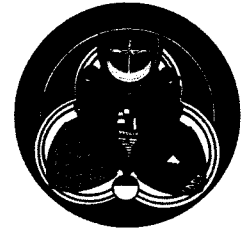
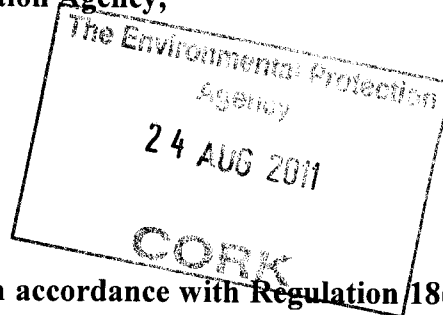


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Orla Harrington,
Inspector,
Office of Climate, Licensing & Resource Use,
Environmental Protection Agency,
Regional Inspectorate,
Inniscarra,
Co. Cork.



23rd August 2011.

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

Application: D0058-01 – Fermoy Town & Environs.

Further to your letter of 27th July, 2011 I now enclose response to queries raised in the correspondence.

Please find attached revised Appropriate Assessment, i.e. Appendix 15 – Fermoy Screening and Assessment (Ref: D0058-01) including Assessment of Secondary Discharge Point (SW4).

I enclose one original document, one copy and also one electronic copy in searchable PDF format on a CD-ROM as requested.

I trust same is satisfactory.

Yours sincerely,

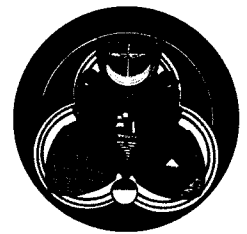
Noel O'Keeffe,
Co. Engineer & Director of Water Services,
Cork Co. Council.



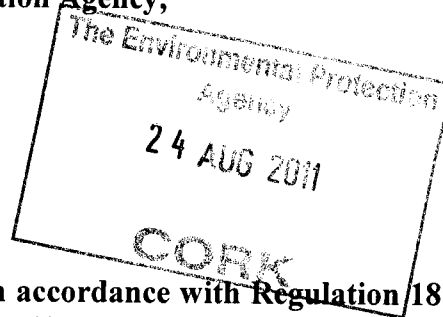
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Noel O'Keeffe,
Co. Engineer & Director of Water Services,
Cork Co. Council.



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Appendix 15 – Fermoy Screening & Assessment (Ref: D0058-01)

Project	
Location	Discharge associated with agglomeration of Fermoy town, County Cork.
Distance from designated site	0km: WWTP discharges to the Blackwater River, inside the cSAC boundary. The Blackwater Callows SPA is also coincident with the cSAC, downstream of Fermoy.
Brief description	<p>Fermoy is situated in the centre of the Blackwater Valley. It is on the crossroads between the Rosslare/Killarney and Dublin/Cork routes. The town was subject to rapid expansion in the 1990s and is now both a commuter satellite town for Cork and an established industrial centre in its own right.</p> <p>The wastewater in Fermoy is collected in a partially combined foul and separated foul sewage drainage network. The wastewater drains from the town on both sides of the Blackwater River. The wastewater on the north side of the river drains to a pumping station at Rathealy Road, which is then pumped across Fermoy Bridge to the main sewer. The wastewater arising on the south side of the river drains directly to the WWTW.</p> <p>The Fermoy WWTW was most recently upgraded in 2006 and now features a design Population Equivalent (PE) of 20,000PE and BOD loading of 1,200Kg/day. The maximum hydraulic capacity of the Fermoy WWTP is 673m³/h which is 2.3 Dry Weather Flow (2.3DWF). In order to cope with flows above 2.3DWF storm storage has been provided at the WWTW. The existing WWTW were upgraded with an additional stream. These upgrade works facilitated the splitting of the treatment process into two streams. The flow is split after the wastewater passes through the new inlet works. 40% of the flow is diverted to the existing wastewater treatment stream. The remaining 60% is directed to a new treatment system. The existing stream has an aeration phase, a secondary settlement phase and return activated sludge phase. The new stream has an anaerobic, anoxic and aeration phase, a secondary settlement phase and return activated sludge phase.</p> <p>The pollution load for the Fermoy agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • The local Population • The local Industries <p>The pollution load from these sources varies greatly with daily, weekly and seasonal producers of effluent. The sewage from all industries is collected via the public sewer and treated in conjunction with domestic waste at the waste water treatment plant.</p> <p>The domestic population of Fermoy has grown over the last three censuses owing to its development as a town within the Cork Metropolitan area. The most recent Census figures show that Fermoy</p>

	<p>Town and environs now has a population in excess of 5,800. (Census, 2006). Other sources of influent that contribute to the sewage scheme would be:</p> <ul style="list-style-type: none"> • Commercial premises • Schools • Tourism <p>The WWTW currently services an agglomeration with an estimated PE of 14,000. It is therefore significantly underloaded. With a design PE of 20,000 the WWTW is the largest treatment plant in the Blackwater catchment.</p> <p>On May 3rd 2011, the plant was taken in charge by Northumbrian Water on an operational contract from Cork County Council. A suite of alarms have been established at the plant to facilitate rapid responses to functional issues if and when they arise. The same contractor has also taken charge of the Mallow WWTP.</p> <p>A secondary discharge point (SW4) to the Blackwater occurs in the immediate environs of Fermoy Bridge. Water flowing to this discharge comprises trade effluent from the MicroBio plant in the town and is not directed to the WWTW due to its chloride content, which would disrupt the normal biological function of the WWTW.</p> <p>The Silver Pail dairy plant also discharges to SW4; however, this component is comprised of cooling water only. It does not contain any trade or sewage effluents, which are all directed to sewer and on to the Fermoy WWTW.</p>
<p>Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?</p>	<p>No</p>

Stage 1 - Screening	
<p>Describe the individual elements of the plan (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 sites.</p>	<p>The Fermoy agglomeration receives tertiary treatment at the recently upgraded WWTW, before discharging to the Blackwater River. The effluent then disperses in the water column.</p> <p>An observation of the Blackwater in the vicinity of the WWTW revealed that at this location, the river is extensive in scale (>20m wide) with moderate flows over occasional riffles along a shallow incline. Some aquatic macrophytes were observed, including Water crowfoot; no algal mats were observed.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Blackwater River are somewhat heterogeneous. Sampling on the right hand side at Fermoy Bridge returns Good ecological quality (Q=4). However, conditions on the opposite bank are only Poor (Q=3). Both samples occur upstream of the Fermoy WWTW. The Blackwaters maintains the Good ecological status at the next downstream sampling</p>

point, west of Kilmurry South; this site has shown an improvement since 2006, coincident with the upgrade of the Fermoy WWTW. This contrasting situation is indicative of a localised pollution source in or slightly upstream of Fermoy and is not related to the WWTW, which is located some 150m downstream of these results.

Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:

- BOD = 1.73
- SS = 4
- COD = <21
- P = 1.5
- N = 5.1

As such, the plant is compliant for BOD, SS, COD and Phosphorus (the Blackwater is designated as 'Sensitive' between Mallow and Ballyduff). The value for N, which was non-compliant, was compared to other samples from 2007, which ranged from 1.2 to 12.2; this indicates a generally compliant state for this effluent variable.

The Blackwater at this location is a sizeable waterbody with large dilution factors. The EIS for the plant upgrade which was published in 2000 stated that "[d]ue to the high dilution capabilities of the river, it shall not suffer any noticeable decrease in Dissolved Oxygen downstream of the outfall. The increase in population and industry in the Fermoy area will place additional demands on the wastewater treatment facilities in the area and if not provided for could be expected to result in a deterioration of the water quality in the Blackwater River downstream of the town. However, the proposed upgrading and expansion of the works at the Wastewater Treatment plant are designed to protect the water body downstream of the outfall sufficiently to restore its quality rating around Q4. Without the proposed works, the town developments would cause a much greater BOD loading to the river, so that the effects of the treatment works expansion is positive". Prior to the upgrade, overloading of the plant had led to occasional fish kills, the most notable occurring in May 1991. No such incidents have occurred since this upgrade.

In relation to the water quality variables detailed in the 2009 Surface Water Regulations, no increases in BOD, Ammonia or Orthophosphate result from the current effluent discharge at Fermoy. As such, the WWTP is not contributing to decline in water quality and is therefore compliant with the regulations. It is noted that BOD loading in the Blackwater is quite high due to the urbanised nature of the town, which features a number of industrial facilities. BOD status is classed as 'Poor' upstream of the WWTP; sampling data from the Fermoy licence application actually shows a slight fall in BOD loading downstream of the WWTW. As such, it is considered that the dilution factors at this location result in no perceptible impact upon water chemistry from the Fermoy discharge; it is in all likelihood contributing to negating against deleterious pressures on water quality which are apparent upstream of Fermoy Bridge.

The Water Framework Directive currently assigns 'Moderate' status to this stretch of the Blackwater; this is based on historical presence of a progressively ageing population of Freshwater Pearl Mussels in the river.

Specimens have been recorded at Fermoy Bridge and at Careysville, some distance downstream of the WWTW; the Fermoy plant is not listed among the 18 identified in the Pearl Mussel sub-basin plan as posing a significant risk to mussel populations.

The Fermoy WWTW is also not listed as a WWTP risk to the overall Blackwater WMU.

Under consultation, IFI had no specific concerns regarding the discharge of the Fermoy plant. They noted the overall pressure on the middle stretches of the river caused by BOD loading from the Mallow plant.

The SW4 discharge results from the trade processes at the MicroBio and Silver Pail facilities and does not contain any wastewater as defined by the UWWT regulations.

The main activity at the MicroBio installation is the manufacture of inorganic chemicals in a membrane cell electrolysis plant using sodium chloride or salt-water brine. It operates on a continuous basis. Chemicals produced include hydrochloric acid, sodium hydroxide solution and sodium hypochlorite. The company also trades in chemical solutions.

Sanitary effluent arising at the installation discharges to the normal sewerage system and on to the Fermoy WWTW. There is a wastewater treatment plant on-site which treats all process effluent arising. Onsite treatment consists of a combination of solids settling, neutralisation and final chemical dechlorination using sodium sulphite. The treated effluent discharges to a pipe that is under the control of Cork County Council. Because of the high concentration of chloride in the effluent however, it is not directed to the Fermoy WWTW, but discharged to the River Blackwater in a dedicated pipe just downstream of Fermoy Bridge. There is no mixing of the company's trade effluent with domestic effluent in the Cork County Council pipe.

A chlorate decomposition system was installed at the plant in 2003 as part of a *Cleaner Greener Production Programme* (CGPP) project. This had the effect of allowing increased recycling of the waste brine stream thus reducing the discharge of chloride to drain which would result from bleeds from the brine circuit. There has been 100% compliance with the emission limit values for emissions to sewer during the period 2000-2006. This includes a period prior to the installation of the chlorate decomposition unit. The additional increase in chloride concentration to the river resulting from the current maximum discharge is therefore 7.6 mg/l.

EPA chemical data from upstream of Fermoy at Killavullen records a median Chloride level in the Blackwater of 20mg/l, with a maximum recorded value of 84mg/l between 2001 and 2003. Ambient monitoring of Chloride concentrations in the Blackwater around Fermoy has been recently carried out by Cork County Council. Between 2010 and 2011, sampling at Ilclash reported a median Chloride level of 19.5mg/l, rising to a maximum of 45.8mg/l on one occasion May 2010. These samples were taken 2.5km downstream of the SW4 discharge and 1.25km downstream of the main WWTW discharge.

There are very few Irish studies in relation to the ecological effects of chloride discharges. However, a literature review of individual acute

	<p>and chronic toxicity data as reviewed in USEPA 1988 and the data from field distribution in relation to salinity or chloride levels (from Australia, Canada, South Africa and the US) would indicate that healthy freshwater communities are most likely to occur at chloride levels (as sodium chloride) at or below 250-500 mg/l for continuous exposure. As the Blackwater is naturally relatively low in chloride, the maximum increase in chloride resulting from SW4 would still keep the river approximately an order of ten below the negative impact threshold from chloride. It is therefore not considered likely that the chloride component of SW4 is contributing to any significant negative impact to the Blackwater cSAC.</p> <p>The Silver Pail plant only releases cooling water via the SW4 discharge point. This has no chemical or organic content and as such will not lead to any biological or chemical changes in the Blackwater downstream of the discharge. Any physical alterations resulting from temperature changes are also considered minimal as the majority of the heat in the cooling water will have been lost by the stage the discharge reaches the river.</p>
<p>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 by virtue of:</p> <ul style="list-style-type: none"> Size and scale; Land-take; Distance from Natura 2000 site or key features of the site; Resource requirements; Emissions; Excavation requirements; Transportation requirements; Duration of construction, operation etc.; Others. 	<p>All impacts relate to the influence of the contents of the respective effluents entering the receiving waters. No construction, land-take etc. will take place in the vicinity of the WWTPs.</p> <p>Effluent discharging to freshwater catchments can lead to eutrophication (nutrient enrichment) of the receiving waters, increases in suspended solids, build up of toxic materials, reduction of ecological diversity and the subsequent alteration of trophic food webs.</p> <p>Unmitigated contamination events during the operational phase of the plant pose the risk of releasing toxic pollutants to the respective receiving waters. Such events could potentially have significant negative impacts on all of the aquatic species for which the Blackwater River cSAC has been designated. Extensive fish kills resulting from such an event may destabilize the food web of an entire sub-catchment.</p> <p>Depending on the natural trophic status of the receiving water, eutrophication can result in accelerated algal growth. This has knock-on effects on aquatic ecology; dissolved oxygen levels can be affected by increased biological oxygen demand.</p> <p>Reduced assimilative capacity of rivers will occur during periods of low flow. This will be further exacerbated in rivers where abstractions are located.</p> <p>Fermoy is an urbanised centre with an associated range of pressures on local ecology besides the WWTW, the town features a number of industrial facilities, including Sanmina/S.C.I., F.C.I., Silver Pail, Micro Bio, Moorepark and Anderson Power. These range from IT sector manufacturing plants to dairy research installations; of the above, only Micro Bio discharges a discrete output to the Blackwater.</p> <p>A surface water drain and outflow from the Fermoy Leisure Centre also discharge to the north bank of the Blackwater in very close proximity to the SW4 discharge. This may also be contributing to poor macroinvertebrate diversity at this location.</p>

The other main cumulative pressure upstream of Fermoy is considered to come from agriculture along this stretch of the Blackwater. High phosphorus run-off is likely to have led to eutrophication of the river here, with an associated increase in Biochemical Oxygen Demand from phytoplankton and macrophyte growth in the water column. However, it is noted that there has been very significant change in agricultural infrastructure and practices in recent years which should have the effect of dramatically reducing the agricultural pressures on the Blackwater catchment. In recent years much of the agricultural point source problem has been addressed through the investment of €2bn through the Farm Waste Management Scheme in on-farm storage and management facilities. The Nitrates Action Plans (1 and 2) have led to a significant reduction in the level of chemical fertiliser usage, in particular phosphorus. In addition, restrictions on applications at vulnerable times of year have reduced losses to surface water. Similar improvements have occurred in the usage of organic manures. These improvements will continue to have a positive impact on water quality over many years as the nutrient to slow moving groundwater reduce and the proportion of soils which contain high levels of nutrient reduce. The level of awareness of farmers of best practice in nutrient management has improved dramatically due to participation in REPS and more recently, to the Nitrates Action Programme. This programme is likely to have accounted for some of the improvement in water quality observed in the other parts of the Blackwater catchment in recent years. Continued implementation is expected to show benefits to the middle stretches of the Blackwater in coming years. This should contribute to an improvement in water quality immediately upstream of Fermoy.

Initial consultation with NPWS by Cork County Council at the time of the licence application raised a specific issue relating to the potential impact of endocrine disruptors on fish populations. Municipal wastewaters are a complex mixture containing oestrogens and oestrogen mimics that are known to affect the reproductive health of wild fishes. Male fish downstream of some wastewater outfalls produce vitellogenin (a protein normally synthesized by females during oocyte maturation) and early-stage eggs in their testes, and this feminization has been attributed to the presence of oestrogenic substances such as natural oestrogens, the synthetic oestrogen used in birth-control pills, or weaker oestrogen mimics such as nonylphenol in the water. Despite widespread evidence that male fishes are being feminized, it is not known whether these low-level, chronic exposures adversely impact the sustainability of wild populations.

The NPWS consultation responses noted that "One recent study has shown EDCs to have a significant adverse effect on a minnow population (in Canada), but another concluded that significant effects on brown trout populations unlikely (in Switzerland). Irish data reviewed in 2005 led to the conclusion that, in general, fish populations "do not appear to be at risk from oestrogenic chemicals", but, more recently, data from the Shannon system has shown EDCs to be present in concentrations which are known to cause reproductive changes in river fish. Physiological effects of these concentrations on roach (*Rutilus rutilus*) has been demonstrated in the Shannon rivers, but their population effects are not known. A U.K. study concluded that more restrictive discharge limits for alkylphenol polyethoxylates "can potentially lead to significant reduction in the effects of these chemicals on exposed fish". The SCOPE/IUPAC Project on the implications of endocrine active substances for humans and wildlife concluded in 2003 that "In cases where there is documented scientific

	<p>evidence based upon valid studies of serious and irreversible damage, but some degree of scientific doubt, it may be important to consider implementing interim precautionary measures or risk management actions that may avert harm, while ongoing research fills the knowledge gap". NPWS therefore raised a specific concern regarding the potential impacts upon the minnow prey of the Kingfisher; while this species is not a listed Conservation Objective of the Blackwater Callows SPA, it is listed on Annex I of the Birds Directive.</p> <p>Research carried out at Athlone IT has indicated qualitative sex changes to roach and brown trout in the Shannon catchment. Rivers sampled include the Suck, Woodford, Clodiagh, Ballyfinboy, Brosna, Hind, Camcor, Comlin, Inny, Little Brosna, Nenagh and Ross Rivers. In general, male fish sampled downstream of WWTPs in the Shannon system have increased HSI and decreased GSI compared with upstream fish. Anomalies exist in several locations such as Birr, Ferbane etc. which may have been due to non point discharge, disused landfill leachate, age bias etc. The report depicts intersex fish gonads sampled downstream of Mullingar WWTP. This discharges to the Brosna, which is a considerably smaller waterbody than the Blackwater at Fermoy. The Mullingar WWTP currently services a PE of 30000, which is significantly larger than Fermoy.</p> <p>The aforementioned Canadian study was carried out over a 7-year period in a single lake in North-western Ontario. As such, it may not be directly comparable to the situation of the Blackwater, as such endocrine disruptors can more readily build up in a lake ecosystem with more significant impacts resulting from such a situation. The Blackwater by contrast, being a more dynamic waterbody may be less susceptible to such effects. (The EPA have carried out studies relating to these disruptors in the Lee and Bandon Rivers in County Cork, and concluded that no evidence for significant impacts in these rivers.) There is currently no data available for oestrogenic compounds in the Blackwater River. The issue of endocrine disruption is considered again later in the assessment.</p> <p>One other project directly impacting the Blackwater in Fermoy is the planned repair work to the Fermoy weir. At present, there is concern that partial collapse of the fish pass is contributing to blocking salmon migration up the river, particularly at low water levels. It has been proposed to repair the fish pass in 2011 to deal with this problem. IFI have stated that if these remedial works are not carried out, the weir will have to be demolished to form a 'rock ramp' over which migrating salmon may pass much more easily. Works would be carried out using methodologies which do not pose a risk to the conservation interests of the cSAC. In either case, there will be a positive impact upon migrating salmon; this may have a knock-on positive impact on species dependent on salmon, such as otter and freshwater pearl mussel.</p>
<p>Describe any likely changes to the site arising as a result of: Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value;</p>	<p>There will be no loss of or reduction in Annex I habitats as a result of the operation of the existing WWTP.</p> <p>The potential nutrient enrichment of the Blackwater of this location may result in a range of changes to the SAC, both on a localised and system-wide basis.</p> <p>The following key species of the SAC are not expected to be impacted</p>

<p>Climate change.</p>	<p>by the discharge:</p> <ul style="list-style-type: none"> • Killarney Fern - Non water-dependent species • Twaite Shad - Distribution restricted to lower reaches of River Blackwater • Sea lamprey - Anadromous phase of species restricted to lower stretches of catchment • White-clawed Crayfish – Only known in the Blackwater upstream of Mallow. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon, Freshwater Pearl Mussel and Otter.</p> <p>Accelerated algae and plant growth within river water columns leads to shifts in diurnal oxygen concentrations. This in turn leads to loss of biological indicator macroinvertebrate species. These species form the bases of salmonid feeding patterns, and their loss may lead to alterations in river ecology as other less sensitive invertebrate species begin to dominate. Loss of salmonids will in turn affect the feeding ecology of otter populations within the sub-catchment and may reduce the carrying capacity of the constituent rivers.</p> <p>Salmonid spawning grounds may be significantly impacted by the increased growth of plants on the river substrate. Such growth will also impede the movement of Lamprey and juvenile fish.</p> <p>Freshwater Pearl Mussels are sensitive to elevated nutrient levels in rivers, particularly orthophosphate. A population is known from the main Blackwater at Fermoy and Careysville, though the condition of these populations is unclear; it is conceivable that some specimens remain immediately downstream of the WWTW discharge. The recently upgraded Fermoy plant is currently preventing a significant degree of potentially enriching material from reaching the Blackwater and is predicted to be contributing to an overall improvement in water quality downstream of Fermoy; it is likely to be negating against other pressures upstream of this point which are cumulatively acting to cause the recorded increased BOD levels at Fermoy Bridge.</p> <p>It is estimated that climate change will result in more extended but less frequent wet and dry periods and warmer water temperatures, as rainfall patterns in Ireland are changing. This could result in precipitation increases of over 10% in the winter months, and decreases of approximately 25% in the summer, and annual temperature increases. However, there is insufficient information to predict the effects on the site as these will be more closely related to localised rainfall events.</p>
<p>Describe any likely impacts on the Natura site as a whole in terms of: Interference with the key relationships that define the structure of the site; Interference with key relationships that define the function of the site.</p>	<p>The greater Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river in its upland tributaries, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the Blackwater catchment was low, leading to significant pollution. Infrastructural investment via Cork County Council on a number of WWTPs along the channel in the last decade and the</p>

	<p>implementation of the Nitrates Directive has addressed this nutrient input to a major degree.</p> <p>The key ecological relationships that define the structure and function of the Blackwater River cSAC are likely to be impacted by ongoing nutrient enrichment of its constituent rivers. This may have direct effects by reducing dissolved oxygen and leading to loss of species. Indirect effects include loss of river substrate with specific ecological function (e.g. spawning gravel) due to blanketing with opportunistic aquatic plants. Water quality is seen to be good downstream of the Fermoy WWTW and as such, no impacts to the food chains within the Blackwater Callows are envisaged.</p> <p>The Fermoy plant is currently significantly underloaded and generating a good quality effluent with low nutrient concentrations. Only Good ecological conditions are recorded downstream of the WWTW, with a noted improvement in Q-rating recorded at the nearest EPA sampling point since the 2006 WWTW upgrade. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Pearl Mussel, Lamprey and Otter).</p> <p>No impacts are expected to result from the SW4 discharge, as it will only result in a minimal increase in Chloride levels from the MicroBio Plant. Cooling water generated by the Silver Pail plant may actually assist in diluting this Chloride prior to it entering the Blackwater.</p>
<p>Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale of magnitude of impacts is not known.</p>	<p>The Fermoy WWTW is a recently upgraded installation and is generating an excellent effluent for the scale of the plant. This efficient treatment means that it is unlikely to be contributing to significant nutrient input to this stretch of the Blackwater; conversely, it is considered that it is likely to be leading to a progressive improvement in river conditions, despite negative pressure from the environs of Fermoy. Ecological conditions downstream of the WWTW have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in nutrient input. Given the dilution factors of the Blackwater at this location, it is concluded that potential negative impacts to Pearl Mussel populations are more likely to result from other localised pressures (industrial flows/unidentified sewage point sources/agriculture) which should be addressed before any further upgrades to the plant are considered. The currently controllable aspects of the WWTW (e.g. BOD, Phosphate, Nitrogen) from Primary Discharge SW1 is not considered to be leading to adverse effects to the River Blackwater cSAC/Blackwater Callows SPA. This is also considered to be the case for the trade effluents discharging from SW4.</p> <p>There is, by contrast, a lack of information regarding the potential impacts of endocrine disruptors from the Fermoy WWTW. Elevated concentrations of these chemicals could disrupt the demography of small fish (e.g. minnow) populations in the vicinity of the outfall, with subsequent impacts to bird species which feed upon them.</p> <p>The screening exercise therefore concludes that further assessment relating to endocrine disruptors should be carried out in Stage 2 below. This assessment considers the potential impacts of the discharge with specific reference to the species and/or habitats which may be impacted.</p>

Stage 2 - Project Assessment	
Describe the elements of the plan that are likely to give rise to significant effects on the site	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. In the case of the Fermoy plant, it is concluded that with the adequate level of treatment and the dilution factor in the Blackwater at this location, that the risk of such impacts can be discounted.</p> <p>However, there is an unknown factor relating to impacts to fish populations from endocrine disruptors contained within the WWTW effluent.</p>
Set out the conservation objectives of the site	<p>European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.</p> <p>According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing; and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable as defined below. The favourable conservation status of a species is achieved when population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.</p> <p>The generic conservation objectives of the Blackwater River cSAC are:</p> <ol style="list-style-type: none"> 1. To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status: Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); <i>Salicornia</i> and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330); Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410); Perennial vegetation of stony banks (1220); Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0). 2. To maintain the Annex II species for which the cSAC has been selected at favourable conservation status: Sea Lamprey (<i>Petromyzon marinus</i>); River Lamprey (<i>Lampetra fluviatilis</i>); Brook Lamprey (<i>Lampetra planeri</i>); Twaité Shad (<i>Alosa fallax fallax</i>); Salmon (<i>Salmo salar</i>); Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>); White-clawed Crayfish (<i>Austropotamobius pallipes</i>); Otter (<i>Lutra lutra</i>); Killarney Fern (<i>Trichomanes speciosum</i>) 3. To maintain the extent, species richness and biodiversity of the entire site. 4. To establish effective liaison and co-operation with landowners, legal

	<p>users and relevant authorities.</p> <p>It should be noted that only a sub-sample of these qualifying interests are water-dependent, as identified in the screening process.</p> <p>In terms of the Blackwater Callows SPA, the conservation objectives are set out below:</p> <p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <ul style="list-style-type: none"> • <i>Cygnus cygnus</i> [wintering] • <i>Anas penelope</i> [wintering] • <i>Anas crecca</i> [wintering] • <i>Limosa limosa</i> [wintering] <p>The Kingfisher <i>Alcedo atthis</i> is not listed as Special Conservation Interest for the site, but is listed on Annex I of the Birds Directive and its presence contributes to the overall biodiversity of the cSAC/SPA. Impacts to this species would be considered in contravention of Objective 3 of the cSAC/SPA.</p>
<p>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Fermoy WWTW is a potential negative impact to small fish species which form a key diet resource for predators in the vicinity of Fermoy.</p> <p>Endocrine disruption is the disturbance, by natural hormones or xenobiotics present in either the habitat or the diet of the fish, of the normal hormonal mechanisms within the fish. This disruption is associated with many different mechanisms, one of which involves binding xenobiotics to the androgen and oestrogen receptors, evoking physiological responses within the fish. As the major functions of oestrogens and androgens are in sex determination, sexual differentiation, and sexual development, many of the effects of EDCs are associated with the reproductive health of fish.</p> <p>EDCs can affect the endocrine system of fish in several ways; they can disrupt the hypothalamic and pituitary function, reproductive function, eggs embryos, larvae and juvenile fish, liver function and thyroid and inter-renal function.</p> <p>The effects of EDCs on fish include reduced plasma sex steroid concentrations, reduced pituitary gonadotrophin concentrations, decreased gonadal size, decreased fecundity with age, impaired male maturation, absence of secondary sexual characteristics in males, intersex, induced vitellogenesis in juveniles and males, changes in gonad morphology and increased liver size. 'Intersex' specimens, containing tissue of neither male nor female gender may start to appear in a population. Where vitellogenesis occurs to a significant degree, population demography may shift inexorably towards a female bias. This in turn can lead to population collapse. Such impacts are however, likely to be very limited in extent spatially when considered in large-scale river systems.</p>

<p>Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the project or plan (e.g. loss of habitat, disturbance, disruption, chemical changes, hydrological changes etc).</p>	<p>Localised collapse in a small fish (e.g. minnow) population would have significant implications for a specialised predator such as the Kingfisher. It may be predicted that prolonged exposure to endocrine disruptors could cause such a collapse. This in turn could lead to localised extinction of Kingfishers along a territory stretch of the Blackwater. This would be a contravention of one of the key conservation objectives of the site.</p>
<p>Describe mitigation measures that are to be introduced to avoid, reduce or remedy the adverse effects on the integrity of the site</p>	<p>As there is a paucity of data regarding the input of endocrine-disrupting chemicals in the Fermoy discharge, it is proposed that a baseline will need to be established in the vicinity of the WWTW to allow future monitoring of any changes in fish population density and demography.</p> <p>It is therefore proposed that as part of the Fermoy WWTW licence application that a programme for monitoring be put in place. This would require seasonal sampling of the Blackwater downstream of Fermoy, investigating the population biology of a test species, ideally minnow (<i>Phoxinus phoxinus</i>).</p> <p>Fish sampling would be carried out via electrofishing on a maximum of 6 occasions, spread across 18 months. Specimens collected would be sexed and released, with a defined fraction of the sample being euthanized and samples taken for lab testing. Tests would include assessments for degree of vitellogenesis and presence of intersex tissue. A control site would also be sampled upstream of the WWTW discharge, with care being taken to identify a site with relatively equal exposure to other water quality pressures from Fermoy town.</p> <p>Such a sampling regime is however dependent on the logistics of establishing a monitoring programme at this location. Cork Co Co has noted that there are notable Health & Safety concerns related to sampling downstream of Fermoy. The river is very steeply banked and has no readily accessible shallows. The aforementioned fish collection may therefore require boat access for sampling. Consultation between Cork Co Co, Fermoy Town Council, the EPA and Inland Fisheries Ireland should be carried out prior to the initiation of the proposed sampling programme to ensure all logistic concerns are addressed. If said Health & Safety concerns cannot be addressed satisfactorily, then an alternative methodology should be proposed.</p> <p>Once this baseline has been established, it will subsequently be possible to establish the degree of influence of endocrine disruptors in the vicinity of Fermoy WWTW and if necessary, make provision for further mitigation measures.</p> <p>On May 3rd 2011, the plant was taken in charge by Northumbrian Water on an operational contract from Cork County Council. A suite of alarms have been established at the plant to facilitate rapid responses to functional issues if and when they arise. The employment of a private contractor at the plant should theoretically reduce the risk of plant malfunction and the release of polluting material to the Blackwater.</p>

<p>Conclusion</p>	<p>At present, there is no evidence of endocrine disruptor impacts in the Blackwater, though no specific studies have been carried out to date. Two other Cork rivers (Lee and Bandon) have been studied with little substantiation for such concerns.</p> <p>However, applying the precautionary principle, it is proposed to initiate a monitoring programme on a selected species of fish (ideally minnow) in the environs of Fermoy to establish a baseline from where any future evidence of such impacts can be assessed.</p> <p>With this monitoring in place, it is considered that any potential significant negative effects upon the integrity of the cSAC/SPA can be readily identified and addressed in the near future if required.</p> <p>The main aspects (BOD, SS, COD, P & N) of the main SW1 discharge and the Chloride component of SW4 are not considered to be a significant risk to the cSAC/SPA.</p>
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