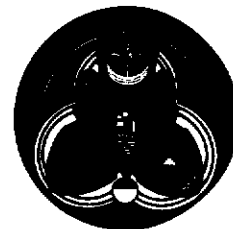


# Comhairle Contae Chorcaí Cork County Council

Halla an Chontae,  
Corcaigh, Éire.  
Fón: (021) 4276891 • Faics: (021) 4276321  
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Administration,  
Environmental Licencing programme,  
Office of Climate, Licencing & Resource Use,  
Environmental Protection Agency,  
Regional Inspectorate,  
Inniscarra,  
County Cork.

October 18<sup>th</sup> 2010

D0136-01

**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 Bandon 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 12<sup>th</sup> of October 2010, please find our response attached.

Yours Faithfully

A handwritten signature in black ink, appearing to read 'Patricia Power'.

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

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# **+Bandon 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)”.

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**Wastewater Discharge Licence Application: D0136-01 Bandon**

**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?	No
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/species?	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

**\*Note: Bandon WWTP is located on the floodplain of the river Bandon but the site is bunded to prevent ingress of water. In the severe flooding experienced in Bandon in November 2009, the bund was marginally breached but none of the equipment/plant was affected and the treatment plant was able to work uninhibited.**

**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 Bandon 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 aSW01uBAND and aSW02dBAND 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 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.

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## UPSTREAM COMPARISON TABLE

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2008 upstream ambient sampling results at aSW01uBAND</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<b><i>Oxygenation conditions Table 9</i></b>	<b><i>River water body</i></b>	<b><i>Ambient sampling results</i></b>
Biochemical Oxygen Demand (BOD) (mgO <sub>2</sub> /l)	Good status ≤1.5 (mean) or ≤2.6(95%ile)	2.032mg/L (mean) 4.11mg/L (95%ile)
<b><i>Acidification Status Table 9</i></b>	<b><i>River Water Body</i></b>	<b><i>Ambient sampling results</i></b>
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.5-8.1
<b><i>Nutrient conditions Table 9</i></b>	<b><i>River Water body</i></b>	<b><i>Ambient sampling results</i></b>
Total Ammonia (mg N/l)	Good status ≤0.065(mean) or ≤0.140(95%ile)	0.06mg/L (mean) 0.09mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤0.035(mean) or ≤0.075(95%ile)	0.03mg/L (mean) 0.045mg/L (95%ile)
<b><i>Specific pollutants Table 10</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20.0µg/L
Copper (depending on water hardness)	5	<20.0µg/L
Cyanide	10	<5.0µg/L
Flouride	500	<100.0µg/L
Zinc (depending on water hardness)	50	<20.0µg/L
<b><i>Priority Substances Table 11</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20.0µg/L
Nickel and its compounds	20	<20.0µg/L
<b><i>Priority Hazardous Substances Table 12</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Cadmium and its compounds (depending on water hardness)	≤0.09	<20µg/L
Mercury and its compounds	0.05	<0.2µg/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 River Bandon is 71.0mgCaCO<sub>3</sub>/L

**UPSTREAM COMPARISON TABLE  
(ANALYSIS BELOW THE LIMIT OF DETECTION)**

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2007-2008 upstream ambient sampling results at aSW01uBAND</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<b><i>Nutrient conditions Table 9</i></b>	<b><i>River Water body</i></b>	<b><i>Ambient sampling results</i></b>
Total Ammonia (mg N/l)	Good status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	0.054 mg/L (mean) <b>0.16 mg/L (95%ile)</b>
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	0.025 mg/L (mean) 0.048 mg/L (95%ile)
<b><i>Specific pollutants Table 10</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Total Chromium	8.1	0.85 µg/L
Copper (depending on water hardness)	5	< 1.0 µg/L
Zinc (depending on water hardness)	50	0.37 µg/L
<b><i>Priority Substances Table 11</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Lead and its compounds	7.2	5.5 µg/L
Nickel and its compounds	20	0.83 µg/L
<b><i>Priority Hazardous Substances Table 12</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Cadmium and its compounds (depending on water hardness)	≤ 0.09	< 1.0 µg/L

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## DOWNSTREAM COMPARISON TABLE

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2008 Downstream ambient sampling results at aSW01dBAND</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<b><i>Oxygenation conditions Table 9</i></b>	<b><i>River water body</i></b>	<b><i>Ambient sampling results</i></b>
Biochemical Oxygen Demand (BOD) (mgO <sub>2</sub> /l)	Good status ≤1.5 (mean) or ≤2.6(95%ile)	1.955mg/L (mean) 4.978mg/L (95%ile)
<b><i>Acidification Status Table 9</i></b>	<b><i>River Water Body</i></b>	<b><i>Ambient sampling results</i></b>
pH (individual values)	Soft Water 4.5<pH<9.0 Hard Water 6.0<pH<9.0	7.4-8.0
<b><i>Nutrient conditions Table 9</i></b>	<b><i>River Water body</i></b>	<b><i>Ambient sampling results</i></b>
Total Ammonia (mg N/l)	Good status ≤0.065(mean) or ≤0.140(95%ile)	0.06mg/L (mean) 0.09mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤0.035(mean) or ≤0.075(95%ile)	0.032mg/L (mean) 0.053mg/L (95%ile)
<b><i>Specific pollutants Table 10</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20.0µg/L
Copper (depending on water hardness)	5	<20.0µg/L
Cyanide	10	<5.0µg/L
Flouride	500	50.0µg/L
Zinc (depending on water hardness)	50	<20.0µg/L
<b><i>Priority Substances Table 11</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20.0µg/L
Nickel and its compounds	20	<20.0µg/L
<b><i>Priority Hazardous Substances Table 12</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Cadmium and its compounds (depending on water hardness)	≤0.09	<20µg/L
Mercury and its compounds	0.05	<0.2µg/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 River Bandon is 71.0mg CaCO<sub>3</sub>/L

**DOWNSTREAM COMPARISON TABLE  
(ANALYSIS BELOW THE LIMIT OF DETECTION)**

<i>Physico-chemical conditions</i>	<i>Ecological quality ratio/standard</i>	<i>2007-2008 Downstream ambient sampling results at aSW01dBAND</i>
	<i>Good boundary</i>	
	<i>Rivers (All Types)</i>	
<b><i>Nutrient conditions Table 9</i></b>	<b><i>River Water body</i></b>	<b><i>Ambient sampling results</i></b>
Total Ammonia (mg N/l)	Good status ≤0.065(mean) or ≤0.140(95%ile)	0.043mg/L (mean) 0.1mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status ≤0.035(mean) or ≤0.075(95%ile)	0.034mg/L (mean) 0.053mg/L (95%ile)
<b><i>Specific pollutants Table 10</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Total Chromium	8.1	1.09µg/L
Copper (depending on water hardness)	5	<1.0µg/L
Zinc (depending on water hardness)	50	0.82µg/L
<b><i>Priority Substances Table 11</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Lead and its compounds	7.2	5.45µg/L
Nickel and its compounds	20	0.7µg/L
<b><i>Priority Hazardous Substances Table 12</i></b>	<b><i>Inland surface waters AA-EQS</i></b>	<b><i>Ambient sampling results</i></b>
Cadmium and its compounds (depending on water hardness)	≤0.09	<1.0µg/L

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# 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) = 1.99m<sup>3</sup>/sec

Mean BOD in River (upstream) = 2.032mg/L

Max volume of discharge = 0.0429m<sup>3</sup>/sec

Max value for BOD in discharge = 25.0mg/L (Max from Online Tables)

$$C_{\text{final}} = \frac{(1.99 \times 2.032) + (0.0429 \times 25.0)}{(1.99 + 0.0429)}$$

$$C_{\text{final}} = 2.51\text{mg/l BOD}$$

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

However it is worth noting that the mean upstream BOD value is 2.032mg/L, which is already in breach of the EQS of 1.5mg/L and the 95%ile upstream BOD value is 4.11mg/L, which also breaches the EQS of 2.6mg/L.

### Normal Scenario:

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

Flow of River (Median) = 11.4m<sup>3</sup>/sec

Mean BOD in River (upstream) = 1.482mg/L

Normal volume of discharge = 0.027m<sup>3</sup>/sec

Mean value for BOD in discharge = 10.44mg/L (2008 Mean from Outlet Table E4)

$$C_{\text{final}} = \frac{(11.4 \times 1.482) + (0.027 \times 10.44)}{(11.4 + 0.027)}$$

$$C_{\text{final}} = 1.5\text{mg/l BOD}$$

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

Note: According to EPA guidance notes version 7,

"Assimilative capacity calculations shall use the appropriate receiving water flow values, i.e., Dry Weather Flow for dangerous or toxic substances, median flow for Ortho-phosphate and 95%ile flow for other substances"

Based on these notes the 95%ile BOD standard is met under all conditions.

## **MASS BALANCE EQUATIONS FOR AMMONIA:**

### **Worst Case Scenario:**

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

Flow of River (95%ile) = 1.99m<sup>3</sup>/sec

Mean Ammonia in River (upstream) = 0.054mg/L

Max volume of discharge = 0.0429m<sup>3</sup>/sec

Max value for Ammonia in discharge = 3.0mg/L (Max from Online Tables)

$$C_{\text{final}} = \frac{(1.99 \times 0.054) + (0.0429 \times 3.0)}{(1.99 + 0.0429)}$$

$$C_{\text{final}} = 0.116\text{mg/l Ammonia}$$

This is in breach of the 0.065mg/L Mean but within 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) = 11.4m<sup>3</sup>/sec

Mean Ammonia in River (upstream) = 0.054g/L

Normal volume of discharge = 0.027m<sup>3</sup>/sec

Mean value for Ammonia in discharge = 0.38mg/L (2008 Mean from Outlet Table E4)

$$C_{\text{final}} = \frac{(11.4 \times 0.054) + (0.027 \times 0.38)}{(11.4 + 0.027)}$$

$$C_{\text{final}} = 0.055\text{mg/l Ammonia}$$

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

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Note: According to EPA guidance notes version 7,

"Assimilative capacity calculations shall use the appropriate receiving water flow values, i.e., Dry Weather Flow for dangerous or toxic substances, median flow for Ortho-phosphate and 95%ile flow for other substances"

Based on these notes the 95%ile BOD standard is met under all conditions.

## **MASS BALANCE EQUATIONS FOR ORTHOPHOSPHATE:**

### **Worst Case Scenario:**

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

Flow of River (95%ile) = 1.99m<sup>3</sup>/sec

Mean Orthophosphate in River (upstream) = 0.025mg/L

Max volume of discharge = 0.0429m<sup>3</sup>/sec

Max value for Orthophosphate in discharge = 4.5mg/L (Max from Online Tables)

$$C_{\text{final}} = \frac{(1.99 \times 0.025) + (0.0429 \times 4.5)}{(1.99 + 0.0429)}$$

$C_{\text{final}} = 0.119\text{mg/l}$  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) = 11.4m<sup>3</sup>/sec

Mean Orthophosphate in River (upstream) = 0.025mg/L

Normal volume of discharge = 0.027m<sup>3</sup>/sec

Mean value for Orthophosphate in discharge = 2.96mg/L (2008 Mean from Outlet Table E4)

$$C_{\text{final}} = \frac{(11.4 \times 0.025) + (0.027 \times 2.96)}{(11.4 + 0.027)}$$

$C_{\text{final}} = 0.032\text{mg/l}$  Orthophosphate

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

Note: According to EPA guidance notes version 7,

"Assimilative capacity calculations shall use the appropriate receiving water flow values, i.e., Dry Weather Flow for dangerous or toxic substances, median flow for Ortho-phosphate and 95%ile flow for other substances"

Based on these notes the Orthophosphate EQS mean and 95%ile standard is met when assessed using median flow conditions.

D0136-01 Attachment E4 Bandon Inlet- Revised									0136-01 Attachment E4 Bandon Storm Overflow- Revise				
Sample Date	09/08/2007	07/02/2008	06/03/2008	03/04/2008	04/06/2008	17/07/2008	21/08/2008	Average	Sample Date	19/06/2008			
Sample	influent	Influent	Influent	Influent	influent	Influent	Influent		Sample	storm Overflow			
Flow M <sup>3</sup> /Day	*	*	*	*	1574	*	*	1574	Flow M <sup>3</sup> /Day	*			
pH	*	*	*	*	*	7.6	*	7.6	pH	*			
Temperature °C	*	*	*	*	*	*	*		Temperature °C	*			
Cond 20°C	*	*	*	633	493	723	*	616.3333	Cond 20°C	533			
SS mg/L	*		88	*	*	276	*	182	SS mg/L	103			
NH <sub>3</sub> mg/L	*	18.3	*	*	20.5	46.8	*	28.53333	NH <sub>3</sub> mg/L	24.8			
BOD mg/L	*	*	*	*	*	261	*	261	BOD mg/L	147			
COD mg/L	428	294	363	510	472	233	358	379.7143	COD mg/L	339			
TN mg/L	*	33	*	*	*	64	*	48.5	TN mg/L	55			
Nitrite mg/L	*	*	*	*	*	<0.004	*	<0.004	Nitrite mg/L	*			
Nitrate mg/L	*	*	*	*	*	<0.405	*	<0.405	Nitrate mg/L	*			
TP mg/L	*	4.7	2.98	6.43	5.15	8.75	*	5.602	TP mg/L	2.2			
O-PO4-P mg/L	4.32	2.85	3.82	3.34	2.87	5.78	*	3.83	O-PO4-P mg/L	*			
SO4 mg/L	*	51.4	*	*	*	48.4	*	49.9	SO4 mg/L	*			
Phenols µg/L	*	*	*	*	*	<0.1	*	<0.1	Phenols µg/L	*			
Atrazine µg/L	*	*	*	*	*	<0.01	*	<0.01	Atrazine µg/L	*			
Dichloromethane µg/L	*	*	*	*	*	<1.0	*	<1.0	Dichloromethane	*			
Simazine µg/L	*	*	*	*	*	<0.01	*	<0.01	Simazine µg/L	*			
Toluene µg/L	*	*	*	*	*	<1.0	*	<1.0	Toluene µg/L	*			
Tributyltin µg/L	*	*	*	*	*	not required	*	*	Tributyltin µg/L	*			
Xylenes µg/L	*	*	*	*	*	<1.0	*	<1.0	Xylenes µg/L	*			
Arsenic µg/L	*	*	*	*	*	<0.96	*	<0.96	Arsenic µg/L	*			
Chromium ug/L	<20	*	*	*	<20	<20	*	<20	Chromium mg/L	*			
Copper ug/L	45	*	*	*	21	50	*	38.66667	Copper mg/L	*			
Cyanide µg/L	*	*	*	*	*	<5	*	<5	Cyanide µg/L	*			
Fluoride ug/l	*	*	*	*	*	430	*	430	Fluoride	*			
Lead ug/L	10	*	*	*	10	21	*	13.66667	Lead mg/L	*			
Nickel ug/L	<20	*	*	*	<20	<20	*	<20	Nickel mg/L	*			
Zinc ug/L	107	*	*	*	139	86	*	110.6667	Zinc mg/L	*			
Boron ug/L	*	*	*	*	175	10	*	92.5	Boron mg/L	*			
Cadmium ug/L	<20	*	*	*	<20	<20	*	<20	Cadmium mg/L	*			
Mercury µg/L	*	*	*	*	*	0.4	*	0.4	Mercury µg/L	*			
Selenium µg/L	*	*	*	*	*	1	*	1	Selenium µg/L	*			
Barium ug/L	10	*	*	*	35	10	*	18.33333	Barium mg/L	*			

### D0136-01 Attachment E4 Bandon outlet - Revised Bandon Table E

Sample Date	07/02/2008	06/03/2008	03/04/2008	22/05/2008	04/06/2008	17/07/2008	21/08/2008	2008			17/01/2007	07/02/2007	12/04/2007	03/05/2007	13/06/2007
Sample	Effluent	Effluent	Effluent	effluent	effluent	Effluent	Effluent	Average	Kg/Day	Kg/Year	effluent	effluent	effluent	effluent	effluent
Flow M <sup>3</sup> /Day	*	*	1587	963	1535	1253	3710	1809.6	*	*	*	*	*	*	*
pH	7.4	7.6	*	7.0	7.3	7.0	7.4	7.283333	*	*	7.2	7.2	7.4	7	7.2
Temperature °C	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cond 20°C	*	714	475	432	537	549	*	541.4	*	*	*	*	*	*	*
SS mg/L	5	9	13	129	8	9	8	25.85714	46.79108571	17078.74629	8	13	10	8	14
NH <sub>3</sub> mg/L	0.5	0.5	*	0.2	0.2	0.5	*	0.38	0.687648	250.99152	*	*	*	*	*
BOD mg/L	5.7	7.2	12.1	24.1	7.81	7.7	8.5	10.44429	18.89997943	6898.492491	2.3	16	7.4	6.6	7.4
COD mg/L	10.5	45	57	134	37	41	44	52.64286	95.26251429	34770.81771	23	40	37	43	<21
TN mg/L	16.3	40.6	24.3	95	*	27.5	*	40.74	73.723104	26908.93296	6.8	24.1	18	31.6	19
Nitrite mg/L	*	*	*	*	*	0.32	*	0.32	0.579072	211.36128	*	*	*	*	*
Nitrate mg/L	*	*	*	*	*	28.5	*	28.5	51.5736	18824.364	*	*	*	*	*
TP mg/L	1.37	3.13	1.85	4.3	*	4.23	1.92	2.8	5.06688	1849.4112	0.94	3.58	2.38	2.45	4.5
O-PO4-P mg/L	1.13	2.54	4.04	3.03	3.64	3.4	*	2.963333	5.362448	1957.29352	*	*	*	*	*
SO4 mg/L	15	*	*	*	*	56.4	*	35.7	64.60272	23579.9928	*	*	*	*	*
Phenols µg/L	*	*	*	*	*	<0.1	*	<0.1	<0.00013345	<0.04870925	*	*	*	*	*
Atrazine µg/L	*	*	*	*	*	<0.01	*	<0.01	<0.000013345	<0.004870925	*	*	*	*	*
Dichloromethane	*	*	*	*	*	<1.0	*	<1.0	<0.0013345	<0.4870925	*	*	*	*	*
Simazine µg/L	*	*	*	*	*	<0.01	*	<0.01	<0.000013345	<0.004870925	*	*	*	*	*
Toluene µg/L	*	*	*	*	*	<1.0	*	<1.0	<0.0013345	<0.4870925	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	*	not required	*	*	*	*	*	*	*	*	*
Xylenes µg/L	*	*	*	*	*	<1.0	*	<1.0	<0.0013345	<0.4870925	*	*	*	*	*
Arsenic µg/L	*	*	*	*	*	2	*	2	0.003619200	1.321008	*	*	*	*	*
Chromium ug/L	<20	*	*	<20	<20	<20	<20	<20	0.036180	13.2057	*	*	*	*	*
Copper ug/L	<20	*	*	<20	<20	<20	<20	<20	0.036180	13.2057	*	*	*	*	*
Cyanide µg/L	*	*	*	*	*	<5.0	*	<5.0	<0.0066725	<2.4354625	*	*	*	*	*
Fluoride ug/l	*	*	*	*	*	260	*	260	0.4704960	171.73104	*	*	*	*	*
Lead ug/L	10	*	*	10	23	23	*	16.5	0.029850	10.8947	*	*	*	*	*
Nickel ug/L	<20	<20	<20	<20	<20	<20	<20	<20	0.036180	13.2057	*	*	*	*	*
Zinc ug/L	23	*	*	386	73	34	10	105.2	0.19031000	69.462	*	*	*	*	*
Boron ug/L	10	*	*	10	38	84	71	42.6	0.077060	28.128	*	*	*	*	*
Cadmium ug/L	<20	*	*	<20	<20	<20	*	<20	0.036180	13.2057	*	*	*	*	*
Mercury µg/L	*	*	*	*	*	0.3	*	0.3	0.000542880	0.1981512	*	*	*	*	*
Selenium µg/L	*	*	*	*	*	2	*	2	0.003619200	1.321008	*	*	*	*	*
Barium ug/L	10	*	*	101	26	10	10	31.4	0.05680000	20.7329	*	*	*	*	*

04/07/2007	09/08/2007	06/09/2007	14/11/2007	Average
effluent	effluent	effluent	effluent	2007
*	2475	*	*	
7.1	6.9	6.8	7.1	7.1
*	*	*	*	
*	*	*	*	
5	16	11	17	11.333
0.5	1	1	1.7	1.05
7.45	10	13	11.94	9.1211111
34	46	35	58	39.5
*	36	*	56	27.3571
*	*	*	*	
*	*	*	*	
2.88	4.33	2.44	4.38	3.0978
*	3.63	*	4.03	3.83
*	44.3	*	57.5	50.9
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	<20	<20	<20
*	*	<20	<20	<20
*	*	*	*	*
*	*	*	*	*
*	*	10	81	45.5
*	*	<20	<20	<20
*	*	47	61	54
*	*	10	60	35
*	*	<20	<20	<20
*	*	*	*	*
*	*	*	*	*
*	*	<20	<20	<20

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# D0136-01 Attachment E4 Bandon Upstream- Revised Bandon Table E

Sample Date	07/02/2008	06/03/2008	03/04/2008	22/05/2008	17/07/2008	21/08/2008	Average	95%ile	Range	17/01/2007	07/02/2007	12/04/2007	03/05/2007	13/06/2007
Sample	River	River	River	River	River	River	2008	2008	2008	river	river	river	river	river
Flow M <sup>3</sup> /Day			*	*	*		*			*	*	*	*	*
pH	7.5	8.1	*	7.5	7.9	7.7	7.74		7.5-8.1	7.6	7.6	*	*	8
Temperature °C			*	*	*	*				*	*	*	*	*
Cond 20°C		211	210	163.5	239	*	205.875			*	*	*	*	*
SS mg/L	5	1.25	5	23	1.25	1.25	6.125			6	7	13	74	6
NH <sub>3</sub> mg/L	0.05	0.05	0.05	0.1	0.05	*	0.06	0.09		0.05	0.3	0.05	0.05	0.05
BOD mg/L	2.03	1.36	1.42	4.78	2.1	0.5	2.031666667	4.11		0.5	0.5	1.2	6	2
COD mg/L	<21	*	*	*	<21	*				*	*	*	*	<21
TN mg/L	3.1	3.58	*	*	*	*	3.34			4.1	13.5	5.4	5.2	*
Nitrite mg/L	*	*	*	*	0.0047	*	0.0047			*	*	*	*	*
Nitrate mg/L	*	*	*	*	2.86	*	2.86			*	*	*	*	*
TP mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			0.1	0.1	0.1	0.28	0.1
O-PO4-P mg/L	0.025	0.025	0.025	0.05	0.025	*	0.03	0.045		*	*	*	*	*
SO4 mg/L	<30	*	*	*	<30	*	<30			*	*	*	*	*
Phenols µg/L	*	*	*	*	<0.1	*	<0.1			*	*	*	*	*
Atrazine µg/L	*	*	*	*	<0.01	*	<0.01			*	*	*	*	*
Dichloromethane	*	*	*	*	<1.0	*	<1.0			*	*	*	*	*
Simazine µg/L	*	*	*	*	<0.01	*	<0.01			*	*	*	*	*
Toluene µg/L	*	*	*	*	<1.0	*	<1.0			*	*	*	*	*
Tributyltin µg/L	*	*	*	*	not required	*	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			*	*	*	*	*
Copper ug/L	<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			*	*	*	*	*
Nickel ug/L	<20	<20	<20	*	<20	<20	<20			*	*	*	*	*
Zinc ug/L	<20	<20	<20	*	<20	<20	<20			*	*	*	*	*
Boron ug/L	<20	<20	<20	*	<20	<20	<20			*	*	*	*	*
Cadmium ug/L	<20	<20	<20	*	<20	<20	<20			*	*	*	*	*
Mercury µg/L	*	*	*	*	<0.2	*	<0.2			*	*	*	*	*
Selenium µg/L	*	*	*	*	1	*	1			*	*	*	*	*
Barium ug/L	10	10	10	*	22	27	15.8			*	*	*	*	*

river in flood

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04/07/2007	09/08/2007	06/09/2007	31/10/2007	14/11/2007	Average
river	river	river	river	river	2007
*	*			*	
*	7.7	8.2	7.6	7.8	7.785714
*	*	*		*	
*	*	*		*	176
5	1.25	1.25	1.25	1.25	11.6
0.05	0.05	0.05	0.05	0.05	0.075
1.8	1.8	1.5	0.5	2.06	1.786
*	*	*	<21	<21	<21
0.5	5.3	3.5	1.6	2.8	4.655556
*	*	*		*	*
*	*	*		*	*
0.1	0.1	0.1	0.1	0.1	0.118
<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
<30	<30	<30	<30	<30	<30
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	<20	<20	<20	<20
*	*	<20	<20	<20	<20
*	*	*	*	*	*
*	*	*	*	*	*
*	*	<20	<20	<20	<20
*	*	<20	<20	<20	<20
*	*	<20	<20	<20	<20
*	*	<20	<20	<20	<20
*	*	*	*	*	*
*	*	*	*	*	*
*	*	<20	<20	<20	<20

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D0136-01 Attachment E4 tabulation of monitoring results for compliance purposes ag

Sample Date	17/01/2007	07/02/2007	12/04/2007
Sample	Upstream River	Upstream River	Upstream River
Sample Code	GR016	GR115	GR291
NH <sub>3</sub> mg/L	0.048	0.3	0.036
O-PO4-P mg/L	*	*	*
Chromium ug/L	*	*	*
Copper ug/L	*	*	*
Lead ug/L	*	*	*
Nickel ug/L	*	*	*
Zinc ug/L	*	*	*
Boron ug/L	*	*	*
Cadmium ug/L	*	*	*
Barium ug/L	*	*	*

Sample Date	17/01/2007	07/02/2007	12/04/2007
Sample	Downstream River	Downstream River	Downstream River
Sample Code	GR015	GR117	GR290
NH <sub>3</sub> mg/L	0.055	0.031	0.1
O-PO4-P mg/L	*	*	*
Chromium ug/L	*	*	*
Copper ug/L	*	*	*
Lead ug/L	*	*	*
Nickel ug/L	*	*	*
Zinc ug/L	*	*	*
Boron ug/L	*	*	*
Cadmium ug/L	*	*	*
Barium ug/L	*	*	*

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

against SI 272 of 2009 for comparison purposes where results are below LOD for analytical method

03/05/2007	13/06/2007	04/07/2007	09/08/2007	06/09/2007
Upstream River	Upstream River	Upstream River	Upstream River	Upstream River
GR342	GR497	GR574	GR706	GR827
0.078	0.003	0.02	0.018	0.022
*	*	0.027	0.022	0.005
*	*	1.5	<1	<1
*	*	<1	<1	<1
*	*	<1	<1	<1
*	*	1.7	2.0	<1
*	*	3.7	<1	<1
*	*	<1	<1	<1
*	*	<1	<1	<1
*	*	6.0	4.0	3.0

03/05/2007	13/06/2007	04/07/2007	09/08/2007	06/09/2007
Downstream River	Downstream River	Downstream River	Downstream River	Downstream River
GR344	GR499	GR577	GR702	GR829
0.065	0.034	0.018	0.026	0.027
*	*	0.032	0.034	0.036
*	*	1.5	1.0	<1
*	*	<1	<1	<1
*	*	<1	<1	<1
*	*	1.0	2.7	<1
*	*	9.0	<1	<1
*	*	<1	<1	<1
*	*	<1	<1	<1
*	*	4.0	4.0	4.0

thod

31/10/2007	14/11/2007	07/02/2008	06/03/2008	03/04/2008
Upstream River	Upstream River	Upstream River	Upstream River	Upstream River
GR1067	GR1104	GS044	GS169	GS231
0.016	0.027	0.081	0.022	0.019
0.0245	0.023	0.041	0.009	0.007
<1	<1	1.5	<1	3
<1	<1	<1	<1	<1
3.0	7	11.5	9.0	7.5
<1	<1	1.3	<1	<1
<1	<1	<1	<1	<1
<1	<1	<1	<1	<1
<1	<1	<1	<1	<1
2.0	3.5	5.5	5.0	3.5

31/10/2007	14/11/2007	07/02/2008	06/03/2008	03/04/2008
Downstream River	Downstream River	Downstream River	Downstream River	Downstream River
GR1070	GR1105	GS047	GS166	GS232
0.016	0.031	0.05	0.029	0.046
0.035	0.045	0.033	0.027	0.01
<1	1.5	1.5	<1	1.5
<1	<1	<1	<1	<1
4.0	6.5	9.0	8.0	10.5
<1	<1	<1	1.0	<1
<1	<1	<1	<1	<1
<1	<1	13	<1	4.7
<1	<1	<1	<1	<1
3.0	3.5	5.0	5.0	5.5

\* for statistical purposes values of <1 are regarded as zero when calcula

22/05/2008	17/07/2008	21/08/2008	Average	95% percentile
Upstream River	Upstream River	Upstream River		
GS449	GS656	GS785		
0.1	0.015	*	<b>0.054</b>	<b>0.16</b>
0.05	0.02	*	<b>0.023</b>	<b>0.04595</b>
*	1.5	1.0	<b>0.85*</b>	n/a
*	<1	<1	<b>&lt;1.0</b>	n/a
*	4.5	12.5	<b>5.50*</b>	n/a
*	1	2.3	<b>0.83*</b>	n/a
*	<1	<1	<b>0.37*</b>	n/a
*	5.3	6	<b>1.13*</b>	n/a
*	<1	<1	<b>&lt;1.0</b>	n/a
*	22	27	<b>8.150</b>	n/a

22/05/2008	17/07/2008	21/08/2008	Average	95% percentile
Downstream River	Downstream River	Downstream River		
GS447	GS653	GS788		
0.1	0.013	*	<b>0.043</b>	<b>0.1</b>
0.06	0.028	*	<b>0.034</b>	<b>0.05325</b>
3.5	<1	1.5	<b>1.091*</b>	n/a
<1	<1	<1	<b>&lt;1</b>	n/a
13	3.5	5.5	<b>5.45*</b>	n/a
3.0	<1	<1	<b>0.70*</b>	n/a
<1	<1	<1	<b>0.82*</b>	n/a
<1	4.7	3	<b>2.31*</b>	n/a
<1	<1	<1	<b>&lt;1</b>	n/a
60	25.5	32	<b>13.773</b>	n/a

ting mean values

**D0136-01 Attachment E4 Bandon Downstream- Revised Bandon Table E**

Sample Date	07/02/2008	06/03/2008	03/04/2008	22/05/2008	17/07/2008	21/08/2008	Average	95%ile	Range	17/01/2007	07/02/2007	12/04/2007	03/05/2007	13/06/2007	04/07/2007	09/08/2007
Sample	River	River	River	River	River	River	2008	2008	2008	river	river	river	river	river	river	river
Flow M <sup>3</sup> /Day			*	*	*		*			*	*	*	*	*	*	*
pH	7.4	8.0	*	7.4	7.9	76	21.34		7.4-8.0	7.4	7.5	*	*	8.2	*	7.7
Temperature °C			*	*	*		*			*	*	*	*	*	*	*
Cond 20°C		212	209	147.8	237		201.45			*	*	*	*	*	*	*
SS mg/L	3	1.25	5	42	1.25	1.25	8.958333			*	*	*	*	*	*	*
NH <sub>3</sub> mg/L	0.05	0.05	0.05	0.1	0.05		0.06	0.09		0.05	0.05	0.1	0.05	0.05	0.05	0.05
BOD mg/L	1.19	1.35	2.33	5.86	0.5	0.5	1.955	4.9775		0.5	0.5	1.2	2	2	2.7	0.5
COD mg/L	<21		*	*	<21	*				*	*	*	*	*	*	*
TN mg/L	2.1	4.13	*	15	6.4	*	6.9075			4.6	10.6	5.2	4.5	*	*	9.8
Nitrite mg/L	*	*	*	*	0.0135	*	0.0135			*	*	*	*	*	*	*
Nitrate mg/L	*	*	*	*	3.22	*	3.22			*	*	*	*	*	*	*
TP mg/L	0.1	*	0.2	0.1	0.1	0.1	0.12			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
O-PO <sub>4</sub> -P mg/L	0.025	0.025	0.025	0.06	0.025		0.032	0.053		*	*	*	*	*	<0.05	<0.05
SO <sub>4</sub> mg/L	<30		*	*	<30	*	<30			*	*	*	*	*	<30	<30
Phenols µg/L	*	*	*	*	<0.1	*	<0.1			*	*	*	*	*	*	*
Atrazine µg/L	*	*	*	*	<0.01	*	<0.01			*	*	*	*	*	*	*
Dichloromethane	*	*	*	*	<1.0	*	<1.0			*	*	*	*	*	*	*
Simazine µg/L	*	*	*	*	<0.01	*	<0.01			*	*	*	*	*	*	*
Toluene µg/L	*	*	*	*	<1.0	*	<1.0			*	*	*	*	*	*	*
Tributyltin µg/L	*	*	*	*	not required	*	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			*	*	*	*	*	*	*
Copper ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Cyanide µg/L	*	*	*	*	<5	*	<5			*	*	*	*	*	*	*
Fluoride ug/l	*	*	*	*	50	*	50			*	*	*	*	*	*	*
Lead ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Nickel ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Zinc ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Boron ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Cadmium ug/L	<20	<20	<20	<20	<20	<20	<20			*	*	*	*	*	*	*
Mercury µg/L	*	*	*	*	<0.2	*	<0.2			*	*	*	*	*	*	*
Selenium µg/L	*	*	*	*	1	*	1			*	*	*	*	*	*	*
Barium ug/L	10	10	10	10	10	32	13.66667			*	*	*	*	*	*	*

river in flood

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06/09/2007	31/10/2007	14/11/2007	Average
river	river	river	2009
*		*	*
8.6	7.7	7.8	7.8429
*		*	*
*	184	*	198.54167
*	3	1.25	7.4398148
0.05	0.05	0.05	0.0550
1.1	1.09	1.74	1.333
*	<21	<21	<21
5.1	3.9	4.1	5.9750
*	*	*	*
*	*	*	*
<0.2	<0.2	<0.2	<0.2
<0.05	<0.05	<0.05	<0.05
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