27866.2608
COD mg/L	326	126	206	133	66	171.4	172.7712	63061.488
TN mg/L	67	*	*	*	30.9	48.95	49.3416	18009.684
Nitrite mg/L	*	*	*	*	0.805	0.805	0.81144	296.1756
Nitrate mg/L	*	*	*	*	4.11	4.11	4.14288	1512.1512
TP mg/L	10.58	*	*	*	7.5	9.04	9.11232	3325.9968
O-PO4-P mg/L	9.08	*	*	*	5.03	7.055	7.11144	2595.6756
SO4 mg/L	*	*	*	*	<30	<30	<30.24	<11037.6
Phenols µg/L	*	*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	<0.01	<0.00001	<0.00001008	<0.0036792
Dichloromethane	*	*	*	*	<1	<1	<1.008	<367.92
Simazine µg/L	*	*	*	*	<0.01	<0.01	<0.01008	<3.6792
Toluene µg/L	*	*	*	*	<1	<1	<1.008	<367.92
Tributyltin µg/L	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	<1	<1	<1.008	<367.92
Arsenic µg/L	*	*	*	*	<0.96	<0.96	<0.96768	<353.2032
Chromium mg/L	<0.02	*	*	<0.02	<0.02	<0.02	<0.02016	<7.3584
Copper mg/L	0.201	*	*	0.049.	0.049	0.125	0.126	45.99
Cyanide µg/L	*	*	*	*	6	6	6.048	2207.52
Fluoride µg/L	*	*	*	*	39	39	39.312	14348.88
Lead mg/L	<0.02	*	*	<0.02	<0.02	<0.02	<0.02016	<7.3584
Nickel mg/L	<0.02	*	*	<0.02	<0.02	<0.02	<0.02016	<7.3584
Zinc mg/L	0.112	*	*	<0.02	<0.02	0.044	0.044352	16.18848
Boron mg/L	0.042	*	*	0.04	<0.02	0.031	0.031248	11.40552
Cadmium mg/L	<0.02	*	*	<0.02	<0.02	<0.02	<0.02016	<7.3584
Mercury µg/L	*	*	*	*	<0.2	<0.2	<0.2016	<73.584
Selenium µg/L	*	*		*	1.4	1.4	1.4112	515.088
Barium mg/L	0.034	*	*	<0.02	<0.02	0.018	0.018144	6.62256

Values recorded as 1/2 of LOD for stsistical purposes

Note Maximum volume is 1008 m3 per day

Attachment E4 Cloughduv Upstream Table E4

Sample Date	15/01/2009	Average
Sample	River	
Sample Code	GT060	
Flow M^3/Day	*	*
pH	7.7	7.7
Temperature ℃	*	*
Cond 20℃	192	192
SS mg/L	<2.5	<2.5
NH_3 mg/L	<0.1	<0.1
BOD mg/L	<1.0	<1.0
COD mg/L	<21	<21
TN mg/L	4.5	4.5
Nitrite mg/L	0.086	0.086
Nitrate mg/L	3.92	3.92
TP mg/L	<0.20	<0.20
O-PO4-P mg/L	0.05	0.05
SO4 mg/L	<30	<30
Phenols µg/L	<0.10	<0.10
Atrazine µg/L	<0.01	<0.01
Dichloromethane µg/L	<1	<1
Simazine µg/L	<0.01	<0.01
Toluene µg/L	<1	<1
Tributyltin µg/L	*	*
Xylenes µg/L	<1	<1
Arsenic µg/L	<0.96	<0.96
Chromium mg/L	<0.02	<0.02
Copper mg/L	<0.02	<0.02
Cyanide µg/L	5	5
Fluoride µg/L	33	33
Lead mg/L	<0.02	<0.02
Nickel mg/L	<0.02	<0.02
Zinc mg/L	<0.02	<0.02
Boron mg/L	<0.02	<0.02
Cadmium mg/L	<0.02	<0.02
Mercury µg/L	<0.2	<0.2
Selenium µg/L	1.1	1.1
Barium mg/L	0.029	0.029

Attachment E4 Cloughduv Downstream Table E4

Sample Date	24/09/2008	15/01/2009	Average
Sample	River	River	
Sample Code	GS996	GT057	
Flow M^3/Day	*	*	
pH	*	7.6	7.6
Temperature ℃	*	*	*
Cond 20℃	*	196	196
SS mg/L	*	5	5
NH_3 mg/L	*	<0.1	<0.1
BOD mg/L	*	<10	<10
COD mg/L	*	35	35
TN mg/L	*	3.8	3.8
Nitrite mg/L	*	0.00951	0.00951
Nitrate mg/L	*	3.32	3.32
TP mg/L	*	<0.20	<0.20
O-PO4-P mg/L	<0.05	<0.05	<0.05
SO4 mg/L	*	<30	<30
Phenols µg/L	*	<0.10	<0.10
Atrazine µg/L	*	<0.01	<0.01
Dichloromethane µg/L	*	<1	<1
Simazine µg/L	*	<0.01	<0.01
Toluene µg/L	*	<1	<1
Tributyltin µg/L	*	*	*
Xylenes µg/L	*	<1	<1
Arsenic µg/L	*	<0.96	<0.96
Chromium mg/L	*	<0.02	<0.02
Copper mg/L	*	<0.02	<0.02
Cyanide µg/L	*	<5	<5
Fluoride µg/L	*	36	36
Lead mg/L	*	<0.02	<0.02
Nickel mg/L	*	<0.02	<0.02
Zinc mg/L	*	<0.02	<0.02
Boron mg/L	*	<0.02	<0.02
Cadmium mg/L	*	<0.02	<0.02
Mercury µg/L	*	<0.2	<0.2
Selenium µg/L	*	1.2	1.2
Barium mg/L	*	0.032	0.032

Project	Location	Location R	Location E	Location N	Sample Te	Sample Re	Sample Date	Sample Tir	Comments	Temperatu	Dissolved O2	pH	BOD O2
									Max.	--	15	Varies	Varies
									Target	--	--	--	--
									Min.	--	5	Varies	--
										Degrees C	mg/l	pH units	mg/l
Bride South	Br u/s R Le	19B04160(	156253	70712	WFD Oper	2008/0935	14-May-08	10:30		14.9	10.8	8.1	0.9
Bride South	Br u/s R Le	19B04160(	156253	70712	WFD Oper	2008/1407	09-Jul-08	10:15		14.2	9.9	8	0.8
Bride South	Br u/s R Le	19B04160(	156253	70712	WFD Oper	2008/2572	08-Oct-08	10:05		12.1	11.2	8	0.4
									Sample Coun	4	4	4	4
									Maximum	14.9	12.2	8.2	0.9
									Minimum	7.2	9.9	8	0.4
									Mean	12.1	11	8.07	0.65
									Median	13.2	11	8.05	0.65
									Std. Deviatior	3.48	0.954	0.096	0.238
Bride South	Br. at Crookstown	142635.3		65930.7	WFD Oper	2008/0361	05-Mar-08	09:40		6.5	12.3	8	0.1
Bride South	Br. at Crookstown	142635.3		65930.7	WFD Oper	2008/0933	14-May-08	10:00		12.4	10.8	7.9	0.9
Bride South	Br. at Crookstown	142635.3		65930.7	WFD Oper	2008/1405	09-Jul-08	09:30		13.4	10.3	7.9	0.8
Bride South	Br. at Crookstown	142635.3		65930.7	WFD Oper	2008/2570	08-Oct-08	09:20		10.7	12.6	7.8	0.2
									Sample Coun	4	4	4	4
									Maximum	13.4	12.6	8	0.9
									Minimum	6.5	10.3	7.8	0.1
									Mean	10.8	11.5	7.9	0.5
									Median	11.6	11.6	7.9	0.5
									Std. Deviatior	3.04	1.12	0.082	0.408
Bride South	Coolmucke	19B04090(	146046	67832	WFD Oper	2008/0362	05-Mar-08	10:00		7	11.9	7.9	0.3
Bride South	Coolmucke	19B04090(	146046	67832	WFD Oper	2008/0934	14-May-08	10:15		13.1	10.1	7.8	0.7
Bride South	Coolmucke	19B04090(	146046	67832	WFD Oper	2008/1406	09-Jul-08	09:40		13.5	10.2	7.8	0.9
Bride South	Coolmucke	19B04090(	146046	67832	WFD Oper	2008/2571	08-Oct-08	09:40		11.2	9.8	7.8	0.6
									Sample Coun	4	4	4	4
									Maximum	13.5	11.9	7.9	0.9
									Minimum	7	9.8	7.8	0.3
									Mean	11.2	10.5	7.82	0.625
									Median	12.1	10.1	7.8	0.65
									Std. Deviatior	2.97	0.949	0.05	0.25

Nitrite	Molybdate	Ammonium	Nitrate	Hardness	Alkalinity	Appearanc	Chloride	Dissolved (	Colour	Conductivit	Mg	Ca
NO2	P	NH4	NO3	CaCO3	CaCO3		Cl		Hz		Mg	Ca
0.05	Varies	Varies	Varies	--	--	--	--	150	Varies	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	50	--	--	--	--
mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	Descriptive	mg/l	% O2	Hazen	µS/cm	mg/l	mg/l
0.025	***0.036***	0.048	20.2	135	110		19.7	106		304		
0.04	***0.037***	< 0.026	20.1	106	86	clear		97		247		
0.038	***0.034***	0.037	16.5	120	100	foamy	17.5	101	54	273		
3	3	3	3	4	4	-	2	4	2	4	1	1
0.04	0.037	0.048	20.2	142	110	-	19.7	106	54	304	6.5	46
0.025	0.034	< 0.026	16.5	106	86	-	17.5	97	24	247	6.5	46
0.034	0.036	0.033	18.9	126	102	-	18.6	101	39	280	6.5	46
0.038	0.036	0.037	20.1	128	105	-	18.6	100	39	285	6.5	46
0.008	0.002	0.018	2.11	16.1	11.4	-	1.56	3.87	21.2	25.8	0	0
				84	58	clear		99	18	201	5	25
< 0.013	0.015	0.066	15	82	66		19	101		206		
0.059	***0.046***	0.056	14.4	81	58	clear		100		191		
0.031	***0.033***	0.053	12.9	79	62	clear	16.8	114	48	190		
3	3	3	3	4	4	-	2	4	2	4	1	1
0.059	0.046	0.066	15	84	66	-	19	114	48	206	5	25
< 0.013	0.015	0.053	12.9	79	58	-	16.8	99	18	190	5	25
0.032	0.031	0.058	14.1	81.5	61	-	17.9	104	33	197	5	25
0.031	0.033	0.056	14.4	81.5	60	-	17.9	100	33	196	5	25
0.026	0.016	0.007	1.08	2.08	3.83	-	1.56	7.07	21.2	7.79	0	0
				124	96	clear		96	13	269	6.7	39
< 0.013	0.014	< 0.026	17.7	125	104		18.8	96		283		
0.05	***0.046***	0.036	15.7	93	76	clear		101		223		
0.024	***0.032***	0.03	14.1	105	90	foamy	17	89	40	241		
3	3	3	3	4	4	-	2	4	2	4	1	1
0.05	0.046	0.036	17.7	125	104	-	18.8	101	40	283	6.7	39
< 0.013	0.014	< 0.026	14.1	93	76	-	17	89	13	223	6.7	39
0.027	0.031	0.026	15.8	112	91.5	-	17.9	95.5	26.5	254	6.7	39
0.024	0.032	0.03	15.7	114	93	-	17.9	96	26.5	255	6.7	39
0.022	0.016	0.012	1.8	15.5	11.8	-	1.27	4.93	19.1	27.1	0	0

D0330-01 Attachment E4 tabulation of monitoring results for compliance purposes against SI 272 of 2009 for comparison purposes where results are below LOD for analytical method

Sample Date	15/01/2009	Average	95% percentile
Sample	Upstream River		
Sample Code	GT060		
NH_3 mg/L	0.068	0.068	0.068
O-PO4-P mg/L	0.05	0.05	0.05
Chromium ug/L	<1	<1	n/a
Copper ug/L	<1	<1	n/a
Lead ug/L	<1	<1	n/a
Nickel ug/L	<1	<1	n/a
Zinc ug/L	<1	<1	n/a
Boron ug/L	<1	<1	n/a
Cadmium ug/L	<1	<1	n/a
Barium ug/L	29	29	n/a

Sample Date	24/09/2008	15/01/2009	Average	95% percentile
Sample	Downstream River	Downstream River		
Sample Code	GS996	GT057		
NH_3 mg/L	*	0.0435	0.0435	0.0435
O-PO4-P mg/L	0.0135	0.0435	0.0285	0.042
Chromium ug/L	*	<1	<1	n/a
Copper ug/L	*	<1	<1	n/a
Lead ug/L	*	3.5	3.5	n/a
Nickel ug/L	*	<1	<1	n/a
Zinc ug/L	*	<1	<1	n/a
Boron ug/L	*	<1	<1	n/a
Cadmium ug/L	*	<1	<1	n/a
Barium ug/L	*	32	32	n/a

<1 Note values of 0ug/l recorded as <1ug/l