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Administration,
Environmental Licensing Programme,
Office of Climate,
Licensing & Resource Use,
Environmental Protection Agency,
P.O. Box 3000,
Johnstown Castle Estate,
County Wexford.

30th August 2010

Re: Register Number D0515-01
Waste Water Discharge Licence Application for
Agglomeration of Glenville, County Cork

Dear Sir/Madam,

I refer to the above and to a letter received from the Agency dated 30th ult. regarding Regulation 16 compliance requirements. I enclose a submission to the Agency in response to the matters raised in the said letter.

I trust that all is now in order and I look forward to a licence being granted to Cork County Council for the discharges from the waste water works serving the Glenville Agglomeration.

Yours faithfully,

Patricia Power
Director of Services

Encl.

090104_0002

CORK COUNTY COUNCIL
Comhairle Contae Chorcaí
Water Services South
County Hall
Carrigrohane Road
Cork

SUBMISSION TO ACHIEVE COMPLIANCE WITH REGULATION 16 OF THE WASTE WATER DISCHARGE REGULATIONS 2007 FOR GLENVILLE (D0515-01)

August 2010

QUESTION 1 "ASSESS THE LIKELIHOOD OF SIGNIFICANT EFFECTS OF THE WASTE WATER DISCHARGE ON THE RELEVANT EUROPEAN SITES..."

1.0 Background

Glenville is located approximately 15km north of Cork City in the Owenbawn River Valley. Cork County Council South is the Water Services Authority serving Glenville. The agglomeration boundary can be seen at Attachment A.1 of the original application. This boundary encompasses the Development Plan boundary and the site boundaries of all planning applications granted permission since 2005 whereby the waste water arising from those applications would discharge to the waste water works. The Development Plan boundary is set out in the 2005 Blarney Electoral Area LAP. The 2006 Census found that the population of Glenville was approximately 480. The calculated PE to be contributed to the waste water works as a result of the planning applications granted since 2005 is 60. The total estimated PE of the agglomeration being served by the waste water is therefore 540. Refer to Attachments B.9(i) and B.9(ii) of the original application.

The waste water collection system serving Glenville includes one pumping station which serves Bridge View Terrance and Glendule Housing Estate. There is a single secondary discharge from the waste water works in the form of an emergency overflow from this pumping station. This discharges to the Owenbawn River. There are no storm overflows from the collection system. All waste water collected drains to the waste water treatment plant.

The waste water treatment plant provides primary and secondary treatment. The primary treatment is achieved by settlement. The secondary treatment is achieved by intermittent aeration of the settle waste water by means of a rotating biological contactor. All treated effluent from the waste water treatment pant drains by gravity to the Owenbawn River where it discharges directly at the primary discharge point. The Owenbawn River flows into the Glashanabrack River approximately 1km downstream of the primary discharge point. The Glashanabrack River flows into the River Bride approximately 2.3km downstream of the primary discharge point. The River Bride flows into the Blackwater River approximately 44km downstream of the primary discharge point.

The primary discharge point is located within the Blackwater River (Cork/Waterford) Special Area of Conservation (SAC).

1.1 Habitats Directive Assessment

The Habitats Directive 92/43/EEC is transposed into Irish Law under the European Union (Natural Habitats) Regulations SI 94/1997 (The Regulations). The Regulations require the assessment of all projects or plans that have the potential to impact on nature conservation sites, including SACs. This assessment is referred to as a Habitats Directive Assessment. The purpose of a Habitats Directive Assessment is to identify potential impacts on nature conservation sites arising from a project or plan and to predict the effect of such impacts on the integrity of the sites.

The European Union has provided guidance on Habitats Directive Assessment which identifies four stages in the assessment process as follows:

1. *Stage One - Screening*

   Screening identifies the likely impacts on a Natura 2000 site of a project or plan, whether alone or in combination with other projects or plans, and considers whether or not these impacts are likely to be significant.

2. *Stage Two – Appropriate Assessment*

   This assessment considers the impact on the integrity of the Natura 2000 site of a 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, the Appropriate Assessment considers the potential mitigation of those impacts.

3. *Stage Three - Assessment of Alternative Solutions*

   This assessment examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

4. *Stage Four - Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain*

   This assessment considers 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.

This Submission brings together all of the information necessary to make determination as to whether or not there are likely to be significant impacts arising from the discharges from the Glenville Agglomeration on the Blackwater River (Cork/Waterford) SAC.

1.2 Stage One - Screening

Screening identifies the likely impacts on a Natura 2000 site of a project or plan, whether alone or in combination with other projects or plans, and considers whether or not these impacts are likely to be significant. Screening comprises of 5 steps as follows:

1. *Step One – Description of Project or Plan*

   Provide a description of the project or plan and other projects or plans that, alone or in combination, have the potential to have significant effects on Natura 2000 sites within the potential impact zone.

2. *Step Two – Identification of Impacted Natura 2000 Sites*

   Identify Natura 2000 sites which may be impacted by the project or plan, and compile information on their qualifying interests and conservation objectives.

3. *Step Three – Assessment Criteria*

   Determine whether the project or plan needs to be screened for potential impacts on Natura 2000 sites.

4. *Step Four – Assessment of Likely Effects*

   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.

5. *Step Five – Significance of Effects*

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

Steps 1 to 5 are presented as an Appropriate Assessment Screening Matrix below. This assessment has been prepared in accordance with the following guidance:

- European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the Habitats Dreictive 92/43/EEC;
- European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habtiats Directive 92/43/EEC;
- Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Environment, Heritage and Local Government, 2009.

Step One - Description of Project or Plan	
Location	Glenville, Co Cork.
Description of the key components of the project	Glenville Agglomeration is served by a WWTP which provides secondary treatment. Treated effluent discharges to the Owenbawn River.
Distance from designated sites in potential impact zone	Discharges directly into the Blackwater River (Cork/Waterford) SAC.

Step Two – Identification of Impacted Natura 2000 Sites[1]	
Name	Blackwater River (Cork/Waterford) SAC
Site Code	SAC 002170

[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.

Site Description	The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. The site is a candidate SAC selected for alluvial wet woodlands and Yew wood, both priority habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, estuaries, tidal mudflats, Salicornia mudflats, Atlantic salt meadows, Mediterranean salt meadows, perennial vegetation of stony banks and old Oak woodlands, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter and the plant, Killarney Fern. The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, dredging of the upper reaches of the Awbeg, overgrazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel. The River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively; furthermore it is of high conservation value for the populations of bird species that use it. Two Special Protection Areas, designated under the E.U. Birds Directive, are also located within the site - Blackwater Callows and Blackwater Estuary. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.
Qualifying Interests of Blackwater River SAC.	1. Alluvial Wet Woodlands; 2. Yew Woods; 3. Floating River Vegetation; 4. Estuaries; 5. Tidal Mudflats; 6. Salicornia Mudflats; 7. Atlantic Salt Meadows; 8. Mediterranean Salt Meadows; 9. Perennial Vegetation of Stony Banks & Old Oak Woodlands; 10. Sea Lamprey; 11. River Lamprey; 12. Brook Lamprey; 13. Freshwater Pearl Mussel; 14. Crayfish; 15. Twaite Shad; 16. Atlantic Salmon; 17. Otter; 18. Killarney Fern.
Other Notable Features of Blackwater River SAC.	1. Long-eared Owl; 2. Barn Owl; 3. Reed Warbler; 4. Dipper.

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: 1. the population of the species as a viable component of the site; 2. the distribution and extent of habitats supporting the species; 3. the structure, function and supporting processes of habitats supporting the species. *(Source – National Parks and Wildlife Service)*

Step Three – 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.	1. Glenville WWTP; 2. Rathcormac WWTP; 3. Bartlemy WWTP; 4. Castlelyons WWTP; 5. Ballynoe WWTP; 6. Conna WWTP; 7. Tallow WWTP; 8. Tallow Supplementary WWTP; 9. Lismore WWTP; 10. Ballyduff WWTP; 11. Clondulane WWTP; 12. Kilworth WWTP; 13. Glanworth WWTP; 14. Ballindagin WWTP; 15. Kildorrey WWTP; 16. Mitchelstown WWTP; 17. Fermoy WWTP; 18. Ballyhooley WWTP; 19. Castletownroche WWTP; 20. Shanballymore WWTP; 21. Doneraile WWTP; 22. Buttevant WWTP; 23. Buttevant Septic Tank; 24. Churchtown WWTP; 25. Ballyhea WWTP; 26. Lisscarroll WWTP; 27. Killavullen WWTP; 28. Mallow WWTP; 29. Dromahane WWTP; 30. Ballyclough WWTP; 31. Lombardstown WWTP; 32. Castlemagner WWTP; 33. Kilbrin WWTP; 34. Banteer WWTP; 35. Nad WWTP; 36. Kanturk WWTP; 37. Boherbue WWTP; 38. Newmarket WWTP; 39. Freemount WWTP; 40. Rathcool WWTP; 41. Kilcorney WWTP; 42. Millstreet WWTP; 43. Kilcullen WWTP; 44. Kiskeam WWTP; 45. Rathmore WWTP; 46. Knocknagree WWTP; 47. Ballydesmond WWTP; 48. Tooraneena WWTP; 49. Cappoquin WWTP; 50. Villierstown WWTP; 51. Aglish WWTP;

	52. Clashmore WWTP; 53. Piltown WWTP. The Blackwater and its tributaries flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford.
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.	The likely impact of the discharge of treated effluent from the Glenville Agglomeration is to increase the nutrient concentration in the Owenbawn, Glashanabrack, Bride and Blackwater Rivers. However, given the dilution available in the Glashanabrack, Bride and Blackwater Rivers and the ongoing "good" status of the receiving Owenbawn River, it is reasonable to suggest that the impact of the discharge of treated effluent from the Glanville Agglomeration is not significant. The impact of the discharge of treated effluent from the Glanville Agglomeration on each of the above-listed qualifying interests is as follows: *i.* *Alluvial Wet Woodlands* These woodlands are found on the River Bride and are therefore unaffected by discharges to the Owenbawn River. *ii.* *Yew Woods* These woods are not wet woodlands and are therefore unlikely to be affected by discharges to the Owenbawn River. *iii.* *Floating River Vegetation* The effects of discharges to the Owenbawn River on floating river vegetation within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *iv.* *Estuaries* The estuary is over 80km downstream of the discharges and is unlikely to be affected. *v.* *Tidal Mudflats* The tidal mudflats are over 80km downstream of the discharges and are unlikely to be affected. *vi.* *Salicornia Mudflats* The *salicornia* mudflats are over 80km downstream of the discharges and are unlikely to be affected. *vii.* *Atlantic Salt Meadows* The Atlantic salt meadows are over 80km downstream of the discharges and are unlikely to be affected. *viii.* *Mediterranean Salt Meadows* The Mediterranean salt meadows are over 80km downstream of the discharges and are unlikely to be affected. *ix.* *Perennial Vegetation of Stony Banks & Old Oak Woodlands* Perennial vegetation of stony banks & old oak woodlands are unlikely to be affected by discharges to the Owenbawn River. *x.* *Sea Lamprey* The sea is over 80km downstream of the discharges and sea lamprey is therefore unlikely to be affected. *xi.* *River Lamprey* The effects of discharges to the Owenbawn River on river lamprey within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xii.* *Brook Lamprey* The effects of discharges to the Owenbawn River on brook lamprey within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xiii.* *Freshwater Pearl Mussel* The effects of discharges to the Owenbawn River on freshwater pearl mussel within the SAC are unknown but are not deemed to be significant due to the ongoing

	"good" status of the receiving water. *xiv.* *Crayfish* The effects of discharges to the Owenbawn River on crayfish within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xv.* *Twaite Shad* The effects of discharges to the Owenbawn River on twaite shad within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xvi.* *Atlantic Salmon* The effects of discharges to the Owenbawn River on Atlantic salmon within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xvii.* *Otter* The effects of discharges to the Owenbawn River on the otter within the SAC are unknown but are not deemed to be significant due to the ongoing "good" status of the receiving water. *xviii.* *Killarney Fern* Killarney fern is unlikely to be affected by discharges to the Owenbawn River. The combined impact of all of the above-listed WWTPs on the nature conservation site would require a full ecological assessment of the entire SAC. This assessment has not been undertaken in the preparation of this Submission. However, consideration is currently being given by Cork County Council to such an assessment.
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:** *Not significant.* **Disturbance to key species:** *The operation of the WWTP does not cause any disturbance to species within the SAC.* **Habitat or species fragmentation:** *No habitat fragmentation has been caused as a result of the operation of this facility.* **Reduction in species density:** *No significant impacts are evident or predicted on species for which the SAC is designated.* **Changes in key indicators of conservation value eg water quality:** *While there is no ongoing monitoring of water quality for the Owenbawn River, some sampling and testing were done and submitted as part of the Wastewater Licence Application. This testing, while insufficient for a complete analysis indicates that there is no deterioration in water quality associated with the Glenville discharge.*

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 SAC is not impacted by the operation of this facility.* **Interference with key relationships that define the function of the site:** *The function of the SAC 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.

Step Four – Assessment of Likely Effects	
Name of project or plan	Glenville WWTP discharge
Name and location of Natura 2000 site	Blackwater River SAC
Description of the project or plan	The waste water collection system serving Glenville includes one pumping station which serves Bridge View Terrance and Glendule Housing Estate. There is a single secondary discharge from the waste water works in the form of an emergency overflow from this pumping station. This discharges to the Owenbawn River. There are no storm overflows from the collection system. All waste water collected drains to the waste water treatment plant. The waste water treatment plant provides primary and secondary treatment. The primary treatment is achieved by settlement. The secondary treatment is achieved by intermittent aeration of the settle waste water by means of a rotating biological contactor. All treated effluent from the waste water treatment pant drains by gravity to the Owenbawn River where it discharges directly at the primary discharge point. The WWTP has a design capacity of approximately 300PE. The current estimated load on the WWTP is 540PE. The Owenbawn River flows into the Glashanabrack River approximately 1km downstream of the primary discharge point. The Glashanabrack River flows into the River Bride approximately 2.3km downstream of the primary discharge point. The River Bride flows into the Blackwater River approximately 44km downstream of the primary discharge point. The primary discharge point is located within the Blackwater River (Cork/Waterford) Special Area of Conservation (SAC).

Is the project or plan directly connected with or necessary to the management of the site (provide details)?	No
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 Site.	Discharges from the Glenville WWTP either alone or in combination with discharges from other sources could give rise to elevated nutrients within the SAC. 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.

Step Five – Significance of Effects	
Explain why these effects are not considered significant.	Treated effluent is discharging to a large well-exchanged body of water where dilution and dispersion potential is high – this is especially applicable to the Glashanabrack, Bride and Blackwater Rivers. Furthermore, the receiving Owenbawn River has ongoing "good" status. No significant impacts are evident or predicted on species for which the SAC is designated.
List of agencies consulted: provide contact name and telephone or email address	National Parks and Wildlife Service
Response to consultation	N/A

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**
John Slattery, Executive Engineer, Water Services Operations, Cork County Council	Urban Waste Water Discharge Licence Application fro Glenville; Cork County Council Water Quality Monitoring Data; Nation Parks & Wildlife Service Website; Birdwatch Ireland Website.	Desktop review of cited data.	This Submission.

QUESTION 2 "REVIEW THE ASSESSMENT OF THE IMPACT OF THE DISCHARGE IN RELATION TO THE ENVIRONMENTAL QUALITY OBJECTIVES REGULATIONS..."

2.0 Environmental Quality Objectives

The River Owenbawn 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 2009-2010 at aSW01a, aSW01u, aSW01d and/or aSW02a 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 based on averages that include assumed figures. Therefore additional upstream and downstream tables with actual results for analysis below the Limit of Detection have been included. This "Analysis below the Limit of Detection" is laid out on a separate sheet in the Revised Table E.

UPSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***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)	<1.0mg/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	7.1
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	<0.1mg/L (mean) <0.1mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	<0.05mg/L (mean) <0.05mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.01µg/L
Toulene	10	<0.28µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.17µg/L
Total Chromium	8.1	<20.0µg/L
Copper (depending on water hardness)	5	<20µg/L
Cyanide	10	<5µg/L
Flouride	500	63µg/L
Zinc (depending on water hardness)	50	<20µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.1µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.1µg/L
Lead and its compounds	7.2	<20.0µg/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)	0.45	<20µg/L
Mercury and its compounds	0.05	<0.03 µg/L

Note the following:

The black results are within the EQR/S.
The red results break the EQR/S.
The blue results may break the EQR/S.
The results highlighted grey are at the limit of detection.
Water hardness in the Owenbawn River (measured at the River Bride) is 35mg$CaCO_3$/L

UPSTREAM COMPARISON TABLE
(ANALYSIS BELOW LIMIT OF DETECTION)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009-10 upstream ambient sampling results at aSW01u***
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)	0.055mg/L (mean) 0.06175mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.0145mg/L (mean) 0.0145mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Total Chromium	8.1	1.159µg/L
Copper (depending on water hardness)	30	<1.0µg/L
Zinc (depending on water hardness)	100	1.3µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	<1.0µg/L
Nickel and its compounds	20	3.0µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<1.0µg/L

DOWNSTREAM COMPARISON TABLE

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2009-2010 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)	<1.0mg/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	7.2
Nutrient conditions Table 9	***River Water body***	***Ambient sampling results***
Total Ammonia (mg N/l)	Good status≤0.065(mean) or ≤0.140(95%ile)	<0.1mg/L (mean) <0.1mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	<0.05mg/L (mean) <0.05mg/L (95%ile)
Specific pollutants Table 10	***Inland surface waters AA-EQS***	***Ambient sampling results***
Phenol	8	<0.01µg/L
Toulene	10	<0.28µg/L
Xylene	10	<1.0µg/L
Arsenic	25	<0.17µg/L
Total Chromium	8.1	<20µg/L Chromium
Copper (depending on water hardness)	5	<20µg/L
Cyanide	10	<5.0µg/L
Flouride	500	42.0µg/L
Zinc (depending on water hardness)	50	<20.0µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Atrazine	0.6	<0.1µg/L
Dichloromethane	20	<1.0µg/L
Simazine	1	<0.1µg/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)	0.45	<20µg/L
Mercury and its compounds	0.05	<0.03 µg/L

Note the following:

The black results are within the EQR/S.
The red results break the EQR/S.
The blue results may break the EQR/S.
The results highlighted grey are at the limit of detection.
Water hardness in the Owenbawn River (measured at the River Bride) is 35mg$CaCO_3$/L

DOWNSTREAM COMPARISON TABLE (ANALYSIS BELOW LIMIT OF DETECTION)

Physico-chemical conditions	***Ecological quality ratio/standard*** ***Good boundary*** ***Rivers (All Types)***	***2008 Downstream ambient sampling results at aSW01CMYRd***
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)	0.117mg/L (mean) 0.1917mg/L (95%ile)
Molybdate Reactive Phosphorus (MRP) (mg P/l)	Good status≤0.035(mean) or ≤0.075(95%ile)	0.008mg/L (mean) 0.008mg/L (95%ile)
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	<1.0µg/L
Zinc (depending on water hardness)	100	1.3µg/L
Priority Substances Table 11	***Inland surface waters AA-EQS***	***Ambient sampling results***
Lead and its compounds	7.2	<1.0µg/L
Nickel and its compounds	20	2.283µg/L
Priority Hazardous Substances Table 12	***Inland surface waters AA-EQS***	***Ambient sampling results***
Cadmium and its compounds (depending on water hardness)	0.25	<1.0µg/L

PREDICTED IMPACTS

MASS BALANCE EQUATIONS FOR BOD:

Worst Case Scenario:

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

Flow of River (95%ile) = 0.0872m3/sec (Owenbawn)
Mean BOD in River (upstream) = 0.5mg/L (Half of the LOD for Calculation)
Max volume of discharge = 0.0028m3/sec
Max value for BOD in discharge = 25mg/L

$$C_{final} = \frac{(0.0872 \times 0.5) + (0.0028 \times 25)}{(0.0872 + 0.0028)}$$

C_{final} = 1.262mg/l BOD

This is within 1.5mg/L EQS and 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) = 0.5501m3/sec
Mean BOD in River (upstream) = 0.5mg/L
Normal volume of discharge = 0.00094m3/sec
Mean value for BOD in discharge = 8mg/L

$$C_{final} = \frac{(0.5501 \times 0.5) + (0.00094 \times 8)}{(0.5501 + 0.00094)}$$

C_{final} = 0.513mg/l BOD

This is within the 1.5mg/L EQS and the 2.6mg/L 95% 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) = 0.0872m3/sec
Mean Ammonia in River (upstream) = 0.1mg/L
Max volume of discharge = 0.0028m3/sec
Max value for Ammonia in discharge = 5mg/L

$$C_{final} = \frac{(0.0872 \times 0.1) + (0.0028 \times 5)}{(0.0872 + 0.0028)}$$

C_{final} = 0.252mg/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) = 0.5501m3/sec
Mean Ammonia in River (upstream) = 0.1mg/L
Normal volume of discharge = 0.00094m3/sec
Mean value for Ammonia in discharge = 3.16mg/L

$$C_{final} = \frac{(0.5501 \times 0.1) + (0.00094 \times 3.16)}{(0.5501 + 0.00094)}$$

C_{final} = 0.105mg/l Ammonia

This is in breach of the 0.065mg/L mean EQS for Ammonia.

However it is worth noting that the mean upstream Ammonia value is 0.1mg/L, which is already in breach of the EQS of 0.065mg/L. The 95%ile upstream Ammonia value is 0.252, which also breaches the EQS of 0.14mg/L.

Theoretical Scenario:

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

Flow of River (Median) = 0.5501m3/sec
Theoretical Ammonia in River (upstream) = 0.008mg/L
Normal volume of discharge = 0.00094m3/sec
Mean value for Ammonia in discharge = 3.16mg/L

$$C_{final} = \frac{(0.5501 \times 0.008) + (0.00094 \times 3.16)}{(0.5501 + 0.00094)}$$

C_{final} = 0.0134mg/l Ammonia

This is within 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) = 0.0872m3/sec
Mean Orthophosphate in River (upstream) = 0.033mg/L
Max volume of discharge = 0.0028m3/sec
Max value for Orthophosphate in discharge = 4mg/L

$$C_{final} = \frac{(0.0872 \times 0.033) + (0.0028 \times 4)}{(0.0872 + 0.0028)}$$

C_{final} = 0.156mg/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) = 0.5501m3/sec
Mean Orthophosphate in River (upstream) = 0.033mg/L
Normal volume of discharge = 0.00094m3/sec
Mean value for Orthophosphate in discharge = 1.48mg/L

$$C_{final} = \frac{(0.5501 \times 0.033) + (0.00094 \times 1.48)}{(0.5501 + 0.00094)}$$

C_{final} = 0.0354mg/l Orthophosphate

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

However it is worth noting that the mean upstream Orthophosphate value is 0.0354mg/L, which is very close to the EQS of 0.035mg/L. The 95%ile upstream Orthophosphate value is 0.156, which is significantly greater than the EQS of 0.075mg/L.

Theoretical Scenario:

Normal Discharge, Median Flow in the River, Mean Orthophosphate in Discharge, Theoretical value for Orthophosphate in the River.

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

Flow of River (Median) = 0.5501m3/sec
Theoretical Orthophosphate in River (upstream) = 0.005mg/L
Normal volume of discharge = 0.00094m3/sec
Mean value for Orthophosphate in discharge = 1.48mg/L

$$C_{final} = \frac{(0.5501 \times 0.005) + (0.00\ 94 \times 1.48)}{(0.5501 + 0.00094)}$$

C_{final} = 0.0302mg/l Orthophosphate

This is within the 0.035mg/L mean EQS for Orthophosphate.