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Mr. Stuart Huskisson,
Inspector,
Environmental Protection Agency,
Office of Climate, Licensing & Resource Use,
Regional Inspectorate,
Inniscarra,
County Cork.

26/07/2010 **D0445-01**

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

Dear Mr. Huskisson,

Your notices dated 31st. May and 1st. June last and previous correspondence regarding the following Waste Water Discharge Licence applications refer.

Reg No.	Agglomeration Name	Date of Application
D0437-01	Boherbue	22/06/2009
D0438-01	Bweeng	22/06/2009
D0439-01	Conna	22/06/2009
D0445-01	Glanworth	22/06/2009
D0450-01	Clondulane	22/06/2009

Attached find an assessment of the impact of the discharge in relation to the requirements of the Environmental Quality Objectives regulations (S.I. No. 272 of 2009 for Glanworth WWTP. CD – ROM also attached.

Yours truly,
Paddy O' Friel
Substitute Senior Engineer
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022- 30441.
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Glanworth Waste Water Treatment Plant

Review of the Impact of the Discharge in relation to the requirements of the Environmental Quality Objectives.

Provide a comparison of the predicted receiving water concentrations (based on the waste water treatment plant discharging at maximum average discharge concentration) with the values included in the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 SI No 272/2009

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

The upstream and downstream sampling results for 2009 at aSW01 GLAN d 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. These “actual results for metals” are laid out on a separate “metal analysis” sheet in the Revised Table E.

UPSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard***	***2009 upstream ambient sampling results at aSW01 GLAN u***
	Good boundary	
	Rivers (All Types)	
Oxygenation conditions Table 9	***River water body***	***Ambient sampling results***
Biochemical Oxygen Demand (BOD) (mgO_2/l)	Good status≤1.5 (mean) or ≤2.6(95%ile)	0.9 (mean) 1mg/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	7.8-8.1
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	0.136mg/L (mean) 0.28mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.056mg/L (mean) 0.093mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20µg/L
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	<20µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	<0.20µg/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.

UPSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009 upstream ambient sampling results at aSW01GLAN u***
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	1.5µg/L
Copper (depending on water hardness)	30	<1µg/L
Zinc (depending on water hardness)	100	7.3µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	*13.75µg/L on excel as 3 results of <1 recorded and excel excludes values- if results were divided by recording 0ug/l for 3 then value is **5.5 ug/l**
Nickel and its compounds	20	2.15µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<1µg/L however results were 0ug/l-no breach of limit

DOWNSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009 Downstream ambient sampling results at aSW01GLANd***
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)	0.9mg/L (mean) <1.0mg/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	7.8-8.2 (range)
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	0.09mg/L (mean) 0.179mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.056mg/L (mean) 0.093mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.1µg/L
Toulene	10	<1.0µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.96µg/L
Total Chromium	8.1	<20µg/L Chromium
Copper (depending on water hardness)	30	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	<100µg/L
Zinc (depending on water hardness)	100	14.0µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.01µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.01µg/L
Lead and its compounds	7.2	<20µg/L
Nickel and its compounds	20	<20µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<20µg/L
Mercury and its compounds	0.05	<0.20µg/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.

DOWNSTREAM COMPARISON TABLE
(ACTUAL METAL RESULTS)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009 Downstream ambient sampling results at aSW01GLANd***
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	2.54µg/L
Copper (depending on water hardness)	30	*43.1µg/L on excel as 5 results of <1 recorded and excel excludes values- if results were divided by recording 0ug/l for 5 then value is **7.18 ug/l**
Zinc (depending on water hardness)	100	11.2µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	*15.361µg/L on excel as 4 results of <1 recorded and excel excludes values- if results were divided by recording 0ug/l for 4 then value is **5.12 ug/**l
Nickel and its compounds	20	3.14µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<1µg/L however results were 0ug/l- no breach of limit

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) =2m3/sec
Mean BOD in River (upstream) = 2mg/L
Max volume of discharge = 0.0075m3/sec
Max value for BOD in discharge = 76mg/L

$$C_{final} = \frac{(2 \times 2) + (0.0075 \times 76)}{(2 + 0.0075)}$$

C_{final} = 2.28mg/l BOD

This is under 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) = 6.35m3/sec
Mean BOD in River (upstream) = 2mg/L
Normal volume of discharge = 0.0016m3/sec
Mean value for BOD in discharge = 47mg/L

$$C_{final} = \frac{(6.35 \times 2) + (0.0016 \times 47)}{(6.35 + 0.0016)}$$

C_{final} = 2.0mg/l BOD

This is 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) = 2m3/sec
Mean Ammonia in River (upstream) = 0.14mg/L
Max volume of discharge = 0.0075m3/sec
Max value for Ammonia in discharge = 24mg/L

$$C_{final} = \frac{(2 \times 0.14) + (0.0075 \times 24)}{(2 + 0.0075)}$$

C_{final} = 0.37mg/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) = 6.35m3/sec
Mean Ammonia in River (upstream) = 0.14mg/L
Normal volume of discharge = 0.0016m3/sec
Mean value for Ammonia in discharge = 19.5mg/L

$$C_{final} = \frac{(6.35 \times 0.14) + (0.0016 \times 19.5)}{(6.35 + 0.0016)}$$

C_{final} = 0.14mg/l Ammonia

This is 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) = 2m3/sec
Mean Orthophosphate in River (upstream) = 0.056mg/L
Max volume of discharge = 0.0075m3/sec
Max value for Orthophosphate in discharge = 2.71mg/L

$$C_{final} = \frac{(2 \times 0.056) + (0.0075 \times 2.71)}{(2 + 0.0075)}$$

C_{final} = 0.067mg/l Orthophosphate

This is under 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) = 6.35m3/sec
Mean Orthophosphate in River (upstream) = 0.056mg/L
Normal volume of discharge = 0.0016m3/sec
Mean value for Orthophosphate in discharge = 2.68mg/L

$$C_{final} = \frac{(6.35 \times 0.056) + (0.0016 \times 2.68)}{(6.35+ 0.0016)}$$

C_{final} = 0.057mg/l Orthophosphate

This is in breach of the 0.035mg/L mean EQS for Orthophosphate

Attachment E4 Glanworth Inlet Table E4

Sample Date	28/01/2009	17/02/2009	19/02/2009	19/03/2009	21/04/2009	19/05/2009	
Sample	Influent	Influent	Influent	Influent	Influent	Influent	Average
Sample Code	GT158	*	GT223	*	GT719	GT801	
Flow M^3/Day	*	8.5	*	8.3	8.2	8.6	
pH	8	*	*	*	*	*	8
Temperature ℃	*	762	*	725	986	733	
Cond 20℃	679	232	*	87	930	199	425.4
SS mg/L	132	22.8	*	85.2	56	17.5	62.7
NH_3 mg/L	38.2	257	*	387	1190	355	445.44
BOD mg/L	201	716	*	616	3020	755	1061.6
COD mg/L	599	62	*	88	79		207
TN mg/L	47.2	*	*	*	*	71.7	59.45
Nitrite mg/L	0.523	*	*	*	*	*	0.523
Nitrate mg/L	3.79	7.1	*	9.5	27.6	5.8	10.758
TP mg/L	8.3	4.4	*	7.3	10.6	3.7	6.86
O-PO4-P mg/L	3.07	*	*	*	*	*	3.07
SO4 mg/L	38	*	*	*	*	*	38
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	not required	*	*	*	*	*	*
Xylenes µg/L	<1	*	*	*	*	*	<1
Arsenic µg/L	<0.96	*	*	*	*	*	<0.96
Chromium ug/L	20	*	10	*	10	10	12.5
Copper ug/L	109	*	23	*	298.7	10	110.175
Cyanide µg/L	<5	*	*	*	*	*	<5
Fluoride µg/L	730	*	*	*	*	*	730
Lead ug/L	<20	*	<20	*	<20	<20	<20
Nickel ug/L	<20	*	<20	*	<20	<20	<20
Zinc ug/L	52	*	129	*	397.7	10	<20
Boron ug/L	<20	*	<20	*	<20	<20	<20
Cadmium ug/L	<20	*	<20	*	<20	<20	<20
Mercury µg/L	<0.2	*	*	*	*	*	<0.2
Selenium µg/L	1	*	*	*	*	*	1
Barium ug/L	49		29.5		107.1	10	48.9

HALF LOD FOR STATISTICAL PURPOSES

Attachment E4 Glanworth Discharge Outlet Table E4

Sample Date	18/09/2008	23/10/2008	28/01/2009	17/02/2009	19/02/2009	05/03/2009	19/03/2009	21/04/2009	19/05/2009	
Sample	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Effluent	Average
Sample Code	GS928	GS1139	GT157	GT285	GT223	GT324	GT409	GT720	GT802	
Flow M^3/Day	*	*	*	*	*	*	*	*	*	
pH	*	7.4	7.6	7.8	7.5	7.6	7.8	7.4	7.6	7.5875
Temperature ℃	*	*	*	*	*	*		*	*	
Cond 20℃	*	*	562	643	*	596	617	659	597	612.3333333
SS mg/L	48	120	16	10	13	60	17	29	217	58.88888889
NH_3 mg/L	*	*	17.7	15.6	*	*	23.4	24	17	19.54
BOD mg/L	56.9	117	19	11	22	36	49	76	36	46.98888889
COD mg/L	153	270	123	89	75	76	136	236	103	140.1111111
TN mg/L	*	*	21.1	23	*	*	23	26	29.9	24.6
Nitrite mg/L	*	*	0.351	*	*	*	*	*	*	0.351
Nitrate mg/L	*	*	2.72	*	*	*	*	*	*	2.72
TP mg/L	*	*	6.1	7.1	*	*	3.9	5.2	3.4	5.14
O-PO4-P mg/L	*	*	2.71	2.6	*	*	2.4	3.4	2.3	2.682
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	*	*	not required	*	*	*	*	*	*	*
Xylenes µg/L	*	*	<1	*	*	*	*	*	*	<1
Arsenic µg/L	*	*	<0.96	*	*	*	*	*	*	<0.96
Chromium ug/L	*	*	<20	<20	*	*	<20	<20	<20	<20
Copper ug/L	*	*	10	24	*	*	10	59.1	<20	25.775
Cyanide µg/L	*	*	<5	*	*	*	*	*	*	<5
Fluoride µg/L	*	*	544	*	*	*	*	*	*	544
Lead ug/L	*	*	<20	<20	*	*	<20	<20	<20	<20
Nickel ug/L	*	*	<20	<20	*	*	<20	<20	<20	<20
Zinc ug/L	*	*	10	22	*	*	10	77.5	<20	29.875
Boron ug/L	*	*	<20	30	*	*	<20	<20	<20	30
Cadmium ug/L	*	*	<20	<20	*	*	<20	<20	<20	<20
Mercury µg/L	*	*	<0.2	*	*	*	*	*	*	<0.2
Selenium µg/L	*	*	1.1	*	*	*	*	*	*	1.1
Barium ug/L	*	*	23	20	*	*	20.8	26.5	<20	22.575

HALF LOD FOR STATISTICAL PURPOSES

Attachment E4 Glanworth Upstream Table E4

Sample Date	23/10/2008	28/01/2009	17/02/2009	19/02/2009	05/03/2009	19/03/2009	21/04/2009	19/05/2009	
Sample	River	River	River	River	River	River	River	River	Average
Sample Code	GS1140	GT159	GT286	GT224	GT325		GT721	GT803	
Flow M^3/Day	*	*	*	*	*	*	*	*	
pH	*	7.8	7.9	*	*	8	8.1	7.9	7.95
Temperature ℃	*	*	8.5	*	*		*	*	
Cond 20℃	*	304	451	*	*	483	505	387	435.75
SS mg/L	*	6	3	*	*	1	3	6	3.25
NH_3 mg/L	*	0.2	0.3	*	*	0.06	0.05	0.07	0.1525
BOD mg/L	*	0.5	1	*	*	1	1	1	0.9
COD mg/L	*	10.5	2.5	*	*	2.5	2.5	31	9.8
TN mg/L	*	4.8	4.7	*	*	4.4	4	4.23	4.426
Nitrite mg/L	*	0.0237	*	*	*	*	*	*	0.0237
Nitrate mg/L	*	4.6	*	*	*	*	*	*	4.6
TP mg/L	*	0.1	0.025	*	*	0.16	0.08	0.1	0.093
O-PO4-P mg/L	0.05	0.025	<0.05	0.025	0.10	0.05	0.08	0.07	0.055
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	*	not required	*	*	*	*	*	*	*
Xylenes µg/L	*	<1	*	*	*	*	*	*	<1
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 µg/L	*	69	*	*	*	*	*	*	69
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	*	0.8	*	*	*	*	*	*	0.8
Barium ug/L	*	43	20	23	*	*	10	<20	24

HALF LOD FOR STATISTICAL PURPOSES

Attachment E4 Glanworth Downstream Table E4

Sample Date	23/10/2008	28/01/2009	17/02/2009	19/02/2009	05/03/2009	19/03/2009	21/04/2009	19/05/2009	
Sample	River	River	River	River	River	River	River	River	Average
Sample Code	GS1138	GT160	GT287	GT222	GT326	GT411	GT722	GT804	
Flow M^3/Day	*	*	*	*	*	*	1	*	
pH	*	7.8	8.5	*	*	8.1	8.2	7.9	8.1
Temperature ℃	*	*	8.5	*	*		*	*	
Cond 20℃	*	309	474	*	*	512	498	387	436
SS mg/L	*	9	7	*	*	<2	3	3	5.5
NH_3 mg/L	*	0.2	0.09	*	*	0.06	<0.05	0.06	0.1025
BOD mg/L	*	0.5	1	*	*	1	1	1	0.9
COD mg/L	*	10.5	2.5	*	*	2.5	8	23	9.3
TN mg/L	*	4.8	4.9	*	*	4.6	4	4.32	4.524
Nitrite mg/L	*	0.0235	*	*	*	*	*	*	0.0235
Nitrate mg/L	*	4.47	*	*	*	*	*	*	4.47
TP mg/L	*	0.1	0.025	*	*	0.18	0.09	0.08	0.095
O-PO4-P mg/L	0.025	0.025	<0.05	0.025	0.10	0.05	0.07	0.08	0.058333333
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	*	not required	*	*	*	*	*	*	not required
Xylenes µg/L	*	<1	*	*	*	*	*	*	<1
Arsenic µg/L	*	<0.96	*	*	*	*	*	*	<0.96
Chromium ug/L	*	<20	<20	<20	*	<20	<20	<20	<20
Copper ug/L	*	10	10	10	*	43.1	10	<20	16.62
Cyanide µg/L	*	<5	*	*	*	*	*	*	<5
Fluoride µg/L	*	57	*	*	*	*	*	*	57
Lead ug/L	*	<20	<20	<20	*	<20	<20	<20	<20
Nickel ug/L	*	<20	<20	<20	*	<20	<20	<20	<20
Zinc ug/L	*	10	10	10	*	29.9	10	<20	13.98
Boron ug/L	*	10	10	10	*	43.9	10	<20	16.78
Cadmium ug/L	*	<20	<20	<20	*	<20	<20	<20	<20
Mercury µg/L	*	<0.2	*	*	*	*	*	*	<0.2
Selenium µg/L	*	0.9	*	*	*	*	*	*	0.9
Barium ug/L	*	51	10	25	*	28.2	10	<20	24.84

HALF LOD FOR STATISTICAL PURPOSES

D0450-01 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	23/10/2008	28/01/2009	17/02/2009	19/02/2009	05/03/2009	19/03/2009	21/04/2009	19/05/2009	Average	95% percentile
Sample	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River	Upstream River		
Sample Code	GS1140	GT159	GT286	GT224	GT325		GT721	GT803		
NH_3 mg/L	*	0.2	0.3	*	*	0.06	0.05	0.07	**0.136**	**0.28**
O-PO4-P mg/L	0.0445	0.039	0.04	0.023	0.10	0.05	0.08	0.07	**0.0558125**	**0.093**
Chromium ug/L	*	<1	1	2	*	*	<1	<1	**1.5**	**n/a**
Copper ug/L	*	<1	<1	<1	*	*	<1	<1	**<1**	**n/a**
Lead ug/L	*	<1	10.5	17	*	*	<1	<1	**13.75**	**n/a**
Nickel ug/L	*	1.667	2.333	3.333	*	*	1.479	1.948	**2.152**	**n/a**
Zinc ug/L	*	6.667	<1	8	*	*	<1	<1	**7.3335**	**n/a**
Boron ug/L	*	<1	<1	11.5	*	*	<1	<1	**11.5**	**n/a**
Cadmium ug/L	*	<1	<1	<1	*	*	<1	<1	**<1**	**n/a**
Barium ug/L	*	43	20	23	*	*	<1	<1	**28.66666667**	**n/a**

Sample Date	23/10/2008	28/01/2009	17/02/2009	19/02/2009	05/03/2009	19/03/2009	21/04/2009	19/05/2009	Average	95% percentile
Sample	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River	Downstream River		
Sample Code	GS1138	GT160	GT287	GT222	GT326	GT411	GT722	GT804		
NH_3 mg/L	*	0.2	0.09	*	*	0.06	0.037	0.06	**0.0894**	**0.178**
O-PO4-P mg/L	0.0445	0.0395	0.04	0.025	0.10	0.05	0.07	0.08	**0.056125**	**0.093**
Chromium ug/L	*	<1	1	3.5	*	3.145	<1	<1	**2.548333333**	**n/a**
Copper ug/L	*	<1	<1	<1	*	43.1	<1	<1	**43.1**	**n/a**
Lead ug/L	*	<1	19	<1	*	11.722	<1	<1	**15.361**	**n/a**
Nickel ug/L	*	1.667	2	4.667	*	5.639	1.731	<1	**3.1408**	**n/a**
Zinc ug/L	*	1.333	6.667	7	*	29.9	<1	<1	**11.225**	**n/a**
Boron ug/L	*	<1	<1	14.5	*	43.9	<1	<1	**29.2**	**n/a**
Cadmium ug/L	*	<1	<1	<1	*	<1	<1	<1	**<1**	**n/a**
Barium ug/L	*	51	19.5	25	*	28.2	<1	<1	**30.925**	**n/a**

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